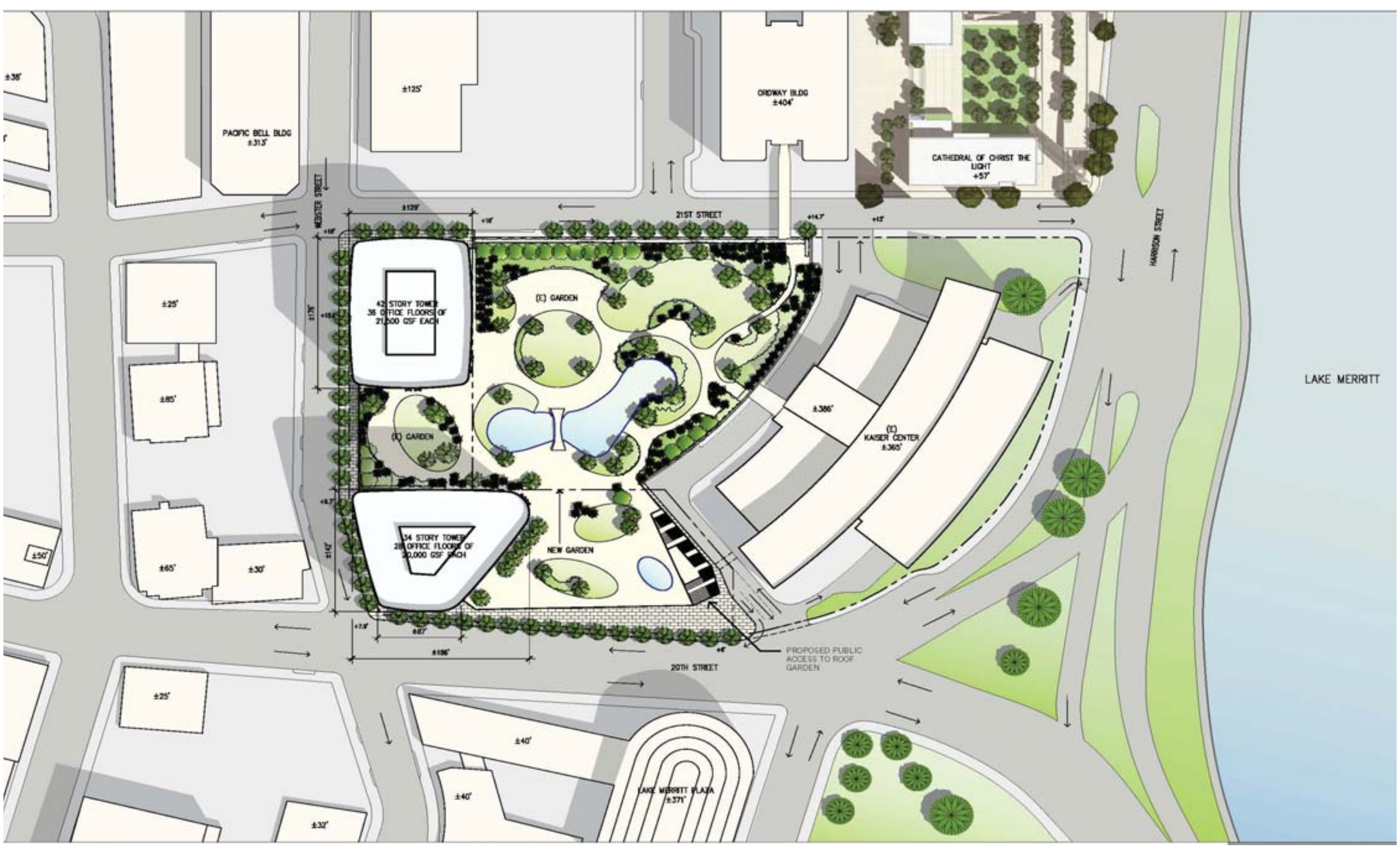
KAISER CENTER OFFICE PROJECT

Draft Environmental Impact Report
SCH No. 2008052103

Prepared for
The City of Oakland

August 2010

ESA



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COMBINED NOTICE OF AVAILABILITY AND RELEASE OF A DRAFT ENVIRONMENTAL IMPACT REPORT (DEIR) AND NOTICE OF PUBLIC HEARINGS ON THE DEIR FOR THE KAISER CENTER OFFICE PROJECT

TO:	All Interested Parties
PROJECT NAME:	Kaiser Center Office Project
PROJECT LOCATION:	300 Lakeside Drive, Oakland, CA 94612
PROJECT SPONSOR:	The Swig Company as "Project Applicant" on behalf of its affiliate, SIC-Lakeside Drive. LLC, the Property Owner
CASE FILE NO:	ER 08-003, PUD 08-103, TPM 9848; CEQA State Clearinghouse No. 2008052103
REVIEW PERIOD:	**August 23, 2010 through October 7, 2010**

PROJECT LOCATION: The Proposed Project would redevelop approximately 2.2 acres at the westernmost portion of the 7.2-acre Kaiser Center property ("Project Site"). The Proposed Project is located at the northeast corner of Webster and 21st Streets and the southeast corner of Webster and 20th Streets in the vicinity of downtown Oakland. The Project Site is bounded by Webster Street to the west, 20th Street to the south, Harrison Street to the east, and 21st Street to the north. The site is a portion of a larger parcel identified as Assessor Parcel Number 008-0652-001-05 and includes the 5-story Kaiser Center Parking Garage, roof garden, the Webster Street Mall, and the 29th Street Mall. The existing 29-story Kaiser Center office tower at the eastern side of the Project Site is not a part of the Proposed Project and would not be altered or affected by the Proposed Project. The Project Site is not on the Cortese List.

PROJECT DESCRIPTION: The Proposed Project includes without limitation a Vesting Tentative Parcel Map, Planned Unit Development Permit, and a Preliminary Development Plan to add two new office towers to a portion of the existing 7.2 acre Kaiser Center site. The Project would add approximately 1,474,992 square feet of net new development in two development phases. Phase I would demolish the existing 20th Street Mall (approximately 58,190 square feet) and construct a 34-story (469 feet tall) office tower (approximately 641,972 square feet) at the corner of 20th/Webster Streets. The existing 122,606 square foot roof garden will be partially demolished (removing approximately 18,369 square feet) and replaced/reconfigured with 22,933 square feet along 20th Street, resulting in an additional 4,564 square feet of roof garden space. Phase II includes the demolition of the Webster Street Mall (approximately 38,190 square feet) and construction of a 42-story (573 feet tall) office tower (approximately 833,020 square feet) at the corner of Webster/21st Street. This project also includes the addition of 697 parking spaces in a subterranean and above ground parking garage.

The Project Site is within the Central Business District land use designation indentified in the Oakland General Plan. The zoning on the Project Site at the time the Project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone[1]. The Project Site is also located within the Lake Merritt Historic District.

ENVIRONMENTAL REVIEW: The City issued a Notice of Preparation (NOP) of a DEIR on May 22, 2008. A DEIR now has been prepared for the Project, under the requirements of the California Environmental Quality Act (CEQA), pursuant to Public Resources Code Section 21000 et.seq.

The DEIR analyzes potentially significant environmental impacts in the following categories: Aesthetics, Shadow and Wind; Air Quality and Greenhouse Gases; Biological Resources; Cultural Resources; Geology, Soils, and Seismicity; Hazardous Materials; Hydrology and Water Quality; Land Uses, Plans, and Policies; Noise and Vibration; Population, Employment, and Housing; Public Services and Recreation; Transportation and Circulation; and Utilities and Services Systems.

The DEIR identifies significant and unavoidable impacts related to Wind Hazards, Air Quality (PM10 emissions), Historic Resources; Noise (related to Traffic), and Transportation (intersection/roadway) impacts.

Copies of the DEIR are available for review or distribution to interested parties at no charge at the Community and Economic Development Agency, Planning Division, 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, CA 94612, Monday through Friday, 8:30 a.m. to 5:00 p.m. The DEIR may also be reviewed at the following website: http://www2.oaklandnet.com/Government/o/CEDA/o/PlanningZoning/s/Application/DOWD009157. This project is document number 10.

PUBLIC HEARINGS ON DEIR:

1. The Oakland City Planning Commission will conduct a public hearing on the DEIR on **October 6, 2010 , at 6:00 p.m.** in Hearing Room 1, City Hall, 1 Frank H. Ogawa Plaza; and

2. The Oakland Landmarks Preservation Advisory Board will conduct a public hearing on the historic resource aspect of the DEIR on **October 4, 2010 , at 6:00 p.m.** in Hearing Room 1, City Hall, 1 Frank H. Ogawa Plaza.

The City of Oakland is hereby releasing this DEIR, finding it to be accurate and complete and ready for public review. Members of the public are invited to comment on the DEIR. There is no fee for commenting, and all comments received will be considered by the City prior to finalizing the EIR and making a decision on the Project. In light of the EIR's purpose to provide useful and accurate information about such factors, comments on the DEIR should focus on the sufficiency of the DEIR in discussing possible impacts on the physical environment, ways in which potential adverse effects might be minimized, and alternatives to the Project. Comments may be made at the public hearing described above or in writing. Please address all written comments to: Heather Klein and Darin Ranelletti, City of Oakland, Community and Economic Development Agency, Major Projects, Planning Division, 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, CA 94612; (510) 238-3658 (fax); or emailed to hklein@oaklandnet.com and dranelletti@oaklandnet.com. Comments should be received no later than **4:00 p.m. on October 7, 2010**. Please reference case number ER 08-003 in all correspondence.

If you challenge the EIR or Project in court, you may be limited to raising only those issues raised at the Planning Commission public hearing described above, or in written correspondence received by the Community and Economic Development Agency on or prior to 4:00 p.m. on **October 7, 2010**.

[1] Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial. However, pursuant to Section 6 of the rezoning ordinance, the Proposed Project is "grandfathered" under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such.

After all comments are received, a Response to Comments/Final EIR will be prepared and the Planning Commission will consider certification of the Final EIR and render a decision on the Project at a meeting date to be scheduled. For further information, please contact Heather Klein **at (510) 238-3659 or at hklein@oaklandnet.com or Darin Ranelletti at (510)238-3663 or at dranelletti@oaklandnet.com**.

ERIC ANGSTADT
Deputy Director, Community and Economic Development Agency

Date of Notice: **August 19, 2010**
File Number ER 08-003

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LIST OF ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACCWP	Alameda Countywide Clean Water Program
ACDEH	Alameda County Department of Environmental Health
ACFD	Alameda County Fire Department
AC Transit	Alameda County Transit
ACM	asbestos-containing materials
ASCE	American Society of Civil Engineers
AST	aboveground storage tank
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BCDC	Bay Conservation and Development Commission
BMPs	Best Management Practices
C&D	construction and demolition
Cal EPA	California Environmental Protection Agency
CALGreen	A building code requirement pursuant to Title 24 of the CCR, proposed to take effect January 2011
Cal/OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CAPCOA	California Air Pollution Control Officers Association
CAR	Climate Action Reserve
CARB	California Air Resources Board
CBC	California Building Code
CBD	Central Business District
CCAA	California Clean Air Act
CCAR	California Climate Action Registry
CCC	California Coastal Commission
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CEC	California Energy Commission

CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFCs	chlorofluorocarbons
CFR	Code of Federal Regulations
CGS	California Geological Survey
CH_4	methane
CHP	California Highway Patrol
CHP	combined heat and power
CIWMB	California Integrated Waste Management Board
CMA	Congestion Management Agency
C.M.S.	City Manager Series, City of Oakland Municipal Code reference
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
CPUC	California Public Utilities Commission
CRT	Climate Reserve Tons
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
Corps	U.S. Army Corps of Engineers
DA	Development Agreement
dB	decibels
dBA	decibels, A-weighted
DDT	dichloro-diphenyl-trichloroethane
DEIR	Draft Environmental Impact Report
DHS	Department of Health Services
DNL	Day/Night Average Sound Level
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DSOD	California Division of Safety of Dams
DTSC	California Department of Toxic Substances Control
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utilities District
EBRPD	East Bay Regional Parks District
EFH	Essential Fish Habitat

EIR	Environmental Impact Report
FAA	Federal Aviation Adminisrtation
FCAA	Federal Clean Air Act
FCWCD	(Alameda County) Flood Control and Water Conservation District
FDDC	Oakland Fire Department Dispatch Center
FDP	Final Development Plan
Fed/OSHA	Federal (U.S. Department of Labor) Occupational Safety and Health Administration
FEIR	Final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FHWA	Federal Highway Administration
FIP	Federal Implementation Plan
FIRM	Flood Insurance Rate Mapping
FMP	Federal Fisheries Management Plans
g	acceleration of gravity
GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
GWP	global warming potential
HABS	Historic American Buildings Survey
HALS	Historic American Landscape Survey
HAP	hazardous air pollutants
HFCs	hydrofluorocarbons
HMBP	Hazardous Materials Business Plan
HMMP	Hazardous Materials Management Plan
HPE	Historic Preservation Element
Hz	hertz
IBC	International Building Code
IEPR	Integrated Energy Policy Report
kW	kilowatt
lb	pound
LCFS	low carbon fuel standard
LEED	Leadership in Energy and Environmental Design
LEED AP	LEED Accredited Professional
LPAB	Landmarks Preservation Advisory Board
LUTE	Land Use and Transportation Element of the City of Oakland General Plan
$\mu g/m^3$	micrograms per cubic meter

M	magnitude
mgd	million gallons per day
MM	Modified Mercalli intensity scale
MMRP	Mitigation Monitoring and Reporting Program
mph	miles per hour
MRP	Municipal Regional Permit
MSDS	Material Safety Data Sheet
msf	million square foot
MT	metric tons
MTC	Metropolitan Transportation Commission
Mw	moment magnitude
MW-hr	megawatt hour
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
O_3	ozone
ODP	Operational Diversion Plan
OES	State Office of Emergency Services
OMC	Oakland Municipal Code
OPR	Governor's Office of Planning and Research
OSCAR	Open Space, Conservation, and Recreation Element of the Oakland General Plan
OUSD	Oakland Unified School District
Pb	lead
PCB	polychlorinated biphenyls
PDP	Preliminary Development Plan
pga	peak ground acceleration
PG&E	Pacific Gas and Electric
$PM_{10;\ 2.5}$	particulate matter less than 10 microns; less than 2.5 microns
ppb	parts per billion
ppm	parts per million
psi	pounds per square inch

PUD	Planned Unit Development
RCRA	Resource Conservation and Recovery Act of 1976
RMP	Risk Management Plan
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SAB	State Allocation Board
SB	Senate Bill
SCA, SCAs	Standard Condition of Approval, Standard Conditions of Approval
SDC	Seismic Design Category
SDWA	Safe Drinking Water Act
SIP	State Implementation Plan
SOV	single occupant vehicle
SPCCP	Spill Prevention, Control and Countermeasure Plan for ASTs
SQMP	Stormwater Quality Management Plan
SRI	solar reflection index
SRRE	Source Reduction and Recycling Element
SU	Significant Unavoidable Impact
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminants
TDM	Transportation Demand Management
TMDL	Total Maximum Daily Load
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGBC	United States Green Building Council
USGS	United States Geological Survey
UST	underground storage tank
VOC	volatile organic compounds
VMT	vehicle miles travelled
VTM	vesting tentative map
WMAC	Waste Management of Alameda County
WRRP	Waste Reduction and Recycling Plan
WSA	Water Supply Assessment
WSMP	Water Supply Management Program
ZNE	zero net energy

CHAPTER I
Introduction

A. Project Overview

In March 2008, The Swig Company LLC ("Project Applicant"), on behalf of the property owner, SIC-Lakeside Drive, LLC, an affiliate of the Project Applicant, submitted a development application to the City of Oakland for the Kaiser Center Office Project ("Proposed Project" or "Project") located near Lake Merritt in Oakland, Alameda County, California. (See **Figure III-1, Regional and Site Location Map**, in Chapter III, Project Description.) The Proposed Project would redevelop approximately 2.2 acres at the westernmost portion of the 7.2-acre Kaiser Center property ("Project Site"). Development of the Proposed Project would occur at the northeast corner of Webster and 20th Streets northeast of downtown Oakland.

The Project Site is currently occupied by the 29-story (365-foot tall) Kaiser Center office building at Harrison and Webster streets; the 20th Street Mall, a three-story retail/office building fronting 20th Street and Webster Street; the approximately three-story Webster Street Mall, which is currently occupied by 24 Hour Fitness Health Club and a portion of the parking garage; and a roof garden that is accessible to visitors to the Kaiser Center during business hours. The Proposed Project would affect only the 20th Street Mall, the Webster Street Mall and the roof garden – which occupy approximately 2.2 acres at the westernmost area of the Project Site. The existing Kaiser Center office building, which is located on the eastern side of the Project Site, would not be altered as part of the Proposed Project and will not be physically affected by the Proposed Project.

Overall, the Proposed Project would demolish approximately 280,002 square feet (sf) of office and commercial/retail uses and construct approximately 1.47 million square feet (msf) of office and commercial/retail uses in two new high-rise towers. The Proposed Project would demolish the existing 20th Street Mall and Webster Street Mall buildings, along with a portion of the roof garden, which would be replaced. The first tower to be constructed would be 34 stories in height and replace the existing 20th Street Mall. The second tower to be constructed would be 42 stories in height and replace the Webster Street Mall . Both towers would be primarily for office use and would also include street level retail spaces and other commercial uses (e.g, restaurants) on the 6th floor.

The Proposed Project would relocate approximately 18,369 square feet of the northwest portion of the existing 122,606 square foot (total) roof garden (which is existing private open space accessible by visitors to the Kaiser Center located at the same level as the proposed 6th floor level of the new high-rise towers) to the southern portion of the site, which would result in a net increase of the roof garden by approximately 4,500 square feet. The Proposed Project would also construct a new exterior "grand stairway" from 20th Street to the roof garden.

The Proposed Project would subdivide the entire Project Site from one existing legal parcel into four legal parcels although no physical changes are proposed to the eastern portion of the Project Site containing the existing office tower. (See Figure III-4, Proposed Vesting Tentative Parcel Map, in Chapter III, Project Description.)

The Project Site is within the Central Business District land use designation indentified in the Oakland General Plan. The zoning on the Project Site at the time the project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone. Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial Zone. However, pursuant to Section 6 of the rezoning ordinance[1], the Proposed Project is "grandfathered" under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such. Notwithstanding the Project's grandfathered status, the land uses proposed by the Project are consistent with the new CBD-C zoning, and based on conceptual Project plans, the Project is generally consistent with the new CBD-C development standards and regulations.

Additionally, the Project Site is located within the Lake Merritt Historic District.

B. Environmental Review

Initiating the Environmental Review Process

Subsequent to receiving and reviewing the Applicant's development application, the City of Oakland Community and Economic Development Agency (CEDA), the Lead Agency for the Proposed Project (pursuant to State and local guidelines for implementing California Environmental Quality Act [CEQA]), determined that the Proposed Project was subject to CEQA (Public Resources Code Section 21000, et seq. and Section 15000, et seq.) and the State CEQA *Guidelines* (California Code of Regulations) promulgated thereunder (together "CEQA"). CEDA decided at the outset to prepare an Environmental Impact Report (EIR) for the Proposed Project.

CEDA has prepared this project-level EIR to analyze the potential environmental effects of the Project under CEQA. This EIR addresses all environmental topics identified in the City of Oakland's CEQA Thresholds/Criteria of Significance document; the City elected not to prepare an Initial Study Checklist to reduce the scope of the EIR, as permitted by Section 15060(d) of the CEQA Guidelines.

1 Section 6 of the Oakland Rezoning Ordinance states that the Ordinance shall be effective 30 days from the date of final passage by the City Council, but shall not apply to (a) building/construction related permits already issued and not yet expired; (b) to zoning applications approved by the City and not yet expired, or (c) to zoning applications deemed complete by the City as of the date of final passage. However, zoning applications deemed complete by the City prior to the date of final passage of this Ordinance may be processed under provisions of these Planning Code amendments if the applicant chooses to do so.

EIR Scoping

On May 22, 2008, CEDA issued a Notice of Preparation (NOP) for 30 calendar days to announce its intent to prepare and distribute an EIR for the Kaiser Center Project. The NOP was distributed to governmental agencies, organizations, and persons interested in the Proposed Project. CEDA sent the NOP to agencies with statutory responsibilities in connection with the Proposed Project and requested their input on the scope and content of the environmental information that should be addressed in the EIR. The City of Oakland Landmarks Preservation Advisory Board and the City Planning Commission held Scoping Meetings on June 9, 2008 and June 18, 2008, respectively, to accept comments regarding the scope of the EIR in response to the NOP. The NOP review period ended on June 21, 2008. The NOP and written and oral comments that CEDA received in response to the NOP are included as **Appendix A** to this Draft EIR. This Draft EIR addresses all comments received in response to the NOP that are relevant to environmental issues under CEQA.

Public Review

This Draft EIR is available for public review and comment for the period identified on the notice accompanying this document (45 calendar days). During the public review and comment period, written comments on the Draft EIR may be submitted to CEDA at the address indicated on the notice. Oral comments may be stated at the public hearing on the Draft EIR, which will be held as indicated on the above-referenced notice.

Following the public review and comment period for the Draft EIR, CEDA will prepare responses that address all substantive written and oral comments on the Draft EIR's environmental analyses and received within the specified review period. The responses and any other revisions to the Draft EIR will be prepared as a Responses to Comments document. The Draft EIR and its Appendices, together with the Response to Comments document will constitute a Final EIR (commonly referred to collectively as "EIR") for the Proposed Project.

Use of this EIR

Pursuant to CEQA, this EIR is a public information document prepared for use by governmental agencies and the public to identify and evaluate potential environmental consequences of the Proposed Project, to evaluate and recommend mitigation measures that would substantially lessen or eliminate significant environmental adverse impacts, and to examine a range of feasible alternatives to the Proposed Project. The information contained in this Draft EIR is subject to review and consideration by the City of Oakland (see *Project Review and Approval,* below) and any other responsible agency prior to the City's decision to approve, reject or modify the Proposed Project.

C. Project Review and Approval

The City of Oakland Planning Commission must ultimately certify that it has reviewed and considered the information in the EIR and that the EIR has been completed in conformity with the requirements of CEQA. The Planning Commission must make this determination before any decision can be made regarding the Kaiser Center Project. This EIR identified significant effects that would result from the Proposed Project. Therefore, pursuant to CEQA *Guidelines* Section 15091, no public agency shall approve or carry out a project for which an EIR has been certified which identifies one of more significant effects of the project, unless the public agency makes one or more of the following findings:

1. Changes or alterations have been required in, or incorporated into, the project which avoid or substantially lessen the significant environmental effect as identified in the Final EIR.
2. Such changes or alterations are within the responsibility and jurisdiction of another public agency and not the agency making the finding. Such changes have been adopted by such other agency or can and should be adopted by such agency.
3. Specified economic, legal, social, technological, or other considerations, including provisions of employment opportunities for highly trained workers, make infeasible the mitigation measures or project alternatives identified in the Final EIR.

D. Organization of the Draft EIR

Following this Chapter I, *Introduction*, this Draft EIR is organized as follows:

Chapter II, *Summary*, contains a brief summary of the Proposed Project and allows the reader to easily reference the analysis presented in the Draft EIR. **Table II-1**, Summary of Impacts, Standard Conditions of Approval (SCA), Mitigation Measures, and Residual Impacts, is provided at the end of Chapter II as a reader-friendly reference to each of the environmental effects, proposed mitigation measures and residual environmental impacts after mitigation is implemented, presented by environmental topic. Chapter II also summarizes the analysis of alternatives to the Proposed Project, areas of controversy, and issues to be resolved.

Chapter III, *Project Description***,** describes in detail the Project Site and surroundings, the background and regulatory context of the Proposed Project; Proposed Project characteristics (including anticipated development phasing and entitlements and approvals requested or required), and Project objectives. Chapter III also identifies other agencies that must consider or approve aspects of the Proposed Project.

Chapter IV, *Environmental Setting, Impacts, Standard Conditions of Approval, and Mitigation Measures,* discusses the environmental setting (existing physical conditions and regulatory framework), the environmental impacts of the Project and cumulative conditions that could result from the Proposed Project, and the SCA and mitigation measures that, after implementation, would reduce or eliminate significant impacts.

Chapter V, *Alternatives*, evaluates a reasonable range of alternatives to the Proposed Project and identifies an environmentally superior alternative.

Chapter VI, *Impact Overview and Growth-Inducing Impacts*, summarizes the potentially significant and unavoidable impacts and the cumulative impacts that could result with the Proposed Project, as they are identified throughout Chapter IV. Chapter VI also describes the Proposed Project's potential for inducing growth.

Chapter VII, *Report Preparation*, identifies the authors of the EIR, including City staff and the EIR consultant team. The Project Sponsor and key consultants that provided technical resources for the EIR are also identified in this chapter.

Appendices to the Draft EIR are provided at the end of the document and include the NOP, Responses to the NOP, as well as certain supporting background documents and technical reports used for the impact analyses for specific topics. All reference documents and persons contacted to prepare the EIR analyses are listed at the end of each analysis section (e.g., M. Utilities) in Chapter IV, *Environmental Setting, Impacts, Standard Conditions of Approval and Mitigation Measures*. The appendices to the Draft EIR are available for review by the public at the City of Oakland CEDA, Planning Department-Major Projects, under reference Case Number ER 08-003, located at 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, California 94612.

CHAPTER II
Summary

A. Project Overview

The Swig Company LLC ("Project Applicant"), on behalf of the property owner, SIC-Lakeside Drive, LLC, an affiliate of the Project Applicant, proposes to develop the Kaiser Center Office Project ("Proposed Project" or "Project") located near Lake Merritt in Oakland, Alameda County, California. In March 2008, the Project Applicant submitted a Basic Application for Development Review to the City of Oakland Community and Economic Development Agency (CEDA) describing the proposed actions. After reviewing the application, the City determined that a project-level Environmental Impact Report (EIR) would be the appropriate document to analyze the potential environmental effects of the Proposed Project under the California Environmental Quality Act (CEQA). This EIR addresses all environmental topics identified in the City of Oakland's CEQA Thresholds/Criteria of Significance document.

Site Location

The Proposed Project is located at 300 Lakeside Drive, Oakland, California, on the west side of Lake Merritt, north of downtown Oakland. The Project Site is 7.2 acres bounded by Harrison Avenue on the east, 20th Street on the south, Webster Street on the west, and 21st Street on the north. The Assessor's Parcel Number (APN) for the Project Site is 008-0652-001-05.

The Project Site consists of the 29-story Kaiser Center office tower on the east side of the site and associated 4-level parking garage on the north side and center of the site, the roof garden (on top of the parking garage) in the center of the site, and the 20th Street Mall and Webster Street Mall located on the west side of the site. The Proposed Project affects only the 20th Street Mall, the Webster Street Mall and a relatively minor portion of the roof garden – a total of approximately 2.2 acres at the westernmost area of the 7.2-acre Project Site.[1]

The Project Site is within the Central Business District land use designation indentified in the Oakland General Plan. The zoning on the Project Site at the time the project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17

1 For clarity in this EIR, "Project Site" refers to the entire 7.2-acre site; the "Proposed Project" refers only to the two mall buildings and roof garden in the central and western portions of the site that will be physically affected by the Proposed Project.

Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone[2]. The Project Site is also located within the Lake Merritt Historic District.

Land uses surrounding the Project Site include high-rise office/commercial buildings similar to that proposed by the Project and that exist on the eastern portion of the site that will not be altered, retail stores at street level, and high-density residential dwellings. Lake Merritt and Lake Merritt Park are located to the east of the Project Site.

Key Components of the Project and Phasing

The Proposed Project would demolish approximately 280,002 square feet (sf) of office and commercial/retail uses and construct approximately 1.47 million square feet (msf) of office and commercial/retail uses in two high-rise towers.

The Proposed Project would be constructed in two phases. The first phase would construct the 34-story South Tower (replacing the existing 20th Street Mall building) and additional roof garden space adjacent to the existing garden, and stairs accessible by visitors to the Kaiser Center to the expanded roof garden space from 20th Street. Demolition and construction activities for the first phase of the Proposed Project would occur for approximately three to four years following approval of the final development plan for the first phase. Occupancy of the South Tower is anticipated to occur approximately at the middle of the fifth year.

The second phase would construct the 42-story North Tower (replacing the existing Webster Street Mall building) and remove and replace a portion of the roof garden. Demolition and construction activities for the second phase of the Proposed Project are projected to begin a few months after completion of the South Tower, and would continue for approximately three to four years. Occupancy of the North Tower is anticipated to occur approximately at the end of the fourth year after the start of construction of the North Tower, or, in other words, approximately in the middle of the eighth year after demolition and construction begins on the South Tower.

Public Agency Approvals

This EIR is intended to be used to provide CEQA clearance for all required discretionary actions for the Proposed Project. The Planning Commission will make decisions on the required discretionary actions. At the time this EIR was prepared, the discretionary actions and other considerations and approvals anticipated to be required for the Proposed Project include those listed below, without limitation.

- **Preliminary Development Plan (PDP), Final Development Plans (FDPs) and Design Review for a Planned Unit Development (PUD)** (Oakland Planning Code Chapter17.140)
- **Vesting Tentative Parcel Map (VTM)** (Oakland Municipal Code Title 16)

[2] Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial. However, pursuant to Section 6 of the rezoning ordinance, the Proposed Project is "grandfathered" under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such.

- **Tree Removal Permit** (Oakland Municipal Code Chapter 12.36)
- **Encroachment Permits** (Oakland Municipal Code Chapter 12.08)
- **Demolition Permits** (Oakland Municipal Code Chapter 15.36)
- **Excavation Permits** (Oakland Municipal Code Chapter 12.12)
- **Public Right-of-Way (P)-Job Permit** (Oakland Municipal Code Chapter 12.20)
- **Other Various Building Permits** (Oakland Municipal Code Title 15)
- **Development Agreement** (Oakland Municipal Code Chapter 17.138). At the time of publication of this Draft EIR, Applicant has not elected to seek approval of a development Agreement with the City, but Applicant reserves the right to do so.

B. Environmental Impacts, Standard Conditions of Approval and Mitigation Measures

Table II-1, Summary of Impacts, Standard Conditions of Approval, Mitigation Measures, and Residual Impacts, is included at the end of this chapter. Table II-1 includes all impact statements, SCAs, recommended mitigation measures, and the level of significance of the impact after SCAs and recommended mitigation measures are implemented. Table II-1 also identifies Recommended Conditions and Project-Specific Conditions of Approval (discussed below).

The Proposed Project will result in significant and unavoidable project-level impacts associated with wind hazards, air quality (PM-10 emissions), historic resources, traffic noise, and traffic. The Proposed Project combined with cumulative development will result in significant and unavoidable cumulative impacts associated with wind hazards, air quality (PM-10 emissions), greenhouse gas emissions, and traffic. Except for the historic resources and wind hazards impacts, each of these impacts is considered significant and unavoidable because the impacts cannot be reduced to less than significant levels even with SCAs and feasible mitigation measures applied. Cultural resources impacts have been conservatively deemed significant and unavoidable because the Proposed Project does not yet incorporate specific design detail to determine review and evaluation for adherence to established standards, such as the Secretary of Interior's Standards for Treatment of Historic Properties. Similarly, wind impacts are conservatively deemed significant and unavoidable because potentially mitigating design features have not been fully tested with the wind model to determine if those designs features would reduce the excessive wind speeds to below the threshold.

Recommended Conditions and Project-Specific Conditions of Approval

Although not required by CEQA, certain "Recommended Conditions" are included the *Transportation and Circulation* section of this EIR with respect to certain improvements that are not necessary to address or mitigate any environmental impacts of the Project but nevertheless are recommended herein by City Staff. These recommendations will be considered by decision makers during the course of Project review and may be imposed as Project-Specific Conditions of Approval.

Other "Project-Specific Conditions of Approval" supplement SCAs and are specific to the Project as they are identified in technical studies or reports prepared for the Project. Project-Specific Conditions of Approval are identified in the *Geology, Soils and Geohazards* and the Public *Services and Recreation Facilities* sections of this EIR, as well as in Table II-1t.

C. Alternatives

Chapter V, Alternatives, presents the analysis of the following reasonable range of alternatives to the Proposed Project:

- **No Project/No Build Alternative** – No change to existing conditions, which would remain consistent with the existing environmental setting described in this EIR.
- **Alternative 1: South Tower Build Only**– This alternative would construct only the proposed South Tower, generally as described for Phase I of the Proposed Project. The 42-story North Tower would not be built. This alternative would include 552,000 square feet of office space and 46,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative, as with the Project.
- **Alternative 2: Onsite Maximum Reduced Impacts** – This Alternative would be similar to Alternative 1 in that only the South Tower would be constructed. However, in order to reduce the maximum number of SU impacts that occur on the Project Site, the size of the South Tower is reduced from 34 stories (Proposed Project) to 11 stories. The South Tower would have 222,000 square feet of office space and 46,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative as with the Project.
- **Alternative 3: Offsite Maximum Reduced Impacts** – This alternative would construct a 268,000 square foot office tower at an offsite location immediately north of the Project Site. The total floor area is the same as Alternative 2, however no commercial/retail area would be developed, primarily due to the limited street frontage available along the site. This Alternative is intended to avoid most of the impacts identified with the Proposed Project by avoiding SU historic resources and roof garden level wind hazards impacts. The offsite location, which is currently a 1-acre private pay parking lot bounded by 21st Street on the south, an existing 11-story commercial office building that fronts Webster Street on the west, 22nd Street on the north, and Kaiser Plaza Street on the east. Under this alternative, Kaiser Center would remain in its current state, with no improvements or demolition of existing facilities.

The No Project/No Build Alternative is considered the environmentally superior alternative in the strictest sense that environmental impacts associated with the Proposed Project's implementation would avoid all of the significant impacts identified with the Proposed Project. However, the No Project/No Build Alternative would fail to achieve any of the Project's Objectives.

Alternative 3, Offsite Maximum Reduced Impacts, has generally the same development program designed to avoid as many of the significant impacts of the Project. Alternative 3 would avoid the significant cultural resources and roof garden wind hazards impacts which are specific to the Kaiser Center Site and that occur with Alternative 2, Onsite Maximum Reduced Impacts. Although Alternative 3 would avoid the significant wind hazards impact that would occur at the roof garden (as Alternative 3 does not include a roof garden), the significant wind hazards at ground level identified with the Project is conservatively considered also to potentially occur with Alternative 3. Therefore, Alternative 3 is the Environmentally Superior Alternative.

D. Areas of Controversy

No areas of controversy are known to the City of Oakland as of publication of this Draft EIR. While not controversial, the following scoping topics were raised in written or oral comments received in response to the Notice of Preparation (NOP) of this EIR. This summary list is compiled based on written comments received (which are included in Appendix A to this EIR) and comments stated during the City's scoping meetings held by the Landmarks Preservation Advisory Board and then the Oakland Planning Commission. Each of these topics is addressed in this Draft EIR.

- **Aesthetics, Shadow and Wind**
  - Wind and shadow studies to show effects on roof garden.
  - Light and glare
  - Views from downtown, Lake Merritt, skyline
- **Air Quality**
  - BAAQMD attainment status
  - Evaluations of the Project's construction, operational, and cumulative air quality impacts.
  - Toxic air contaminants
  - Project's energy demand
  - LEED or sustainable construction methods
  - Greenhouse gas emissions (AB32).
  - Dust emissions from construction activities on roof garden and Lake Merritt open space areas.
- **Cultural Resources**
  - Conduct a cultural resources records search, prepare archaeological inventory survey if needed, contact Native American Heritage Commission, and include appropriate mitigation for unknown archaeological finds.
  - Responsible treatment of historic roof garden.
- **Land Use, Plans and Policies**
  - Access to open space areas
- **Noise**
  - Noise from traffic
- **Population and Housing**
  - Business relocation
- **Traffic, Transportation, and Circulation and Parking**
  - Address bicycle and pedestrian circulation
  - Reduce or eliminate additional automobile parking
  - Use of Alameda County Congestion Management Agency Countywide traffic model.

- Discuss Project impacts on public transit systems.
- Proximity to and effects on BART station
- Reduction in greenhouse gas emissions due to BART use.
- Prepare traffic impact study.
- Use of Traffic Demand Models
- Measure DD program
- Changes to the "Y" driveway at 20th and Harrison.
- Key traffic intersections.

• **Utilities, and Service Systems and Energy**
  - Water supply and conservation measures
  - Adequate wastewater capacity.

TABLE II-1
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.A Aesthetics, Wind, and Shadow		
Impact AES-1: The Proposed Project would not adversely affect a scenic vista or substantially damage scenic resources. (Less than Significant)	None Required	
Impact AES-2: The Proposed Project would alter the existing visual conditions on the Project Site, but would not substantially degrade the existing visual character or quality of the site and its surroundings. (Less than Significant)	None Required	
Impact AES-3: The Proposed Project would create a new source light or glare, but would not adversely affect day or nighttime views in the area. (Less than Significant)	Standard Condition of Approval AES-1, *Lighting Plan* Standard Condition of Approval BIO-5, *Bird Collision Reduction*	Less than Significant
Impact AES-4: The Proposed Project would result in additional shadow on adjacent areas. However, it would not cast shadow that would substantially impair the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; would not cast shadow that would substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space; and would not cast shadow on a historic resource. (Less than Significant)	None Required	
Impact AES-5: The Proposed Project would be consistent with the policies and regulations addressing the provision of adequate light related to appropriate uses. (Less than Significant)	None Required	
Impact AES-6: The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. (Potentially Significant)	**Mitigation Measure AES-1**: At the time of submittal of the Final Development Plan, the Applicant shall develop and, at the time of construction pursuant to the Final Development Plan, the Applicant shall implement a wind reduction plan that reduces wind hazards at the street level and roof garden to the maximum feasible extent, subject to review and approval by the City. The wind reduction plan shall include the results of wind tunnel testing for hazardous wind speeds of the Project conducted on the Project consistent with the Final Development Plan. The wind reduction plan shall include, but not be limited to, structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. Examples of these measures include tree plantings, dense bamboo planting, arbors, canopies and lattice fencing. The Applicant shall develop the wind reduction plan in coordination with the required landscape plan for the roof garden and be submitted to the City's Landmarks Preservation Advisory Board (LPAB) for review and recommendation to the Planning Commission, consistent with Mitigation Measure CUL -2.1 Historically-Sensitive Roof Garden Design. The LPAB will make advisory recommendations to the Planning	**Conservatively Deemed Significant and Unavoidable**

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.A Aesthetics, Wind, and Shadow (cont.)		
Impact AES-6 (cont.)	Commission for its approval as part of its approval of the Final Development Plan, and the Applicant shall implement the approved wind reduction plan. However, implementation of the measures cannot determine if these design features will be effective in reducing this impact to a less than significant impact until they are in place.	
Impact AES-7: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to wind hazards at the roof garden (Potentially Significant)	**Aesthetics, Light and Shadow**: None Required **Wind** **Mitigation Measure AES-2:** Implement Mitigation Measure AES-1.	Aesthetics, Light, and Shadow: Less than Significant Wind: **Conservatively Deemed Significant and Unavoidable**
IV.B Air Quality		
Impact AIR-1: Construction and demolition activities associated with new development under the Proposed Project would generate short-term emissions of fugitive dust. (Less than Significant)	Standard Condition of Approval AIR-1 *Dust Control Plan* **Mitigation**: None Required.	Less than Significant
Impact AIR-2: Activities associated with demolition, site preparation, and construction throughout development of the Proposed Project would generate emissions of criteria pollutants, including equipment exhaust emissions. (Potentially Significant Phase 2 ROG emissions)	Standard Condition of Approval AIR-2 *Construction Emissions* **Mitigation Measure AIR-1:** To reduce the significant Phase 2 ROG emissions, the Project applicant shall use low VOC architectural coatings. Use of low VOC coatings will reduce ROG emissions to below significance thresholds (37.8 pounds per day).	Less than Significant
Impact AIR-3: The Proposed Project would result in increased emissions of criteria pollutants. (Significant PM_{10} emissions at Buildout)	Standard Condition of Approval TRANS-1 *Transportation Demand Management Plan* **Mitigation:** Not feasible because none available. PM_{10} emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduced vehicle GHG emissions, including PM_{10}, but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions.	**Significant and Unavoidable** PM_{10} emissions.
Impact AIR-4: The Proposed Project would not result in increased emissions of criteria pollutants due to poor ventilation in the Parking Garage. (Less than Significant)	None Required	
Impact AIR-5: The Proposed Project would not contribute to CO concentrations exceeding the State AAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour. (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.B Air Quality (cont.)		
Impact AIR-6: The Proposed Project would not frequently and, for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial number of people, specifically in residential uses, schools, daycare centers, nursing homes, or medical centers. (Less than Significant).	None Required	
Impact AIR-7: The Proposed Project would not generate or expose persons to substantial levels of toxic air contaminants (TACs) or $PM_{2.5}$ concentrations. (Less than Significant)	None Required	
Impact AIR-8: Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. (Significant Operational PM_{10} Emissions)	**Mitigation Measure AIR-2:** Construction: None required. Operations: Not feasible because none available. PM_{10} emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduce vehicle GHG emissions, including PM_{10}, but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions	Construction: Less than Significant. Operations: **Significant and Unavoidable** PM_{10} emissions.
Impact AIR-9: Construction and operation of the Proposed Project would result in a cumulatively considerable increase in GHG emissions. (Potentially Significant)	Standard Condition of Approval TRANS-1, *Parking and Transportation Demand Management*, Standard Condition of Approval UTIL-1 – *Waste Reduction and Recycling* Standard Conditions of Approval *Landscape Requirements and Tree Replacement* Standard Condition of Approval GHG-1- *GHG Reduction Plan* **Mitigation Measure AIR-3**: GHG Reduction Plan: The project applicant shall retain a qualified air quality consultant to develop a GHG Reduction Plan for City review and approval. The applicant shall implement the approved GHG Reduction Plan. The goal of the GHG Reduction Plan shall be to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the Bay Area Quality Management District's (BAAQMD's) CEQA Thresholds of Significance (1,100 metric tons of CO2e per year and 4.6 metric tons of CO2e per year per service population) to help achieve the City's goal of reducing GHG emissions. The GHG Reduction Plan shall	Less than Significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.B Air Quality (cont.)		
Impact AIR-9 (cont.)	include, at a minimum, (a) a detailed GHG emissions inventory for the project under a "business-as-usual" scenario with no consideration of project design features, or other energy efficiencies; (b) an adjusted" baseline GHG emissions inventory for the project, taking into consideration energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements); and (c) a comprehensive set of quantified additional GHG reduction measures available to further reduce GHG emissions beyond the adjusted GHG emissions. If the project is to be constructed in phases, the GHG Reduction Plan shall provide GHG emission scenarios by phase. Potential additional GHG reduction measures to be considered include, but are not be limited to, measures recommended in BAAQMD's latest CEQA Air Quality Guidelines, the California Air Resources Board Scoping Plan (December 2008, as may be revised), the California Air Pollution Control Officers Association (CAPCOA) CEQA and Climate Change Guidance Document (January 2008, as may be revised), the California Attorney General's website, and Reference Guides on Leadership in Energy and Environmental Design (LEED) published by the U.S. Green Building Council. The proposed additional GHG reduction measures must be reviewed and approved by the City. The types of allowable GHG reduction measures include the following (listed in order of City preference): (1) physical design features; (2) operational features; and (3) the payment of fees to fund GHG-reducing programs (i.e., the purchase of "carbon credits"). For proposed reduction measures involving the purchase of carbon credits, the City will give preference to proposed payments to the City to offset the costs associated with implementation of GHG reduction strategies identified in the draft City's Energy and Climate Action Plan (ECAP). The allowable locations of the GHG reduction measures include the following (listed in order of City preference): (1) the project site; (2) off-site within the City of Oakland; (3) off-site within the San Francisco Bay Area Air Basin; and (3) off-site within the State of California. For physical GHG reduction measures to be incorporated into the design of the project, the measures shall be included on the drawings submitted for construction-related permits. For operational GHG reduction measures to be incorporated into the project, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of project completion (or at the completion of the project phase for phased projects).	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.B Air Quality (cont.)		
Impact AIR-9 (cont.)	For physical GHG reduction measures to be incorporated into off-site projects, the measures shall be included on drawings and submitted to the City for review and approval and then installed prior to completion of the subject project (or prior to completion of the project phase for phased projects). For operational GHG reduction measures to be incorporated into off-site projects, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of completion of the subject project (or at the completion of the project phase for phased projects). **For GHG reduction measures involving the purchase of carbon credits (either to fund GHG-reducing activities identified in the draft ECAP or to fund non-ECAP GHG-reducing activities), evidence of the payment/purchase shall be submitted to the City for review and approval prior to completion of the subject project (or prior to completion of the project phase for phased projects).**	
Impact AIR-10: The Proposed Project would conflict with an applicable plan, policy or regulation of an appropriate regulatory agency adopted for the purpose of reducing greenhouse gas emissions (Potentially Significant)	Standard Condition of Approval AIR-1 *Dust Control Plan* Standard Condition of Approval AIR-2 *Construction Emissions* **Mitigation Measure AIR-4:** Implement Mitigation Measure AIR-3.	Less than Significant
IV.C Biological Resources		
Impact BIO-1: The Proposed Project would not adversely affect special-status species. (Less than Significant)	None Required	
Impact BIO-2: The Proposed Project would not adversely affect sensitive natural communities. (Less than Significant)	None Required	
Impact BIO-3: The Proposed Project would not adversely affect wetlands. (Less than Significant)	None Required	
Impact BIO-4: Project construction and operations have the potential to affect migratory and breeding birds, and wildlife, corridors, and nursery sites, through building collisions, increases in night lighting, increases in noise pollution due to Project construction, shading of existing habitat, and vegetation removal. (Less than Significant)	Standard Condition of Approval BIO-3 *Tree Replacement Plantings* Standard Condition of Approval BIO-5 *Bird Collision Reduction*	Less than Significant
Impact BIO-5: The Proposed Project would not adversely affect adopted Habitat Conservation Plans. (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.C Biological Resources (cont.)		
Impact BIO-6: The Proposed Project would not adversely affect the City's Tree Preservation or Removal Ordinance. (Less than Significant)	Standard Condition of Approval BIO-1 *Tree Removal During Breeding Season* Standard Condition of Approval BIO-2 *Tree Removal Permit* Standard Condition of Approval BIO-3 *Tree Replacement Plantings* Standard Condition of Approval BIO-4 *Tree Protection During Co*nstruction	Less than Significant
Impact BIO-7: The Proposed Project would not adversely affect the City's Creek Protection Ordinance. (Less than Significant)	Standard Condition of Approval GEO-1 *Erosion and Sedimentation Control Plan* Standard Condition of Approval HAZ-1 *Hazards Best Management Practices* Standard Condition of Approval HYD-1 *Erosion and Sedimentation Control Plan and Standard* Standard Condition of Approval HYD-2 *Stormwater Pollution Prevention Plan* Standard Condition of Approval HYD-3 *Post-Construction Stormwater Pollution Management Plan*	Less than Significant
Impact BIO-8: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in impacts on special-status species, wetlands, and other waters of the U.S. (Less than Significant)	Standard Condition of Approval BIO-1 *Tree Removal During Breeding Season* Standard Condition of Approval BIO-2 *Tree Removal Permit* Standard Condition of Approval BIO-3 *Tree Replacement Plantings* Standard Condition of Approval BIO-4 *Tree Protection During Co*nstruction Standard Condition of Approval BIO-5 *Bird Collision Reduction*	Less than Significant
IV.D Cultural Resources		
Impact CUL-1: The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. (Potentially Significant)	Standard Condition of Approval CUL-4 *Compliance with Policy 3.7 of the Historic Preservation Element (Property Relocation Rather than Demolition)* **Mitigation Measure CUL-1.1.** The Project applicant shall modify the design of the base of the new structures to retain the existing street level design and character, and shall prepare a salvage program.	**Conservatively Deemed Significant and Unavoidable**

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.D Cultural Resources (cont.)		
Impact CUL-1 (cont.)	**Mitigation Measure CUL-1.2.** HABS /HALS Level Recordation: The Project applicant shall complete a recordation of the Kaiser Center which meets the requirements of the National Park Service's Historic American Buildings Survey (HABS) and the Historic American Landscape Survey (HALS). **Mitigation Measure CUL-1.3.** Financial Contributions to a historic resource related program such as the Façade Improvement Program or the Property Relocation Assistance Program: If Mitigation Measure CUL-1.1 is not satisfied, the Project applicants shall make a financial contribution to the City of Oakland, which can be used to fund other historic preservation projects at the Project Site or in the immediate vicinity.	
Impact CUL-2: The proposed new construction would adversely affect remaining portion of the qualified historic resource on the Project Site. (Potentially Significant)	Standard Condition of Approval CUL-5 *Vibration Adjacent to Historic Structures* **Mitigation Measure CUL-2.1.** Historically-Sensitive Roof Garden Design: The Project applicant shall ensure that a qualified Historic Landscape Architect under the Historic Preservation Professional Qualifications Standards familiar with landscape history and historic resources designs a roof garden addition that is differentiated from the old and compatible with the historic design to protect the integrity of the historic roof garden. **Mitigation Measure CUL-2.2. Historically Sensitive Tower Design:** The Proposed Project shall be compatible with, yet clearly differentiated from, the existing Kaiser Center Office Tower. **Mitigation Measure CUL-2.3. Protection During Demolition and Construction:** The Project applicant shall prepare a historic resources protection plan which describes how the resource (both building and landscape) will be protected from vibration, equipment, storage of materials, and dust resulting from demolition and construction activities.	**Conservatively Deemed Significant and Unavoidable**
Impact CUL-3: The Proposed Project Would Have Indirect Shadow Effects on the Historic roof garden (Less than Significant).	None Required	
Impact CUL-4: The Proposed Project Could Affect the Eligibility of the Lake Merritt Historic District (Less than Significant).	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.D Cultural Resources (cont.)		
Impact CUL-5: Construction of the Proposed Project could cause substantial adverse changes to the significance of archaeological resources at the Project Site. Archaeological resources are potentially historical resources as defined in CEQA Section 15064.5(a) or unique archaeological resources as defined in CEQA Section 21083.2(g). (Less than Significant)	Standard Condition of Approval CUL-1 *Archaeological Resources*	Less than Significant
Impact CUL-6: The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant)	Standard Condition of Approval CUL-3 *Paleontological Resources*	Less than Significant
Impact CUL-7: The Proposed Project may adversely affect unidentified human remains at the Project Site. (Less than Significant)	Standard Condition of Approval CUL-2 *Human Remains*	Less than Significant
Impact CUL-8: The Proposed Project Could Have a Cumulative Impact to Historic Architectural Resources (Less than Significant).	None Required	
IV.E Geology, Soils, and Seismicity		
Impact GEO-1: Redevelopment in the Project area could expose people or structures to seismic hazards such as groundshaking or liquefaction. (Less than Significant).	Standard Condition of Approval GEO-4 *Geotechnical Report*	Less than Significant
Impact GEO-2: Redevelopment in the Project area could be subjected to geologic hazards, including expansive soils and differential settlement. (Less than Significant).	Standard Condition of Approval GEO-4 *Geotechnical Report*	Less than Significant
Impact GEO-3: The development proposed as part of the Proposed Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, would not result in significant cumulative impacts with respect to geology, soils or seismicity. (Less than Significant)	Standard Condition of Approval GEO-1 *Erosion and Sedimentation Control Plan* Standard Condition of Approval GEO-2 Vibrations Adjacent to Historic Structures Standard Condition of Approval GEO-3 *Soils Report* Standard Condition of Approval GEO-4 *Geotechnical Report* Project-specific Conditions of Approval to further implement SCA GEO-4: • Structural foundation support may have to be obtained from the competent soil of the Temescal or San Antonio formation located approximately 10 to 20 feet below ground surface. •	Less than Significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.E Geology, Soils, and Seismicity (cont.)		
Impact GEO-3 (cont.)	• Use a rigid mat foundation designed for both short-term elastic settlement during construction and long-term consolidation settlement of the deep clay underlying the site, and/or the use of deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system. • Use tiedown anchors to prevent buoyancy of the building if the proposed structures are not heavy enough to overcome the hydrostatic uplift pressure of the groundwater (Treadwell and Rollo, 2008).	
IV.F Hazardous Materials		
Impact HAZ-1: Demolition of existing structures that contain hazardous building materials, such as lead-based paint, asbestos, and PCBs could expose workers, the public, or the environment to these hazardous materials and would generate hazardous waste. (Less than Significant)	Standard Condition of Approval HAZ-4 *Asbestos Removal in Structures* Standard Condition of Approval HAZ-5 *Lead-Based Paint/ Coatings, Asbestos, or PCB Occurrence Assessment* Standard Condition of Approval HAZ-7 *Lead-based Paint Remediation*	Less than significant
Impact HAZ-2: The Proposed Project would involve the transportation, use, and storage of hazardous chemicals, which could present public health and/or safety risks to facility workers, patients and visitors, and the surrounding area. (Less than Significant)	Standard Condition of Approval HAZ-1 *Hazards Best Management Practices* Standard Condition of Approval HAZ-2 *Site Review By Fire Services Division* Standard Condition of Approval HAZ-3 *Phase I and/or Phase II Reports* Standard Condition of Approval HAZ-4 *Asbestos Removal in Structures* Standard Condition of Approval HAZ-5 *Lead-Based Paint/ Coatings, Asbestos, or PCB Occurrence Assessment* Standard Condition of Approval HAZ-6 *Environmental Site Assessment Remediation* Standard Condition of Approval HAZ-8 *Other Materials Classified as Hazardous Materials* Standard Condition of Approval HAZ-9 *Health and Safety Plan per Assessment* Standard Condition of Approval HAZ-10 *Best Management Practices for Soil and Groundwater Hazards* Standard Condition of Approval HAZ-11 *Hazardous Materials Business Plan*	Less than significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.F Hazardous Materials (cont.)		
Impact HAZ-3: Hazardous materials used onsite during construction activities (i.e. solvents) could be spilled through improper handling or storage, potentially increasing public health and/or safety risks to Kaiser Center workers, patients and visitors, and the surrounding area. (Less than Significant)	Standard Condition of Approval HAZ-1 *Hazards Best Management Practices* Standard Condition of Approval HAZ-2 *Site Review By Fire Services Division* Standard Condition of Approval HAZ-3 *Phase I and/or Phase II Reports* Standard Condition of Approval HAZ-4 *Asbestos Removal in Structures* Standard Condition of Approval HAZ-5 *Lead-Based Paint/ Coatings, Asbestos, or PCB Occurrence Assessment* Standard Condition of Approval HAZ-6 *Environmental Site Assessment Remediation* Standard Condition of Approval HAZ-7 *Lead Based Paint Remediation* Standard Condition of Approval HAZ-8 *Other Materials Classified as Hazardous Materials* Standard Condition of Approval HAZ-9 *Health and Safety Plan* Standard Condition of Approval HAZ-10 *Best Management Practices for Soil and Groundwater Hazards*	Less than Significant
Impact HAZ-4: Hazards at the Project Site could contribute to cumulative hazards in the vicinity of the Project Site. (Less than Significant)	None Required.	
IV.G Hydrology and Water Quality		
Impact HYD-1: Project construction would involve activities (excavation, soil stockpiling, and grading) that could generate loose, erodable soils that could violate water quality standards or waste discharge requirements, result in substantial erosion or siltation, create or constitute substantial polluted runoff, or otherwise substantially degrade water quality. (Less than Significant)	Standard Condition of Approval HYD-1 *Erosion and Sedimentation Control Plan and Standard* Standard Condition of Approval HYD-2 *Stormwater Pollution Prevention Plan*	Less than Significant
Impact HYD-2: Project excavation activities would not deplete groundwater supplies nor substantially interfere with groundwater recharge or cause contaminated groundwater discharge to surface water. (Less than Significant)	None Required	
Impact HYD-3: The Proposed Project would result in new development that could substantially alter existing drainage pattern of the Project Site or the surrounding area (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.G Hydrology and Water Quality (cont.)		
Impact HYD-4: The Proposed Project would not result in a net increase in impervious surfaces and would not cause an increase in the volume of stormwater runoff. The Project would not violate any waste discharge requirements that would create substantial runoff and result in substantial flooding onsite or offsite. The Project would not exceed the capacity of the stormwater drainage system. (Less than Significant)	Standard Condition of Approval HYD-3 *Post-Construction Stormwater Pollution Management Plan* Standard Condition of Approval HYD-4 *Maintenance Agreement for Stormwater Treatment Measures*	Less than Significant
Impact HYD-5: The Proposed Project would not result in flooding due to its proximity to a 100-year flood hazard area, or expose people or structures to other substantial risk related to flooding, seiche, tsunami, or mudflow. (Less than Significant)	None Required	
Impact HYD-6: The increased construction activity and new development resulting from the Proposed Project, in conjunction with past, present, pending and reasonably foreseeable projects in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions (Less than Significant)	None Required	
IV.H Land Use, Plans and Policies		
Impact LU-1: The Proposed Project would redevelop buildings at the Kaiser Center property on the northwest corner of Webster and 20th Streets in Downtown Oakland, but would not result in the physical division of an existing community. (Less than Significant)	None Required	
Impact LU-2: The Proposed Project would not conflict with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effects. (Less than Significant)	None Required	
Impact LU-3: The Proposed Project would not result in a fundamental conflict between adjacent and nearby land uses, particularly with respect to any applicable habitat conservation plan or natural community conservation plan. (Less than Significant)	None Required	
Impact LU-4: The Proposed Project would not result in a significant cumulative land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect from past, present, pending or reasonably foreseeable development. (Less than Significant)	None Required	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.I Noise		
Impact NOI-1: Construction activities associated with the Proposed Project would temporarily generate noise levels that could conflict with standards established in the City noise ordinance. (Less than Significant)	Standard Condition of Approval NOI-1 *Days/Hours of Construction Operation* Standard Condition of Approval NOI-2 *Noise Control* Standard Condition of Approval NOI-3 *Noise Complaint Procedures* Standard Condition of Approval NOI-5 *Pile Driving and Other Extreme Noise Generators* Standard Condition of Approval NOI-6 *Vibration Adjacent to Historic Structures*	Less than Significant
Impact NOI-2: Project operations would increase noise levels in the Project vicinity that could result in the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant)	None Required	
Impact NOI-3: Project traffic could substantially increase traffic noise levels in the Project area. (Less than Significant)	Standard Condition of Approval TRANS-1 *Transportation Demand Management*	Less than Significant
Impact NOI-4: Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. (Potentially Significant)	Standard Condition of Approval TRANS-1 *Transportation Demand Management* Mitigation Measures: Not feasible because none available.	**Significant and Unavoidable**
IV.J Population, Employment, and Housing		
Impact POP-1: The Project would displace existing businesses and jobs, but not in substantial numbers necessitating construction of replacement facilities elsewhere, in excess of that anticipated in the City's General Plan. (Less than Significant)	None Required.	
Impact POP-2: The Project would not induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	None Required.	
Impact POP-3: The Project in combination with other past, present, pending and reasonably foreseeable projects, would not cumulatively induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	None Required.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.K Public Services and Recreation Facilities		
Impact PUB-1: The Project could result in an increase in calls for police protection services, but would not require new or physically altered police facilities in order to maintain acceptable performance objectives. (Less than Significant)	None Required.	
Impact PUB-2: The increased population and density resulting from the Project would not involve or require new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and emergency medical services and facilities. (Less than Significant)	Standard Condition of Approval PUB-*1Conformance with other Requirements* Standard Condition of Approval PUB-2 *Fire Safety Phasing Plan* Project-specific Conditions of Approval: To further implement SCA PUB-2, the Project will incorporate building design elements to enhance fire-fighting and rescue capabilities beyond basic code requirements. Elements would include, but are not limited to, one elevator designed for fire-fighter use and rescue air stations at every fifth floor.	Less than Significant
Impact PUB-3: The Project could result in new students for local schools, but would not require new or physically altered school facilities to maintain acceptable performance objectives. (Less than Significant)	None Required	
Impact PUB-4: The Project could increase the demand for parks, recreational facilities, and library facilities, but would not result in substantial physical deterioration of such facilities or require new or physically altered facilities in order to maintain acceptable performance objectives. (Less than Significant)	None Required	
Impact PUB-5: The Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, could result in cumulative impacts to the provision of public services. (Less than Significant)	None Required.	
IV.L Transportation and Circulation		
Impact TRANS-1a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions (Significant).	**Mitigation Measure TRANS-1a:** Implement the following measures at the Oakland Avenue / Perry Place / I-580 Eastbound Ramps intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. •	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would still be a significant and unavoidable impact under Existing plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-1a (cont.)	• Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and • ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the **approved** plans and improvements.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-1b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (Existing). (Significant)	**Mitigation Measure TRANS-1b:** Implement the following measures at the Harrison Street / 27th Street / 24th Street intersection: • Prohibit westbound left turns from Bay Place (to Harrison Street and 24th Street) during the PM peak hour. • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. • The Project sponsor shall fund, prepare, and install the approved plans and improvements.	**Conservatively Deemed Significant and Unavoidable** If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable. If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Existing plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-1c: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (Existing). (Significant)	**Mitigation Measure TRANS-1c:** Implement the following measures at the Harrison Street / 20th Street / Kaiser Center Access Road intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: – 2070L Type Controller – GPS communication (clock) – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines – Countdown Pedestrian Signals – Full actuation (video detection, pedestrian push buttons, bicycle detection) – Accessible Pedestrian Signals, audible and tactile according to Federal Access – Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet – Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	Less than Significant If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-1d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)	**Mitigation Measure TRANS-1d:** Mitigation Measure TRANS-1d: Implement the following measures at the Oak Street / 5th Street / I-580 Southbound On-Ramp intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-1e: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)	**Mitigation Measure TRANS-1e:** Implement the following measures at the Grand Avenue / El Embarcadero intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing at this intersection with the adjacent intersections in the same coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: – 2070L Type Controller – GPS communication (clock) – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines – City Standard ADA wheelchair ramps – Full actuation (video detection, pedestrian push buttons, bicycle detection) – Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines – Countdown Pedestrian Signals – Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet – Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	Less than Significant If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

<table>
<tr><th>Environmental Impact</th><th>Standard Conditions of Approval and Mitigation Measures</th><th>Level of Significance after application of Standard Conditions of Approval and Mitigation</th></tr>
<tr><td colspan="3">IV.L Transportation and Circulation (cont.)</td></tr>
<tr><td>Impact TRANS-1f: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp) (Existing). (Significant)</td><td>Mitigation Measure TRANS-1f: Mitigation Measure TRANS-1f: Implement the following measures at the Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp intersection:
• Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
• Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.
To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:
• Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
− 2070L Type Controller
− GPS communication (clock)
− Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
− City Standard ADA wheelchair ramps
− Full actuation (video detection, pedestrian push buttons, bicycle detection)
− Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines.
− Countdown Pedestrian Signals
− Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
− Signal timing plans for the signals in the coordination group.
The Project sponsor shall fund, prepare, and install the approved plans and improvements.</td><td>Significant and Unavoidable
If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.</td></tr>
</table>

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-2a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) (Existing). (Significant)	**Mitigation Measure TRANS-2a:** Implement the following measures on Grand Avenue between Harrison Street and El Embarcadero: • Optimize traffic signals (to include determination of allocation of green time for each intersection approach) at intersections along Grand Avenue (i.e., Harrison Street, Bay Place, Park View Terrace / Bellevue Avenue, Perkins Street, Staten Avenue, Euclid Avenue, and El Embarcadero) for the AM and PM peak hours in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing at the intersections in the road segment. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersections. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersections should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock)Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. • The Project sponsor shall fund, prepare, and install the approved plans and improvements.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-2b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (Existing). (Significant)	**Mitigation Measure TRANS-2b:** Implement Mitigation Measures TRANS-1a and TRANS-1b.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.
Impact TRANS-3a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-3a:** Implement Mitigation Measure TRANS-1a.	**Significant and Unavoidable** If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-3b: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015), which would operate at an unacceptable LOS E during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-3b:** Implement Mitigation Measure TRANS-1b.	**Conservatively Deemed Significant and Unavoidable** If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable. If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-3c: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-3c:** Implement the following measures at the Harrison Street / Grand Avenue intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.	**Significant and Unavoidable** If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-3c (cont.)	• Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-3d: Phase I of the proposed Project, when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)	**Mitigation Measure TRANS-3d:** Implement Mitigation Measure TRANS-1c.	Less than Significant If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I) impacts at this location would be Significant and Unavoidable. If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-3e: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015), which would operate at an unacceptable LOS E during the AM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-3e**: Mitigation Measure TRANS-3e: Implement the following measures at the Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp intersection: • Restripe the northeast Oakland Avenue approach from the current configuration of one shared through-left lane and two through lanes to one exclusive left-turn lane, one shared through-left lane, and one through lane. • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.	Less than Significant If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-3e (cont.)	• Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-4a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-4a:** Implement Mitigation Measure TRANS-2b.	**Significant and Unavoidable** If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.
Impact TRANS-5a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-5a**: Implement Mitigation Measure TRANS-1a.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015). (Significant)	**Mitigation Measure TRANS-5b:** Implement Mitigation Measure TRANS-1b.	**Conservatively Deemed Significant and Unavoidable** If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable. If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5c: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2015). (Significant)	**Mitigation Measure TRANS-5c:** Mitigation Measure TRANS-5c: Implement the following measures at the Telegraph Avenue / 27th Street intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.	Less than Significant If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-5c (cont.)	• Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. • Redesigned the signal plan to give the northbound left-turn movement protected-permitted phasing. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-5d: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-5d:** Implement Mitigation Measure TRANS-3c.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5e: The addition of Project-generated traffic (Phase I and II) would cause the PM peak-hour LOS to degrade from an acceptable LOS C under Near-Term (2015) without Project Conditions to an unacceptable LOS F at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road). Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)	**Mitigation Measure TRANS-5e:** Implement Mitigation Measure TRANS-1c.	Less than Significant If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I and II) impacts at this location would be Significant and Unavoidable. If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5f: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp) (2015), which would operate at an unacceptable LOS F during both peak hours under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-5f:** Implement Mitigation Measure TRANS-1d.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-5g: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-5g:** Implement Mitigation Measure TRANS-1e.	Less than Significant If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5h: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-5h:** Implement Mitigation Measure TRANS-1f.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-5i: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-5i:** Implement the following measures at the Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) − Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection)	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-5i (cont.)	− Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	
Impact TRANS-5j: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015). (Significant)	**Mitigation Measure TRANS-5j:** Implement Mitigation Measure TRANS-3e.	Less than Significant If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-6a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-6a:** Implement Mitigation Measure TRANS-2a.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-6b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)	**Mitigation Measure TRANS-6b:** Implement Mitigation Measure TRANS-2b.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.
Impact TRANS-7a: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7a:** Implement Mitigation Measure TRANS-1a.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7b: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7b:** Implement Mitigation Measure TRANS-1b, and also prohibit westbound left turns during the AM peak hour (in addition to the PM peak hour).	**Conservatively Deemed Significant and Unavoidable** If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable. If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7c: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2030). (Significant)	**Mitigation Measure TRANS-7c:** Implement Mitigation Measure TRANS-5c.	Less than Significant If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7d: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7d:** Implement Mitigation Measure TRANS-3c, and also prohibit southbound left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7e: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour at Intersection #13 (Harrison Street / 21st Street) (2030). (Significant)	**Mitigation Measure TRANS-7e:** Implement the following measures at the Harrison Street / 21st Street intersection: • Prohibit eastbound right turns from 21st Street to Harrison Street during the PM peak period, which will increase capacity on the critical eastbound left-turn movement • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7e (cont.)	• Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: – 2070L Type Controller – GPS communication (clock) – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines – City Standard ADA wheelchair ramps – Full actuation (video detection, pedestrian push buttons, bicycle detection) – Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines – Countdown Pedestrian Signals – Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet – Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2030). (Significant)	**Mitigation Measure TRANS-7f**: Implement Mitigation Measure TRANS-1c.	Less than Significant If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Cumulative (2030) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Cumulative Phase I and II) impacts at this location would be Significant and Unavoidable. If only Phase I of the Project were built, this intersection would still be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7g: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 SB On-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7g**: Implement Mitigation Measure TRANS-1d.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7h: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7h**: Implement Mitigation Measure TRANS-1e.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7i: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7i:** Implement Mitigation Measure TRANS-1f.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7j: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7j:** Implement Mitigation Measure TRANS-5i.	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7k: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7k:** Implement Mitigation Measure TRANS-3e.	Less than Significant If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-7l: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-7l:** Implement the following measures at the Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue intersection: • Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches. • Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group. To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval: • Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below: − 2070L Type Controller − GPS communication (clock) −	**Significant and Unavoidable** If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-7l (cont.)	− Accessible pedestrian crosswalks according to Federal and State Access Board guidelines − City Standard ADA wheelchair ramps − Full actuation (video detection, pedestrian push buttons, bicycle detection) − Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines − Countdown Pedestrian Signals − Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet − Signal timing plans for the signals in the coordination group. The Project sponsor shall fund, prepare, and install the approved plans and improvements.	
Impact TRANS-8a: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on Segment #3 (I-880 from Oak Street to 5th Avenue) (2030). (Significant)	**Mitigation Measure TRANS-8a:** There are no feasible measures to mitigate the Project's impact, given the existing alignment and constraints due to lack of right-of-way for both the roadway on the west end of the channel and possibly for support columns above the Union Pacific right-of-way. The segment of I-880 from Oak Street to 5th Avenue consists of two four-lane aerial structures, with the segment immediately west of Lake Merritt Channel bordered on the north by the Laney College parking lot and on the south by industrial uses. The aerial structure continues east of the channel, crossing over the existing Union Pacific railroad right-of-way. Increasing capacity on the freeway would likely require increasing the number of travel lanes. Also, any proposed mitigation measure would also require Caltrans project approval. Therefore, the Project impacts on this roadway segment are significant and unavoidable.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-8b: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-8b:** Implement Mitigation Measure TRANS-2a.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV.L Transportation and Circulation (cont.)		
Impact TRANS-8c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	**Mitigation Measure TRANS-8c:** Implement Mitigation Measure TRANS-2b.	**Significant and Unavoidable** If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.
Impact TRANS-9: The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)	**Mitigation Measure TRANS-9:** Prohibit delivery and service vehicles from accessing the loading docks during the AM and PM peak periods in order to minimize the impact of loading operations on access for the Kaiser Center Garage. The section of the Access Road from Harrison Street / 20th Street to the garage entrance should be restricted to delivery and service vehicles during off-peak hours. During off-peak periods, the Access Road approach onto Harrison Street / 20th Street should be separated off by bollards or other removable barriers to prevent passenger vehicles from crossing the site and expand pedestrian space in this immediate area. Adequate additional site management staff should be made available to direct loading maneuvers to improve the safety of pedestrians, bicyclists, and drivers during deliveries into and out of this dock. Concurrent with the submittal of a Final Development Plan, the Project Applicant shall prepare and submit a loading dock plan and operational analysis which demonstrates there are no conflicts with vehicular, pedestrian, and bicycle access to or adjacent to the site for City review and approval. The Project Applicant shall implement the approved plan.	Less than Significant
Impact TRANS-10: The Project proposes vehicular site access out of an existing garage exit located along 21st Street (just east of Kaiser Plaza) which is currently designed in such a way that could be hazardous to pedestrians on the sidewalk. (Significant)	**Mitigation Measure TRANS-10:** The Project applicant shall redesign the East Exit of the Kaiser Center Garage along 21st Street to allow for sufficient distance and visibility for drivers to see pedestrians and stop. Redesign options shall include sidewalk widening, wherever feasible. In the event that this is structurally infeasible, the Project applicant shall install audible and visible warning devices such as bells and lights to alert pedestrians, and a speed hump to force drivers exiting the garage to slow down and be more alert.	Less than Significant
Impact TRANS-11: Potential short-term construction impacts generated by the Proposed Project would include the impacts associated with the delivery of construction materials and equipment, removal of construction debris, and parking for construction workers. (Less than Significant).	Standard Condition of Approval TRANS-1 *Parking and Transportation Demand Management.*	None

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
ALTERNATIVE MEASURE DD IMPACTS If the City elects to implement the Alternative Measure DD project, then the following impacts would occur, necessitating different mitigation measures than those identified for the Project assuming the original Measure DD project.		
Impact ALT DD TRANS-1 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I), Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection (Significant)	**Mitigation Measure ALT DD TRANS-1:** The Project applicant shall add an additional lane and reconfigure the northbound Harrison Street approach as a shared left-through lane (to westbound 20th Street and Kaiser Center Access Road) and two exclusive right-turn lanes (one lane to northbound Harrison Street, the other to northbound Harrison Street and eastbound 20th Street / Lakeside Drive). This would require curb setback of about 10 feet and a corresponding reduction in park space and removal of up to five on-street parking spaces along the west side of Snow Park. In addition, the left turns from the Kaiser Center Access Road to eastbound 20th Street / Lakeside Drive would need to be prohibited in order to allow the northbound movement along Harrison Street to run concurrently with the Access Road phase. To implement these measures, the Project Applicant shall submit to City of Oakland's Transportation Services Division for review and approval a PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. The Project Applicant shall fund, prepare, and install the approved plans and improvements. Also, implement Mitigation Measure TRANS-1c.	**Conservatively Deemed Significant and Unavoidable**. If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable. After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts. If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation if the City determines additional mitigation measures feasible, and a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
Impact ALT DD TRANS-2 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I and Phase II), Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area. Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. (Significant)	**Mitigation Measure ALT DD TRANS-2:** Implement Mitigation Measure ALT DD TRANS-1 and Mitigation Measure TRANS-1c.	**Conservatively Deemed Significant and Unavoidable.** If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable. After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project’s impacts. If only Phase I of the Project were built, this intersection would still remain a less than significant impact after mitigation if the City determines additional mitigation measures feasible, and a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
Impact ALT DD TRANS-3 - Project with Alternative Measure DD - Cumulative (2030) plus Project (Phase I and Phase II) Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection is located within the Downtown area. Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection. (Significant)	**Mitigation Measure ALT DD TRANS-3:** Implement Mitigation Measure ALT DD TRANS-1 and Mitigation Measure TRANS-1c.	**Conservatively Deemed Significant and Unavoidable.** If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable. After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts. If only Phase I of the Project were built, this intersection would still remain a less than significant impact after mitigation if the City determines additional mitigation measures feasible, and a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.
IV. M Utilities and Service Systems		
Impact UTIL-1: The Proposed Project would not exceed water supplies available to serve the project from existing entitlements and resources, nor require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	None Required	
Impact UTIL-2: The Proposed Project's projected wastewater generation would not result in the City of Oakland exceeding its citywide projected base flow allocation or its base flow allocation for Subbasin 52-05. (Less than Significant)	Standard Condition of Approval UTIL-2: *Stormwater and Sewer*	Less than Significant

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
IV. M Utilities and Service Systems (cont.)		
Impact UTIL-3: The Proposed Project would not require or result in construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)	Standard Condition of Approval UTIL-2: *Stormwater and Sewer* Standard Condition of Approval HYD-2 *Stormwater Pollution Prevention Plan* Standard Condition of Approval HYD-3 *Post-Construction Stormwater Pollution Management Plan*	Less than Significant
Impact UTIL-4: The Proposed Project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs, and would not require or result in construction of landfill facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	Standard Condition of Approval UTIL-1 *Waste Reduction and Recycling*	Less than Significant
Impact UTIL-5: The Proposed Project would not violate applicable federal, state and local statutes and regulations relating to energy standards; nor would result in a determination by the energy provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new energy facilities or expansion of existing facilities. (Less than Significant)	None Required	
Impact UTIL-6: The increased development resulting from the Proposed Project, in conjunction with population and density of other past, present, pending and reasonably foreseeable development in the City, would not result in cumulative impacts on utilities and service systems. (Less than Significant)	None Required	
NON-CEQA RECOMMENDED PROJECT-SPECIFIC CONDITIONS		
Recommendation TRANS-1: Increase sidewalk capacity on the north side of 20th Street between Broadway and Harrison Street.	**Recommendation TRANS-1** includes: • Between Broadway and Franklin Street, remove parking and widen the sidewalk. • Between Franklin Street and Webster Street, widen the sidewalk. • Between Webster Street and Harrison Street, redesign the Project frontage to be pedestrian-friendly.	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-2: Reduce cycle times of signals at the intersections of Franklin Street / 20th Street and Webster Street / 20th Street.	**Recommendation TRANS-2** includes: Reducing the cycle length of these signals from 80-second to 60- or 70-seconds.	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-3: Construct the 20th Street bikeway between Broadway and Harrison Street.	**Recommendation TRANS-3** includes: Complete the Class 2 bicycle facilities (bicycle lanes) network between on 20th Street between Harrison Street and Franklin Street	Not Applicable. No CEQA Impact Identified.

TABLE II-1 (Continued)
SUMMARY OF IMPACTS, STANDARD CONDITIONS OF APPROVAL, MITIGATION MEASURES, AND RESIDUAL IMPACTS

Environmental Impact	Standard Conditions of Approval and Mitigation Measures	Level of Significance after application of Standard Conditions of Approval and Mitigation
NON-CEQA RECOMMENDED PROJECT-SPECIFIC CONDITIONS (cont.)		
Recommendation TRANS-4: Improve bus waiting areas on 20th Street directly adjacent to the Project Site.	**Recommendation TRANS-4** includes: • A large, visible system map (currently only a small area map is provided for the immediate vicinity surrounding the stop) and comprehensive area map showing bus stop locations for other lines in the area; • Bus schedules; and, • Real-time arrival information. • Wayfinding signage to transit facilities should also be provided on major pedestrian routes, such as 20th Street to and from the 19th Street BART Station.	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-5: Close the Stanley Place approach at Intersection #1 (Harrison Street / Stanley Place / I-580 EB Off-Ramp).	**Recommendation TRANS-5** includes: Closure of the Stanley Place minor approach at Intersection #1 (Harrison Street / Stanley Place / I-580 EB Off-Ramp).	Not Applicable. No CEQA Impact Identified.
Recommendation TRANS-6: Installation of a signalized mid-block crossing across Harrison Street between 20th Street and 21st Street.	**Recommendation TRANS-6** includes: Installation of a signalized mid-block pedestrian crossing across Harrison Street between 20th Street and 21st Street under the Alternative Measure DD Configuration would require signal coordination with adjacent traffic signals at Harrison Street / 21st Street, Harrison Street / 20th Street / Kaiser Center Access Road, and other signals in the same signal coordination group. Due to the coordination, the pedestrian phase could be timed to coincide with periods of low arriving traffic flow from upstream intersections such that no additional intersection delay would be created. Instead, the signalized mid-block crossing would potentially improve operations along this corridor by “metering” traffic entering the ultimate bottleneck intersections at Harrison Street / Grand Avenue and Harrison Street / 20th Street / Kaiser Center Access Road. As a result, the crossing itself would not result in secondary impacts to other modes.	Not Applicable. No CEQA Impact Identified.

CHAPTER III
Project Description

A. Project Location and Site Characteristics

Project Location and Site Designations

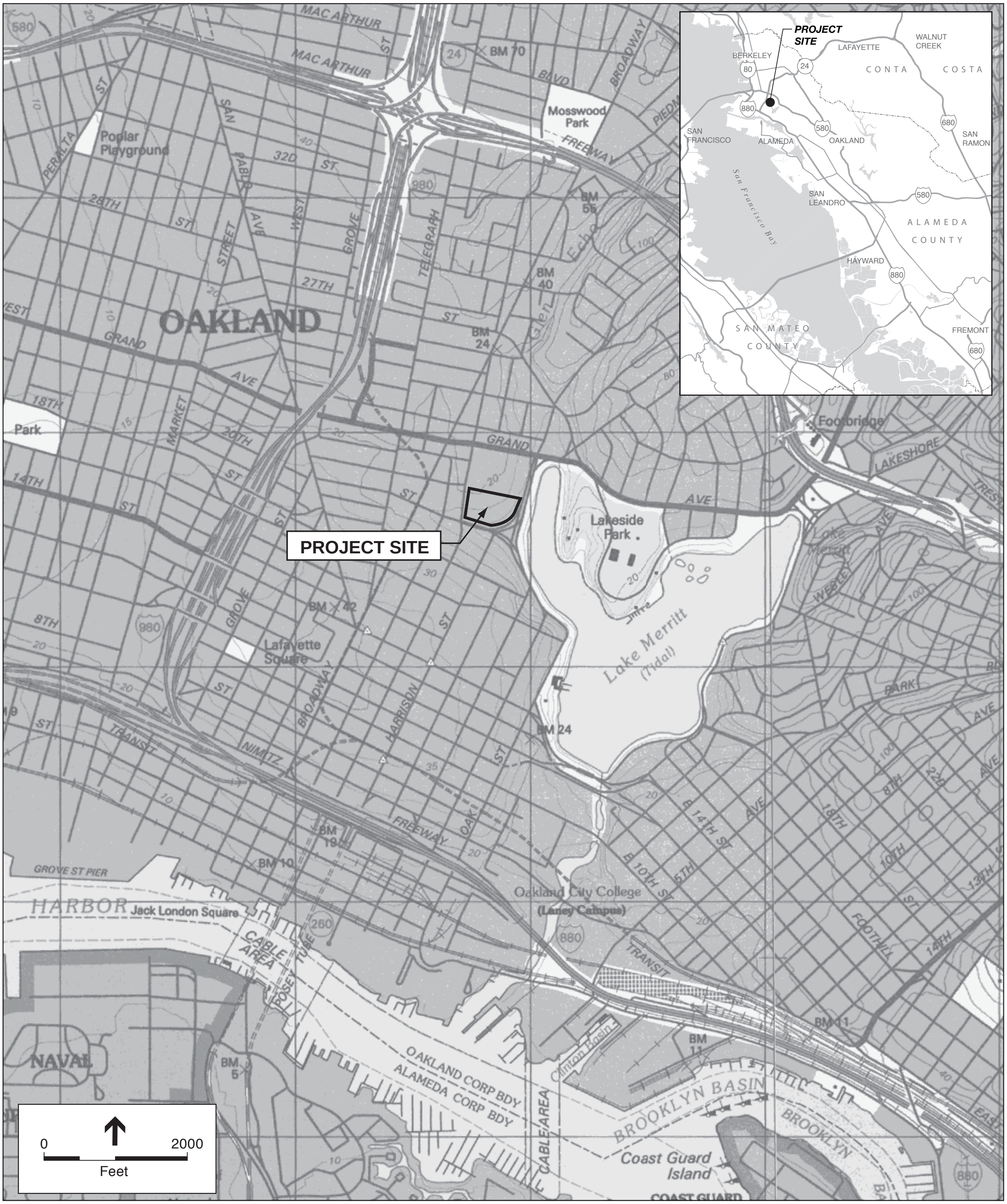
The Proposed Project would redevelop approximately 2.2 acres at the westernmost portion of the 7.2-acre Kaiser Center property ("Project Site"). The Kaiser Center Office Project site is located at the corners of Webster and 20th Streets, and Webster and 21st Streets, in the vicinity of downtown Oakland. As shown in **Figure III-1**, Regional and Site Location Map, and **Figure III-2**, Project Site and Surrounding Land Uses, the Project Site is bounded by Webster Street to the west, 20th Street to the south, Harrison Street to the east, and 21st Street to the north.

The Project Site is within the Central Business District land use designation indentified in the Oakland General Plan. The zoning on the Project Site at the time the Project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone.[1] Zoning on the Project Site is shown in **Figure III-3**, General Plan Land Use Designations and Zoning. The intent of each of the relevant zoning districts is discussed in Section IV.H, *Land Use, Plans and Policies*, in Chapter IV of this EIR.

The entire Project Site is also located within the Lake Merritt Historic District. The Lake Merritt Historic District is described in detail in Chapter IV, Section D, *Cultural Resources*, of this EIR.

The Project Site is currently identified as Alameda County Assessor's Parcel Number (APN) 008-0652-001-05. The parcel is owned by SIC-Lakeside Drive, LLC, an affiliate of The Swig Company, LLC (the Project Applicant). The Proposed Project seeks to subdivide the Project Site into four parcels, as shown in **Figure III-4**, Proposed Vesting Tentative Parcel Map. This would create a new parcel on the eastern side of the Project Site containing the existing Kaiser Center office tower, although no physical changes would occur to that portion of the Project Site or the building.

1 Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C Central Business District Commercial. However, pursuant to Section 6 of the rezoning ordinance, the Proposed Project is "grandfathered" under the C-55, S-17, and S-4 zones, and thus, the City is processing the application as such. Notwithstanding the project's grandfathered status, the land uses proposed by the Project are generally consistent with the new CBD-C zoning.



SOURCE: USGS; ESA

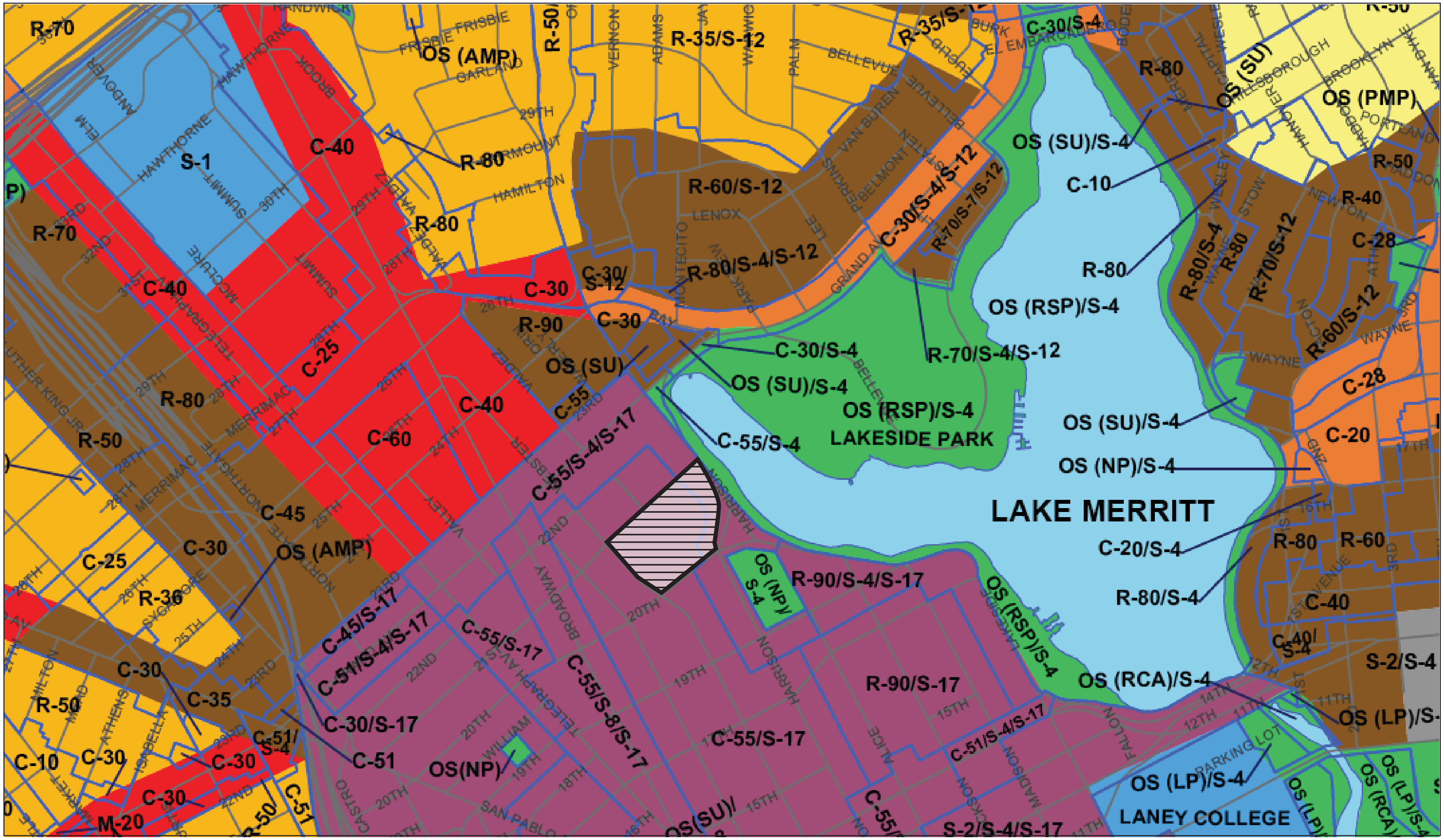
Kaiser Oakland . 206213

Figure III-1
Regional and Site Location Map

SOURCE: ESA

Kaiser Oakland . 206213

Figure III-2
Project Site and Surrounding Land Uses



RESIDENTIAL ZONING		COMMERCIAL ZONING		OPEN SPACE ZONING		SPECIAL ZONING	
R-35	Special One-Family	**C-10**	Local Retail	**OS(LP)**	Local Retail	**S-1**	Medical Center
R-50	Medium Density	**C-20**	Shopping Center	**OS(AMP)**	Shopping Center	**S-2**	Civic Center
R-60	Medium High Density	**C-25**	Office Commercial	**OS(NP)**	Office Commercial	**S-4**	Design Review
R-70	High Density	**C-28**	Commercial Shopping District	**OS(RCA)**	Commercial Shopping District	**S-17**	Downtown Residential Usable Open Space
R-80	High-Rise Aprtment	**C-30**	District Shopping	**OS(RSP)**	District Shopping		
R-90	Downtown Apartment	**C-35**	District Shopping	**OS(SU)**	District Shopping		
		C-36	Boulevard Service				
		C-40	Community Thoroughfare				
		C-51	Central Business				
		C-55	Central Core				
		C-60	City Service				

GENERAL PLAN LAND USE
- Detached Unit Residential
- Mixed Housing Type Residential
- Urban Residential
- Neighborhood Center Mixed Use
- Community Commercial
- Housing and Business Mix
- Central Business District
- Institutional
- Urban Open Space

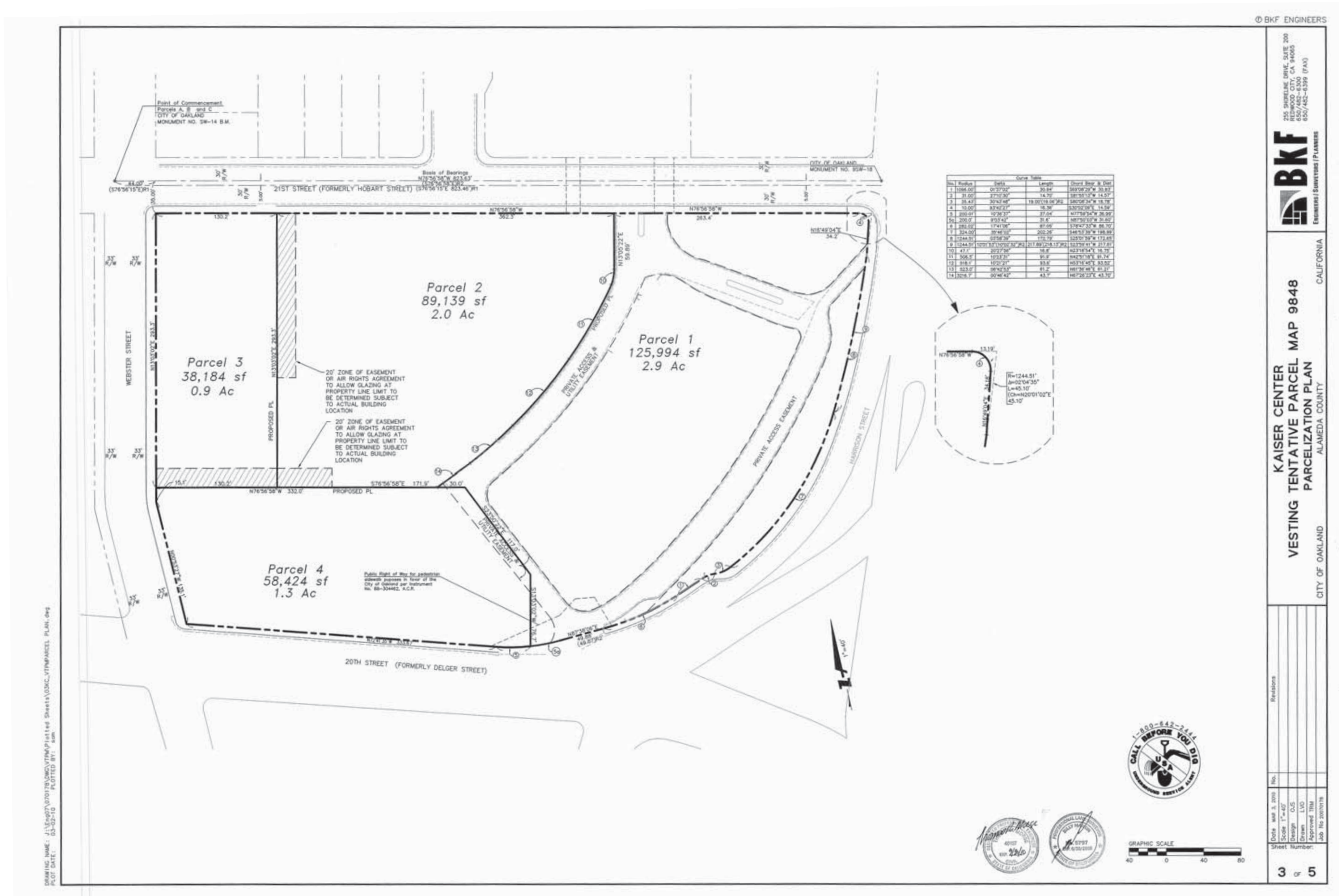
ZONING
- Zoning
- Project Site

0 1000
Feet

SOURCE: City of Oakland

Kaiser Oakland . 206213

Figure III-3
General Plan Land Use Designations and Zoning



SOURCE: BKF Engineers, 2008, excerpted from Kaiser Center Vesting Tentative Parcel Map 9848

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Figure III-4

Proposed Vesting Tentative Parcel Map

Site Access

Principal roadways that provide local access to the Project Site include 20th Street, Webster Street, Harrison Street, and Grand Avenue. Regional access to the Project Site is provided by Interstate 580 (I-580), Interstate 880 (I-880), Interstate 980 (I-980), and State Route 24 (SR 24). The nearest access point to and from the regional network (via I-580) is approximate 1.5 miles east of the Project Site, at Grand Avenue. The 19th Street Oakland Bay Area Rapid Transit (BART) Station is located 2 blocks west of the Project Site with access to the station at Broadway and 20th Street.

Existing Project Site Characteristics

Existing Buildings and Uses

The Project Site is currently occupied by the 29-story Kaiser Center office tower at Harrison Street and Lakeside Drive, the 20th Street Mall, the Webster Street Mall, and a roof garden that is accessible by visitors to the Kaiser Center during business hours. The Proposed Project affects only the 20th Street Mall, the Webster Street Mall and a minor portion of the roof garden – a total of approximately 2.2 acres at the westernmost area of the Project Site. The 29-story Kaiser Center office tower is located on the eastern side of the Project Site, which will not be physically affected by the Proposed Project.

The 20th Street Mall is a three-story retail/office building that fronts Webster and 20th Streets and is approximately 58,190 square feet in floor area. Retail uses include a retail drug store, travel agency, florist, shoe repair, tax preparation, photocopying, and other similar small businesses on the first floor, and office space accounts for uses on the upper floors. The uppermost level of this building opens onto the existing Kaiser Center roof garden that is atop the existing parking garage (see Figure III-2, Project Site and Surrounding Land Uses). The roof garden was the first to be built in the United States after World War II. It is meticulously maintained and open to visitors to the Kaiser Center via pedestrian access from interior escalators from the street level of the 20th Street Mall, from the parking garage, and from a pedestrian bridge from the adjacent Kaiser Center office tower located on the east portion of the parcel.

The Webster Street Mall is an approximately three-story building along Webster Street and below the westernmost portion of the roof garden. It contains approximately 38,190 square feet of retail uses (currently a health club) and a portion of the existing parking garage. Access to the Webster Street Mall health club is from the existing parking garage or from the street.

A five-story parking garage exists in the central portion of the Project Site, below the roof garden, and has 1,340 spaces to serve the existing Mall buildings, the existing Kaiser Center office tower, and the Ordway Building (subject to the terms of a parking lease between the owner of the Ordway Building and the owner of the Project Site) across 21st Street to the north of the Project Site. There is vehicular access to the existing garage from 20th and 21st Streets.

Surrounding Area Characteristics

To the east the Project Site is bound by Harrison Street, and Lakeside Park and Lake Merritt exist immediately beyond Harrison Street and Lakeside Drive.

The 4.2-acre Snow Park is located southeast of the Project Site, across Harrison and 20th Streets, and uses south of the Project Site, across 20th Street, include the 27-story Lake Merritt Plaza tower and low-rise street-level retail uses.

Uses to the west, across Webster Street, include low- to mid-rise commercial uses (primarily financial institutions and commercial offices) and surface parking lots.

Uses to the north, across 21st Street, include the 20-story Pacific Bell/City National Bank Building tower, the 28-story Ordway Building tower, the 15-story AT&T Building and surface parking lots. The 148-foot tall Cathedral of Christ the Light is located one block northeast of the Project Site, at Grand Avenue and Harrison Street.

Figure III-2, Project Site and Surrounding Land Uses, shows the existing Project buildings and surrounding land use and development patterns.

B. Previous Approvals and Site Alterations

In 1982, Kaiser Center, Inc. obtained approval of a Preliminary Planned Unit Development (PUD) application to construct a phased integrated Master Plan commercial development of approximately 4.4 million square feet of a 14.7-acre site bounded by 20th Street, Webster Street, Harrison Street, and West Grand Avenue. The Master Plan area encompassed the current Proposed Project. The Master Plan was refined in 1986 to construct a phased integrated commercial development of approximately 3.5 million square feet of retail and office space on the 14.7-acre site. The Master Plan project was to be phased over a 15-year period. For unspecified reasons, both the 1982 and the 1986 Master Plans were never fully implemented, including on the Proposed Project Site.

Historically, the Kaiser Center Project Site was first designed and constructed between 1955 and 1959. The Center included the 29-story office tower, with three basement levels; a three-story department store; a five-level, 1,200-car parking garage; and a 3.5-acre garden (Kaiser Center roof garden) on the roof of the parking garage. From 1968 to 1970, a 28-story office tower (the Ordway Building) was planned and constructed to the north of the existing tower. In a 1971 site plan, an $85 million expansion project was proposed, including a third office tower on the Project Site, but was never completed. In 2004, an Addendum EIR for the Cathedral of Christ the Light, adjacent to the Ordway Buildings, was prepared and subsequently adopted.

Subsequent alterations have occurred over several years in the 20th Street and Webster Street Mall buildings on the Project Site, including repairs and structural improvements after the Loma Prieta Earthquake in 1989. According to City of Oakland building permits records, tenant improvements to the interior of the 20th Street Mall occurred between 1965 and 1993 and to the interior of the Webster Street Mall between 1961 and 1991.

C. Objectives of the Proposed Project

The following Objectives are sought by the Proposed Project:

- Develop a high-quality office, retail and commercial Project which implements many area-specific and City-wide goals, objectives and policies of the General Plan and other City policies.
- Promote Downtown Oakland's position as a dynamic economic center for the region, by adding new jobs (achieving a better jobs/housing balance in the City), and retail and other business opportunities in high-quality, high-rise buildings in close proximity to BART and AC Transit lines.
- Further develop, support, revitalize and promote the distinct, attractive urban character of Kaiser Center and the Lake Merritt District through development of a Project that revitalizes Kaiser Center while also respecting its character defining features, maximizing the use of existing public and private infrastructure as well as mass transit, and enhancing the long-term social, cultural, environmental and economic sustainability of Kaiser Center, the District and the City.
- Fulfill other long-standing goals of more intensive development of Kaiser Center and the Kaiser Center Master Plan Area, which were initially established 28 years ago in the first long-range Master Plan for Kaiser Center approved by the City of Oakland in the 1982 Preliminary Development Plan (PDP) and subsequently reaffirmed in the 1986 Master Plan PDP Amendment and subsequent City development approvals based thereon.
- Create a modern, attractive and economically viable street-level retail promenade along 20th and Webster Streets in place of the dated and obsolete existing retail "Malls," thereby replacing the current poor pedestrian experience with a more vibrant pedestrian-friendly commercial area linking the Downtown core with Lake Merritt and Snow Park.
- Create a visually interesting and effective project design in harmony with the greater Kaiser Center and its immediate neighborhood that will respect and enhance important views in and of Downtown Oakland both from the new towers and the historic roof garden, and provide an attractive and lasting contribution to Oakland's urban fabric and skyline.
- Increase the size of and create greater public access to the historic roof garden, both from street level and through the new towers at the garden level, and create an enhanced pedestrian linkage between the street and garden.
- Retain and enhance the cohesive historic integrity of Kaiser Center, and maintain and enhance the integrity of the historic Lake Merritt District, through a project design that is compatible with yet differentiated from the design and materials of the existing Kaiser Center office tower and roof garden.
- Meet contemporary energy and design objectives by ensuring that the new towers meet mandatory performance standards equivalent to CALGreen requirements, and provide the opportunity for the Project, as part of its Greenhouse Gas Reduction Plan, to exceed such standards where feasible.
- Create an economically viable Project capable of attracting both construction and permanent financing and Class A office building tenants.

D. Project Components

This section describes the components of the Proposed Project, which constitute the CEQA "Project" analyzed in this EIR.

Proposed Development

The Proposed Project would demolish approximately 280,002 square feet of office and commercial/retail uses and construct approximately 1.47 million square feet (msf) of office and commercial/retail uses in two high-rise towers (see **Table III-1**, Proposed Project Compared to Existing Conditions). The existing development on the 2.2-acre portion of the Project Site would be demolished and replaced as part of the Proposed Project; the Kaiser Center roof garden will mostly remain intact, but will be reconfigured and expanded in some areas as described under *Open Space and Landscaping,* further in this chapter. A Proposed Project Site Plan is shown in **Figure III-5**.

A South Tower, 34 stories tall (469 feet tall), would be constructed at the corner of Webster and 20th Streets and a North Tower, 42 stories tall (573 feet), would be constructed at the corner of Webster and 21st Streets. Overall, the development would entail two to three underground parking levels, a three to four-story podium containing street-level retail, lobbies for the office towers, and two to three above-ground parking levels, and 28 to 36 office floors within the South and North Towers, respectively, above the podium. See **Figures III-6** and **III-7** (Proposed Project Elevation Sections) and **Figures III-8, III-9** and **III-10** (Conceptual Basement, First and Second Level Floor Plans).

The two towers would include a total of 1.32 million gross square feet of office space (replacing a total of 232,000 sf existing), and a total of 46,200 square feet of new commercial/retail space (replacing a total 48,000 sf existing). A total of approximately 22,300 square feet of commercial/retail space would be at street level on Webster and 20th streets frontages, as depicted in Figures III-6 and III-7 (Proposed Project Sections) and Figures III-9 and III-10 (Conceptual First and Second Level Floor Plans); and approximately 11,400 square feet and 12,500 square feet of commercial/retail space on the 6th floors ("Amenity Floors") of the North Tower and South Tower, respectively. (The distribution of uses within each of the proposed towers and within the Amenity Floors is summarized in greater detail in Table III-2, Summary of Minor Project Changes Since the NOP.)

TABLE III-1
PROPOSED PROJECT REDEVELOPMENT COMPARED TO EXISTING CONDITIONS

	Total Existing	Existing to be Demolished	Existing to Remain	New (Proposed Project)	Total	Change (Net New)
Entire Kaiser Center Site (7.2 acres)						
Total Lot Area	311,741 GSF (7.2 acres)	0	311,741 GSF	0	311,741 GSF	0%
Total Building Footprint Area	197,460 GSF	74,900 GSF	122,560 GSF	80,168 GSF	202,728 GSF	+3% (5,268 GSF)
Total Floor Area	1,690,879 GSF	280,002 GSF	1,410,877 GSF [b]	1,830,984 GSF	3,241,861 GSF	+92% (1,550,982 GSF)
Building Height						
Maximum Stories (Built)	29	NA	29	34/42	NA	NA
Maximum Feet (Built)	386 feet	NA	386 feet	±573.5 feet	±573.5 feet	±573.5 feet
Number of Parking Spaces[a]	1,340	155	1185	852	2,037	+52% (697)
Total Proposed Project Square Footage (2.2 acres)						
Office	232,002 GSF	232,002 GSF	0	1,320,040 GSF	1,320,040 GSF	+469% (1,088,038 GSF)
Commercial / Retail	48,000 GSF	48,000 GSF	0	46,200 GSF	46,200 GSF	-4% (-1,800 GSF)
Other/Mech [c]	--	--	0	108,752 GSF	108,752 GSF	--
Total New Area Attributable to FAR:					1,474,992 GSF	--
Parking (stalls)	1,340	155	1,185	852	2,037	--
Total Project Floor Area (with parking)					1,830,984 GSF	--

GSF – gross square feet
SF – square feet

a. Parking includes spaces reserved for existing Kaiser Center Office Tower and the Ordway Building.
b. Square footage figures for the existing 29-story Kaiser Center office building are not being altered as part of the proposed project.
c. Other/Mechanical GSF and Parking GSF are included here to account for total GSF of the project; however, inclusion of these GSFs do not affect other analysis such as trip generations since this data would be included in the office/retail uses.

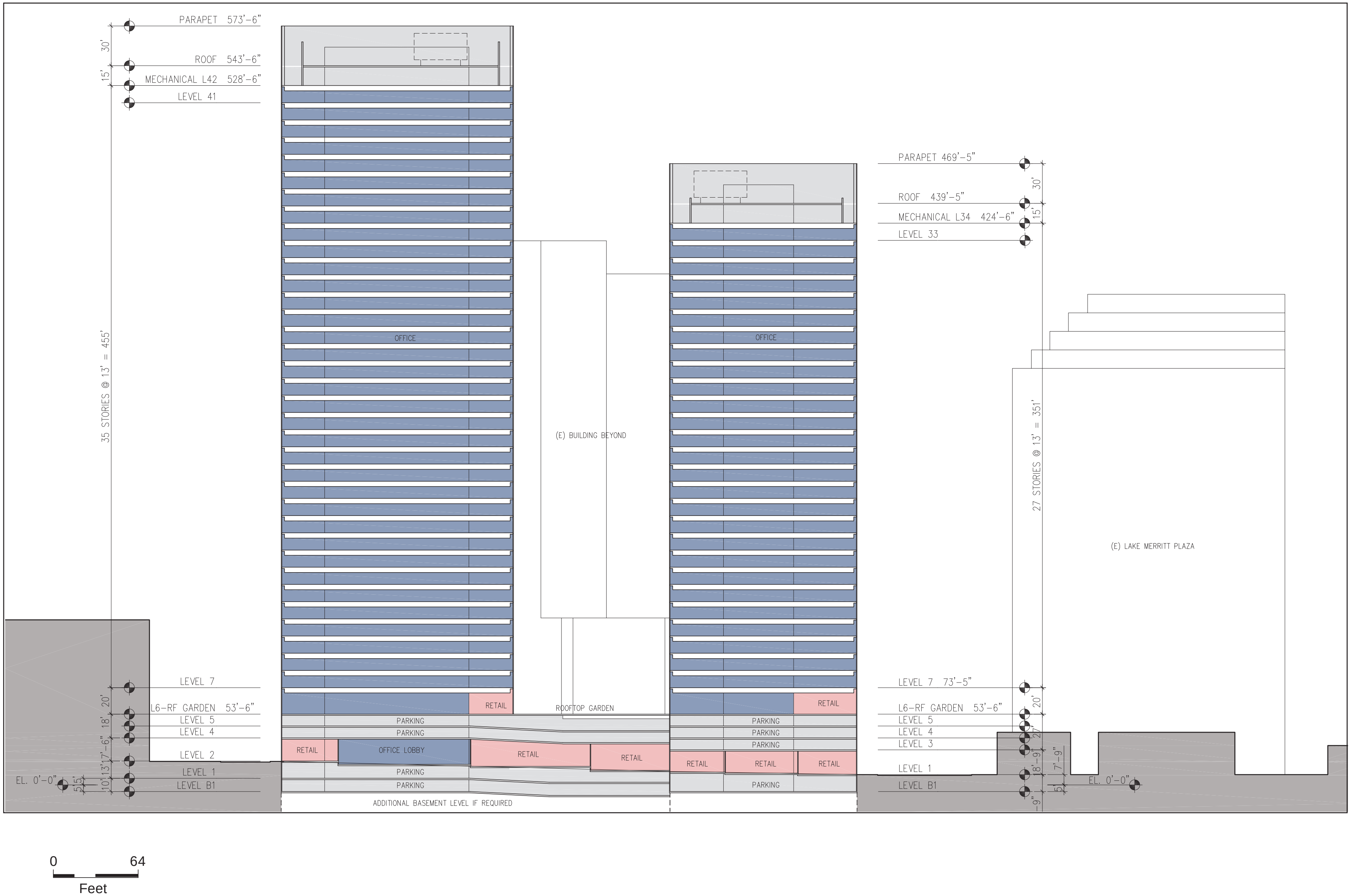
SOURCE: SOM, Project and Lot Information, Sheet ASK-047R2 and ASK 059R2, June 24, 2009; and The Swig Company, Memo to the City of Oakland, August 13, 2008 (memo incorrectly dated 2009).

SOURCE: SOM

Kaiser Oakland . 206213

Figure III-5

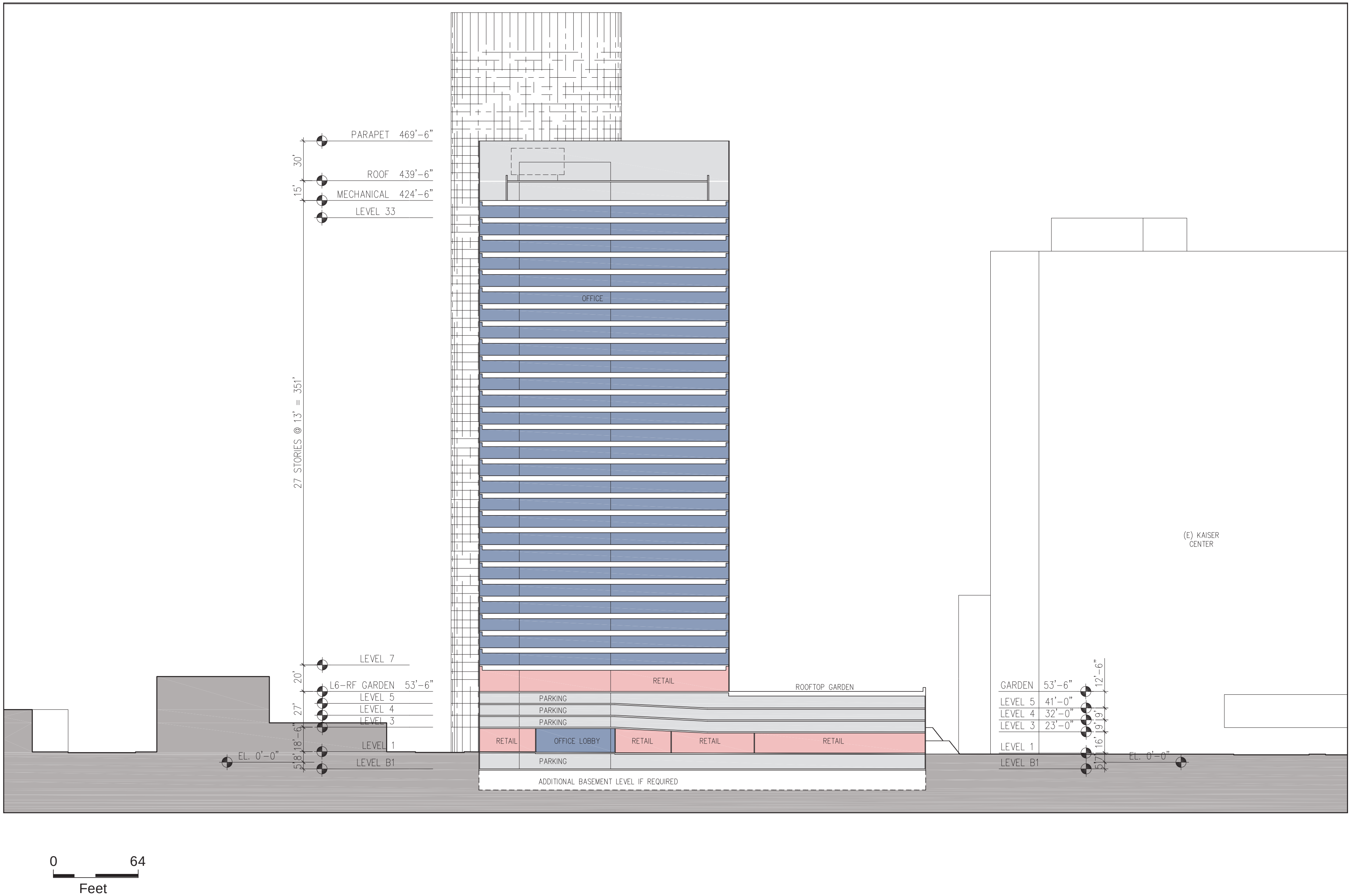
Proposed Project Site Plan



SOURCE: SOM

Kaiser Oakland . 206213

Figure III-6
Conceptual Project Building Section Looking East

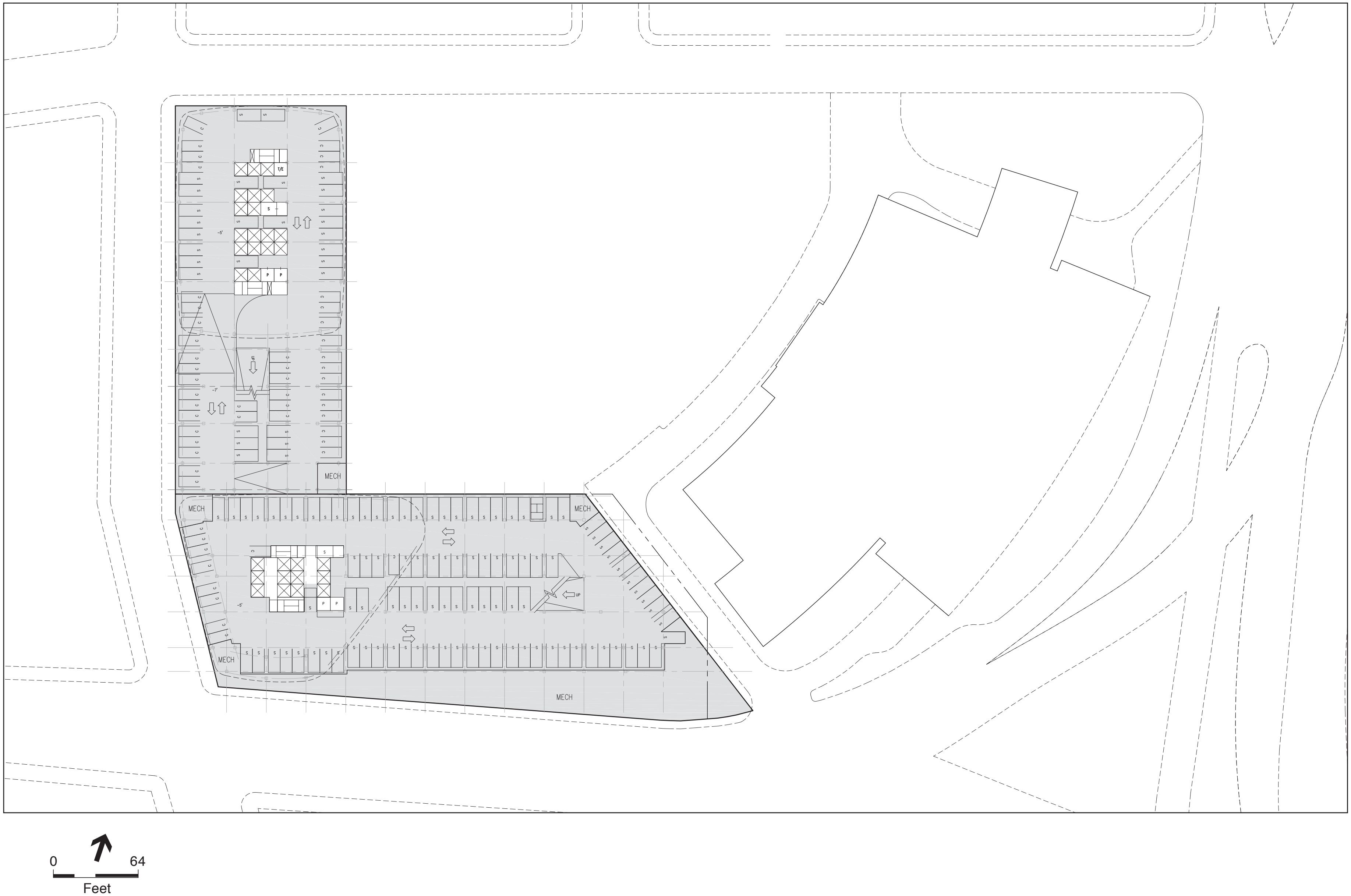


SOURCE: SOM

Kaiser Oakland . 206213

Figure III-7

Conceptual Project Building Section Looking North

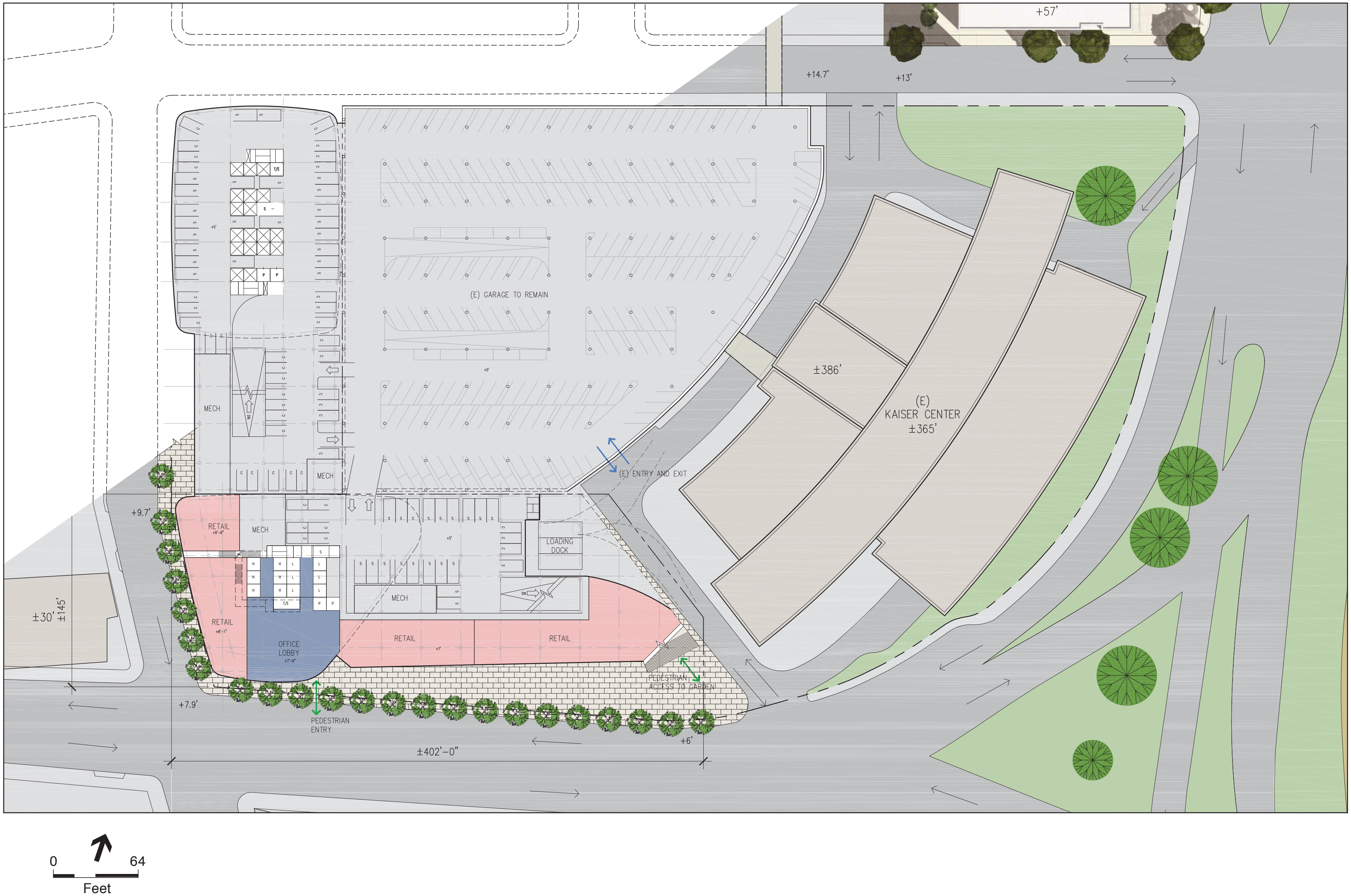


SOURCE: SOM

Kaiser Oakland . 206213

Figure III-8

Conceptual Project -
Basement Level Floor Plan

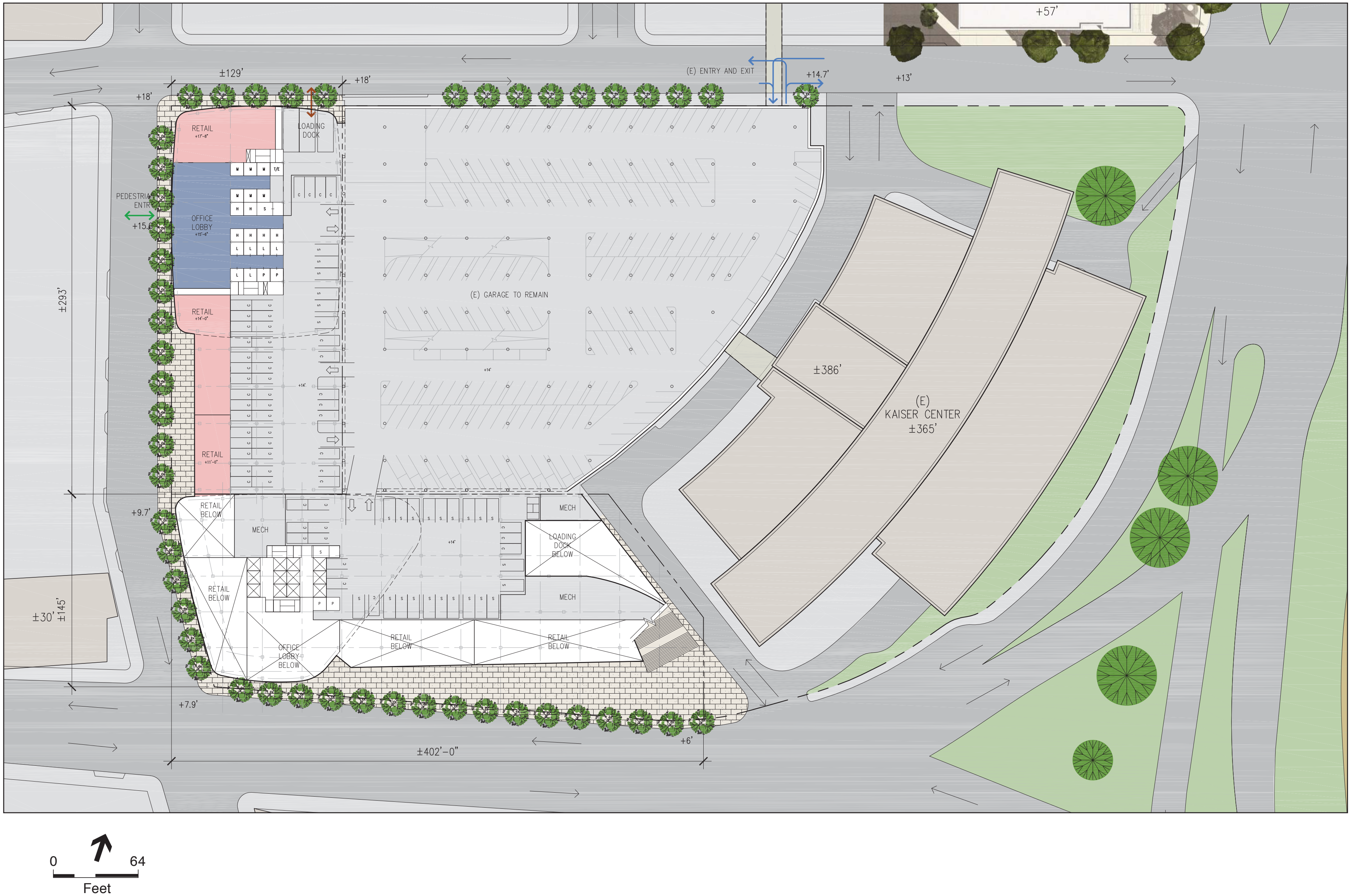


SOURCE: SOM

Kaiser Oakland . 206213

Figure III-9

Conceptual Project -
First Level Floor Plan

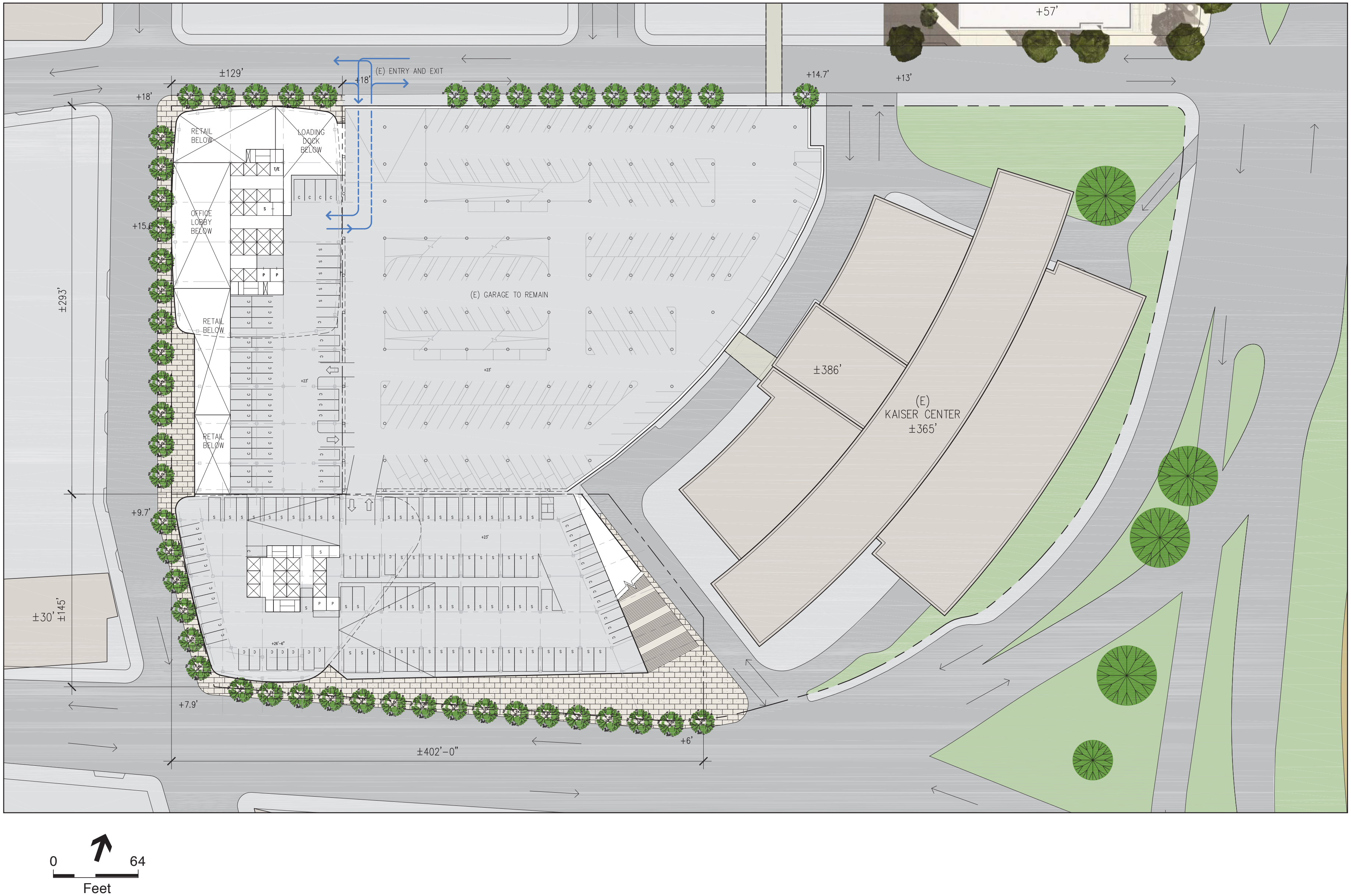


SOURCE: SOM

Kaiser Oakland . 206213

Figure III-10

Conceptual Project -
Second Level Floor Plan



SOURCE: SOM

Kaiser Oakland . 206213

Figure III-11

Conceptual Project - Third Level Floor Plan

SOURCE: SOM

Kaiser Oakland . 206213

Figure III-12

Conceptual Project -
Fourth Level Floor Plan

SOURCE: SOM

Kaiser Oakland . 206213

Figure III-13

Conceptual Project -
Fifth Level Floor Plan

SOURCE: SOM

Kaiser Oakland . 206213

Figure III-14

Conceptual Project -
Sixth Level Floor Plan

Minor Modifications to the Building Program Since the NOP

In August 2008, the Project Applicant submitted to City of Oakland minor modifications to its original submittal for development and environmental review, which proposed the project generally described in the May 2008 NOP of this EIR. The proposed changes included:

- Designating a portion of the 6th floor level in the North Tower and the South Tower for commercial/retail uses instead of office uses as previously proposed; the 6th floor level (which is the Kaiser Center roof garden level) would be referred to as an "Amenity Floor" in each tower. Potential commercial/retail uses contemplated include office, restaurant, fitness facility, and other retail.
- Increasing the height of the 6th floor level Amenity Floor in the North Tower and the South Tower from 13 feet of floor-to-floor clear span to approximately 20 feet to accommodate the contemplated Amenity Floor uses.

TABLE III-2
SUMMARY OF MINOR PROJECT CHANGES SINCE THE NOP

	NOP Project	Proposed EIR Project	Difference
North Tower			
6th Floor Clear Height	13 feet	20 feet	+ 7 feet
Total Tower Height	566.5 feet	573.5 feet,	+ 7 feet
Total Stories *(unchanged)*	42	42	No difference
Total Square Footage *(unchanged)*	786,900 square feet	786,900 square feet	No difference
Office	779,500 square feet	768,100 square feet	- 11,400 square feet
6th Floor Commercial/Retail (approximate)	0 square feet	11,400 square feet	+ 11,400 square feet
Street Level Retail *(unchanged)*	7,400 square feet	7,400 square feet	No difference
South Tower			
6th Floor Clear Height	13 feet	20 feet	+ 7 feet
Total Tower Height	462.5 feet	469.5 feet	+ 7 feet
Total Stories *(unchanged)*	34	34	No difference
Total Square Footage *(unchanged)*:	579,340 square feet	579,340 square feet	No difference
Office	564,440 square feet	551,940 square feet	- 12,500 square feet
6th Floor Commercial/Retail (approximate)	0 square feet	12,500 square feet	+ 12,500 square feet
Street Level Retail *(unchanged)*	14,900 square feet	14,900 square feet	No difference
Total Project			
Total Square Footage *(unchanged):*	1,366,240 square feet	1,366,240 square feet	No difference
Office	1,343,940 square feet	1,320,040 square feet	- 23,900 square feet
6th Floor Commercial/Retail (approximate)	0 square feet	23,900 square feet	+ 23,900 square feet
Street Level Retail *(unchanged)*	22,300 square feet	22,300 square feet	No difference

SOURCE: The Swig Company, 2008

The result of the 6th floor use changes (which is reflected in Table III-1) increases the proposed maximum height of the North Tower by approximately 7 feet and the South Tower by 7 feet[2], and alters the composition of designated uses in the Proposed Project. A tabulation of the changes is shown in Table III-2, Summary of Minor Project Changes Since the NOP.

Parking, Access and Circulation

The Project Site currently has 1,340 parking spaces. The Proposed Project would remove 155 existing parking spaces, and add approximately 852 new parking spaces in new subterranean and above-grade parking, resulting in an additional 697 net new parking spaces onsite (852 minus 155), for a total of 2,037 parking spaces and will be operated as a single garage shared between the existing Kaiser Center tower and the Project.[3] Parking changes by Phase is as follows, and there would be no interim parking shortfall between Phases:

- Phase 1 (South Tower) of the Project would construct 467 new spaces, but would not demolish any existing spaces, resulting in a net increase of 467 spaces; and,
- Phase 2 (North Tower) of the Project would demolish 155 existing spaces and construct 385 new spaces, resulting in a net increase of 230 spaces.

After completion of the Project, the Kaiser Center Garage would have a capacity of 2,037 parking spaces and be operated as a single garage shared between the existing Kaiser Center tower and the Propsed Project towers.

Vehicular entrances to the Project Site would be via driveways on Harrison Street, 20th Street, and 21st Street, similar to existing access to the Project Site. Vehicular access to the garage structure would be provided via the existing entrances and exits located on 21st Street and via the access road on the eastern portion of the block.

Pedestrian entrances to the new office towers would be located on Harrison Street, Webster Street, and 20th Street. New pedestrian access to the Kaiser Center roof garden will be created with a new exterior "grand stairway" from 20th Street as well as from the 6th floor level of the North and South Towers (see **Figure III-14**, Conceptual Project, Sixth Level Floor Plan).

Open Space and Landscaping

The Proposed Project would relocate approximately 18,369 square feet of the northwest portion of the existing 122,606 square foot (total) roof garden (which is existing private open space accessible by visitors to the Kaiser Center located at the same level as the proposed 6th floor level of the new high-rise towers) to the southern portion of the site, which would result in a net increase of the roof garden by approximately 4,500 square feet. A new exterior staircase from

2 The SOM diagram used as the basis of the NOP contained a typographical error identifying the proposed South Tower as 436'6", while in fact the proposed height of the South Tower in the NOP was 462'6."

3 For the purposes of the analysis in this EIR, all existing spaces in the Kaiser Center Garage, including spaces that would be removed and replaced as part of the Project, are not considered part of the Project's proposed parking supply. The proposed parking supply is equivalent to the net new parking as a result of the Project—in this case, 697 spaces.

20th Street up to the roof garden would be constructed to improve public access to the roof garden. Street trees would be planted along the perimeter of the site on 20th Street, Webster Street, and 21st Street. Proposed landscaping is shown in Figure III-14.

Utilities

The Project Site is fully developed and currently served by all existing utilities provided by local providers: water and wastewater (sewer) (East Bay Municipal Utilities District), stormwater drainage (Alameda County Flood Control and Water Conservation District and Oakland Public Works Agency, electricity and gas service (Pacific Gas & Electric), as well as solid waste service (Waste Management of Alameda County). A detailed description of the existing site utilities is presented in Section IV.M, *Utilities and Service Systems*, of this Draft EIR.

Demolition and Construction Phasing

It is anticipated that the Proposed Project would be constructed in two phases over a period of approximately seven years, with the actual start dates and construction periods depending upon market conditions at the time. The first phase would construct the 34-story South Tower (replacing the 20th Street Mall building), including the additional roof garden space and the access stairs from 20th Street. The second phase would begin after the South Tower is near complete and would construct the 42-story North Tower (replacing the Webster Street Mall building), including removal of the westernmost portion of the roof garden.

Phase 1 (South Tower) demolition and construction activities would occur for approximately four years: Demolition of the existing 20th Street Mall building would occur approximately from late in year two through early year three. Construction of the South Tower would begin approximately at the beginning of the year three and continue through the end of year four. Occupancy of the South Tower is anticipated in year four. As discussed above, in Phase 1 (South Tower) , the Project would construct 467 new parking spaces, but would not demolish any existing parking spaces, resulting in a net increase of 467 parking spaces.

Phase 2 (North Tower) demolition and construction activities would occur for approximately four years. Demolition of the existing building and designated areas of the roof garden is projected to begin a few months after completion of the South Tower in year four, and continue for approximately six months. Construction of the North Tower would begin in year five and continue for approximately two years thereafter, to year seven. Occupancy of the North Tower is anticipated to occur approximately at the end of year seven. As discussed previously, Phase 2 (North Tower) would demolish 155 existing parking spaces and construct 385 new parking spaces, resulting in a net increase of 230 parking spaces.

Demolition and Construction Activities

The Proposed Project would demolish the existing retail frontage and mall buildings along 20th and Webster Streets to construct the new development. Some of the structures that would be demolished may have asbestos-containing materials and lead-based paint, which would be removed in accordance with all regulatory requirements prior to demolition. The Proposed Project will also require demolition of paving and other site materials to accommodate new circulation, parking and site development areas. The Kaiser Center roof garden will mostly remain intact, but will be reconfigured in some areas as described under *Open Space and Landscaping,* above.

Excavation will be required to accommodate subsurface development of new parking areas. Construction of the new office towers may be supported on deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system.

The Project Applicant proposes to establish a construction debris recycling program throughout demolition and construction of the Project, which would assume 50 percent materials recycled or reused. Concrete materials, in particular, not needed for the Proposed Project would be hauled from the site for recycled material reuse.

Table III-3 below presents a preliminary summary of proposed construction activity anticipated for the Proposed Project and relevant to the environmental analysis:

TABLE III-3
PRELIMINARY CONSTRUCTION ACTIVITY SUMMARY

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Construction Vehicle Type/Number of Trips		
Off Haul Trucks (excavation materials)	3,100 truck loads	100 truck loads
Debris Box Trucking	260 truck loads	300 truck loads
Delivery Trucks	5,500 truck loads	6,000 truck loads
Passenger Vehicles (incl. construction employees)	140 cars per day average, 250 cars peak	140 cars per day average, 250 cars peak
Mobile Cranes	Intermittent use	Intermittent use
Construction Traffic Routes		
Interstate 580	To Harrison St to job site	To Harrison St to job site
Interstate 880	To Harrison St job site	To Harrison St job site
Interstate 980	To 27th St to Harrison St to job site	To 27th St to Harrison St to job site
Staging Areas/Lane or Street Closures		
Street	Close one lane (no parking) of 20th St and one lane (parking) of Webster St.	Close one lane (parking) of Webster St and one lane (parking) of 21st St
Sidewalk	Close 20th St and Webster St sidewalks (adjacent to Project Site)	Close sidewalks on Webster and 21st streets (adjacent to Project Site)
Construction Workers/Day		
Average number of workers	212	212
Peak	380	380
Parking	Existing onsite garage or surface lots in the vicinity	Existing onsite garage or surface lots in the vicinity
Estimated Cut/Fill; Mass Excavation	31,000 cubic yards	Minimal (existing building demolition)
Number of Truck Trips (Off Haul)		
Demolition Debris	800 truck loads	1,000 truck loads
Excavated Material	3,100 truck loads	100 truck loads

TABLE III-3 (CONTINUED)
PRELIMINARY CONSTRUCTION ACTIVITY SUMMARY

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Anticipated Disposal Sites		
Disposal of demolition debris	Pursuant to Oakland Municipal Code 15.34: To obtain a Building Permit for demolition and construction of non-residential projects, Project Applicant is required to have an approved Waste Reduction & Recycling Plan (WRRP) demonstrating compliance with the City's goal of reducing the quantity of construction and demolition debris disposed of at landfills by 50% or greater. 50% to be recycled. Demolition debris will be trucked to Davis Street Transfer Station in San Leandro. 50% will be landfilled.	
Disposal of excavated materials	Legal disposal site, pursuant to Env. Site Assessment	Legal disposal site, pursuant to Env. Site Assessment
Pile Driving		
Number, location, duration	525 piles; 20 piles per day = approx. 6 weeks.	525 piles; 20 piles per day = approx. 6 weeks.
Solider pile shoring	28,000 sq ft; approx. 6 weeks duration	28,000 sq ft; approx. 6 weeks duration
Water Runoff Plan		
SWPPP Plan	Compliance with SWPPP, which will include all necessary measures to minimize stormwater runoff from the site during construction. Stormwater runoff to be filtered at runoff locations and storm drain inlets. Dust and mud to be contained onsite.	Compliance with SWPPP, which will include all necessary measures to minimize stormwater runoff from the site during construction. Stormwater runoff to be filtered at runoff locations and storm drain inlets. Dust and mud to be contained onsite.
Containment	Onsite storage tanks to contain stormwater and groundwater.	Onsite storage tanks to contain stormwater and groundwater.
Filtration	Filtration at all points of runoff from the site with hay bales and filter fabric. Add'l filtration at all city storm drain inlets.	Filtration at all points of runoff from the site with hay bales and filter fabric. Add'l filtration at all city storm drain inlets.
Estimated Energy Consumption		
Electricity	1,300,000 kW hours	1,450,000 kW hours
Diesel	Negligible except for delivery trucks	Negligible except for delivery trucks
Estimated Water Consumption	55,000 gallons	65,000 gallons
Anticipated Building Materials	Steel, Concrete, Glass, Aluminum, Precast Concrete, Lumber	Steel, Concrete, Glass, Aluminum, Precast Concrete, Lumber

SOURCE: Turner Construction, February 23, 2009, Revised February 26, 2009

E. Required Public Agency Approvals and Utility Providers

As discussed in Chapter I (Introduction), the City of Oakland Community and Economic Development Agency (CEDA) is the Lead Agency responsible for preparation and certification of this EIR (pursuant to CEQA Guidelines Section 15051). This EIR is intended to be used to provide CEQA clearance for all required discretionary actions for the Proposed Project. The Planning Commission will make decisions on the required discretionary actions. At the time this EIR was prepared, the discretionary actions and other considerations and approvals anticipated to be required for the Proposed Project include those listed below, without limitation.

City of Oakland

Preliminary Development Plan (PDP) and Design Review for a Planned Unit Development (PUD) (Oakland Planning Code Chapter17.140) – The Project Applicant seeks approval of a Planned Unit Development (PUD), for which it is required to prepare and obtain approval for an overall Preliminary Development Plan (PDP) for the entire Project Site and, subsequently, one or more Final Development Plan(s) (FDPs) and Final Design Reviews prior to implementation of each site during phased development. The Project Applicant would be required to prepare the FDP that provides more detailed building and landscaping plans and elevations; plans for street improvements; grading or earth-moving plans; the location of water, sewer, and drainage facilities; among other detailed documents regarding site development. The FDP process provides flexibility in making design adjustments and responding to market conditions as the Project develops. The Planning Commission would be required to review the PDP and FDP and conduct Final Design Review(s). To the extent that the City determines any proposed future changes to the Project substantially exceed the Project described and analyzed herein, further environmental review would be conducted pursuant to CEQA Guidelines Sections 15162, 15163 or 15164.

- **Vesting Tentative Parcel Map (VTM)** (Oakland Municipal Code Title 16) – The Project would be required to obtain approval from the City for a vesting tentative map and parcel map to subdivide the Project Site. The Applicant's application for the required VTM was determined by the City to be complete as of March 16, 2010.
- **Tree Removal Permit** (Oakland Municipal Code Chapter 12.36) - Pursuant to the City's Protected Trees Ordinance, the Project Applicant would be required to obtain an approved Tree Removal Permit prior to removal of (or construction activity near) a "Protected Tree," as defined in Oakland Municipal Code Chapter 12.36.020. Tree permits would require approval by the Oakland Public Works Agency – Tree Division.
- **Encroachment Permits** (Oakland Municipal Code Chapter 12.08) – The Project would require City approval of encroachment permits to work within various public rights of way.
- **Demolition Permits** (Oakland Municipal Code Chapter 15.36) – The Project would require administrative approval of demolition permits to demolish existing buildings and structures on the Project Site.
- **Excavation Permits** (Oakland Municipal Code Chapter 12.12) – The Project would require City approval of excavation permits to conduct excavation activities on the Project Site.
- **P-Job Permit** (Oakland Municipal Code Chapter 12.20) – The Project would require City approval of a P-Job permit for the privately-sponsored construction of improvements within the public right-of-way.
- **Other Various Building Permits** (Oakland Municipal Code Title 15) - The Project would require City approval of all other permits required for Project construction on the Project Site.
- **Development Agreement** (Oakland Municipal Code Chapter 17.138). At the time of publication of this Draft EIR, Applicant has not elected to seek approval of a development Agreement with the City, but Applicant reserves the right to do so.

Other Agencies

The Proposed Project may also require review and approval by other public and quasi-public agencies and jurisdictions that have purview over specific aspects of the Project, and include those listed below, without limitation. These other agencies may also consider this EIR in their review and decision-making processes. A description and discussion of each action and agency/jurisdiction is included within the relevant topical analysis sections in Chapter IV, Environmental Setting, Impacts, SCAs, and Mitigation Measures, of this EIR. These potential other agencies with purview over aspects of the Proposed Project are listed below:

- California State Water Resource Control Board – San Francisco Region (RWQCB)
- California Department of Toxic Substances Control (DTSC)
- Alameda County Airport Land Use Commission (ALUC)
- California Department of Transportation (Caltrans)
- Federal Aviation Administration (FAA)

References – Project Description

CFR Title 14 Part 77.13

SOM, Project and Lot Information, Sheet ASK-047R2 and ASK 059R2, June 24, 2009.

The Swig Company, Memo to City of Oakland, August 13, 2008 (memo incorrectly dated 2009).

Turner Construction, “Kaiser Towers DEIR: Construction Impact Summary Data Matrix,” February 23, 2009, revised February 26, 2009.

CHAPTER IV

Environmental Setting, Impacts, Standard Conditions of Approval and Mitigation Measures

This Draft EIR has been prepared in accordance with CEQA, as amended (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines (California Code of Regulations sections 15000 through 15378).

This chapter contains the analysis of the Proposed Project's potential effects to environmental topics considered under CEQA. Sections A through M of this chapter describe the existing setting for each topic, the potential impacts that could result from the Proposed Project, relevant plans and policies, and Standard Conditions of Approval (SCAs) that would minimize or avoid potential adverse environmental effects that could result from the Proposed Project, and mitigation measures necessary to reduce the potential impacts resulting from the Proposed Project.

The following provides an overview of the scope of the analysis included in this chapter, organization of the sections, the methods for determining what impacts are significant, and the applicability of the City's "Uniformly Applied Development Standards and Standard Conditions of Approval."

Environmental Topics

The following environmental topics are analyzed in the following section in this chapter, as presented in the Table of Contents at the front of this document:

A. Aesthetics, Shadow and Wind
B. Air Quality
C. Biological Resources
D. Cultural Resources
E. Geology, Soils and Geohazards
F. Hazards and Hazardous Materials
G. Hydrology and Water Quality
H. Land Use, Plans and Policies
I. Noise
J. Population and Housing
K. Public Services and Recreation Facilities
L. Traffic, Transportation, Circulation and Parking
M. Utilities, Service Systems and Energy

Agricultural Resources and Mineral Resources were determined not to be directly relevant to the Proposed Project and are briefly discussed in Chapter VI, *Impact Overview and Growth Inducement*, under Section E, Effects Found Not to be Significant.

Format of Environmental Topic Sections, Impact Statements, and Mitigation Measures

Each environmental topic section generally includes two main subsections:

- *Existing Setting*, which includes baseline conditions, regulatory setting, Thresholds/Criteria of Significance, and identification of applicable Standard Conditions of Approval (which are discussed under subheading D, below); and
- *Impacts Analysis*, which identifies and discusses the potential impact and cites applicable Standard Conditions of Approval and mitigation measures that would, to the extent possible, reduce or eliminate adverse impacts identified in this chapter.

This EIR identifies all impacts with an abbreviated designation that corresponds to the environmental topic addressed (e.g., "HAZ" for hazardous materials). The topic designator is followed by a number that indicates the sequence in which the impact statement occurs within the section. For example, "Impact HAZ-1" is the first (i.e., "1") hazardous materials impact identified in the EIR. All impact statements are presented in bold text.

Similarly, each mitigation measure is numbered to correspond with the impact that it addresses. Where multiple mitigation measures address a single impact, each mitigation measure is numbered sequentially. For example "Mitigation Measure HAZ-1.1" is the first mitigation identified to address the first hazardous materials impact (i.e., "HAZ"). All mitigation measure statements are presented in bold text.

Thresholds/Criteria of Significance

Under CEQA, a significant effect is determined as a substantial, or potentially substantial, adverse change in the environment (Public Resources Code Section 21068). Each *Impact Analysis* discussion in this chapter is prefaced by significance criteria, which are the thresholds for determining whether an impact is significant.

The significance criteria used in this EIR are from the City of Oakland's Thresholds/Criteria of Significance Guidelines. The City has established these Thresholds/Criteria of Significance Guidelines to help clarify and standardize analysis and decision-making in the environmental review process in the City of Oakland. The Thresholds are offered as guidance in preparing environmental review documents. The City requires use of its Thresholds unless the location of the project or other unique factors warrants the use of different thresholds. The Thresholds are intended to implement and supplement provisions in the CEQA Guidelines for determining the significance of environmental effects, including CEQA Guidelines Sections 15064, 15064.5, 15065, 15382, and Appendix G, and form the basis of the City's Initial Study and Environmental Review Checklist (although one was not prepared for this Proposed Project to scope this EIR).

The Thresholds are intended to be used in conjunction with the City's "Uniformly Applied Development Standards and Conditions of Approval" (see discussion under subheading D, below), which are incorporated into projects as Conditions of Approval regardless of the determination regarding a project's environmental impacts.

Uniformly Applied Development Standards and Conditions of Approval

The City's Uniformly Applied Development Standards and Conditions of Approval (referred to in the EIR as "Standard Conditions of Approval" or SCA) are incorporated into projects as conditions of approval regardless of a project's environmental determination. As applicable, the SCAs are adopted as requirements of an individual project when it is approved by the City and are designed to, and will, substantially mitigate environmental effects.

In reviewing project applications, the City determines which SCAs are applied, based upon the zoning district, community plan, and the type(s) of permit(s)/approval(s) required for the project. Depending on the specific characteristics of the project type and/or project site, the City will determine which SCAs apply to a specific project. For example, SCAs related to creek protection permits will only be applied to projects on creekside properties.

All relevant SCAs have been incorporated as part of the Kaiser Center Project and are appropriately identified in each environmental topic section. Because SCAs are mandatory City requirements, the impact analysis assumes that these will be imposed and implemented by a project. If a SCA would reduce a potentially significant impact to less than significant, the impact is determined to be less than significant and no mitigation is imposed.

The SCAs incorporate development policies and standards from various adopted plans, policies, and ordinances, such as the Oakland Planning and Municipal Codes, Oakland General Plan Elements, including Land Use and Transportation Element (LUTE), Open Space Conservation and Resources (OSCAR), and Historic Preservation Element (HPE); Oakland Creek Protection, Stormwater Management and Discharge Control Ordinance, Oakland Tree Protection Ordinance, Oakland Grading Regulations, National Pollutant Discharge Elimination System [NPDES] permit requirements, California Building Code, and Uniform Fire Code, which have been found to substantially mitigate environmental effects. Where there are peculiar circumstances associated with a project or project site that will result in significant environmental impacts despite implementation of the SCAs, the City will determine whether there are feasible mitigation measures to reduce the impact to less than significant levels.

Recommended Conditions and Project-Specific Conditions of Approval

Although not required by CEQA, certain "Recommended Conditions" are included the *Transportation and Circulation* section of this EIR with respect to certain improvements that are not necessary to address or mitigate any environmental impacts of the Project but nevertheless are recommended herein by City Staff. These recommendations will be considered by decision makers during the course of Project review and may be imposed as Project-Specific Conditions of Approval.

Other "Project-Specific Conditions of Approval" supplement SCAs and are specific to the Project as they are identified in technical studies or reports prepared for the Project. Project-Specific Conditions of Approval are identified in the *Geology, Soils and Geohazards* and the Public *Services and Recreation Facilities* sections of this EIR, as well as in Table II-1.

Impact Classifications

The following level of significance classifications are used throughout the impact analysis in this EIR:

- **Less than Significant (LS) –** The impacts of the Proposed Project, either before or after implementation of SCAs or feasible mitigation measures, do not reach or exceed the defined Threshold/Criteria of Significance. Generally, no mitigation measure is required for a LS impact.
- **Potentially Significant (PS) –** The impact of the Proposed Project may reach or exceed the defined Threshold/Criteria of Significance, however it is not evident that, even in the theoretical worst-case standard conditions, a significant impact would occur. Where feasible, SCAs and/or mitigation measures are identified to reduce the PS impact to LS.
- **Significant (S) and Significant Unavoidable (SU) –** The impact of the Proposed Project reaches or exceeds the defined Threshold/Criteria of Significance. No SCA or feasible mitigation measure is available to reduce the S impact to LS. In these cases, feasible mitigation measures are identified to reduce the S impact to the maximum feasible extent, and the significant impact is considered SU. Impacts are also classified as SU if a feasible mitigation measure is identified that would reduce the impact to LS, but the approval and/or implementation of the mitigation measure is not within the City of Oakland's or the project Applicant's sole control, in which case the analysis cannot presume implementation of the mitigation measure and the resulting LS impact. It is important to clarify that SU is an impact classification that only applies *after* consideration of feasible mitigation measures.
- **No Impact** – No noticeable adverse effect on the environment would occur.

Environmental Baseline

Overall, pursuant to Section 15125(a) of the CEQA Guidelines, this EIR measures the physical impacts of the proposed project against a "baseline" of physical environmental conditions at and near the Proposed Project. The environmental "baseline" is the combined circumstances existing around the time the NOP of the EIR was published, which is March 2008.[1] In most cases, the

1 Except as specified otherwise, any reference to "existing" conditions throughout this EIR refers to the baseline condition as of about March 2008.

baseline condition relevant to the environmental topic being analyzed is described within each environmental topic section in this chapter. In some cases (such as Section IV.B, *Aesthetics,* Section IV.C, *Transportation, Circulation and Parking,* and IV.K, *Population, Housing and Employment*), discussion of the baseline condition is detailed or restated in the *Impacts Analysis* to provide the impact analysis in the most reader-friendly format and organization. The baseline also includes the policy and planning context in which the project is proposed. This is discussed in detail within Section IV.H, *Land Use, Plans and Policies*, and identifies any inconsistencies between the Proposed Project and applicable, currently adopted plans and policies.

Cumulative Analysis

Approach

CEQA defines cumulative as "two or more individual effects which, when considered together, are considerable, or which can compound or increase other environmental impact." Section 15130 of the CEQA Guidelines requires that an EIR evaluate potential environmental impacts when the project's incremental effect is cumulative considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. These impacts can result from a combination of the Proposed Project together with other projects causing related impacts. "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonable foreseeable probable future projects." The City of Oakland's analysis approach specifies that "past, present, existing, approved, pending and reasonably foreseeable future projects" should be included as part of the cumulative analysis.

Context

The context used for assessing cumulative impacts typically varies depending on the specific topic being analyzed. For example, considerations for the cumulative air quality analysis are different from those used for the cumulative analysis of aesthetics. In assessing aesthetic impacts, only development within the vicinity of the project would contribute to a cumulative visual effect. In assessing air quality impacts, on the other hand, all development within the air basin contributes to regional emissions of criteria pollutants, and basin-wide projections of emissions is the best tool for determining the cumulative effect. Accordingly, the geographic setting and other parameters of each cumulative analysis discussion can vary.

Generally, to establish a partial baseline for cumulative analysis, the City of Oakland's Major Projects list was used, in part, to determine past, present, existing, approved, pending and reasonably foreseeable future projects in the vicinity of the Kaiser Center. The geographic areas near the Project Site include Downtown/Central Oakland, Uptown, and Lake Merritt Business District. Major projects from the City's Major Projects List that pertain to the Kaiser Center vicinity are summarized in **Table IV-1**, below. The major projects listed in Table IV-1 are not inclusive of all possible past major projects; projects not listed were no longer maintained on the City's list as of March 2008 but are part of the baseline assumptions for the analysis in this EIR. Additional development projects that are not on the City's Major Projects list have also been considered for the cumulative assessment of certain topic areas and are identified in the appropriate environmental topic section in Chapter IV of this Draft EIR. Specifically, a more detailed cumulative list of projects was identified in order to analyze cumulative visual, wind and shadow effects in the project area, given the site specific and localized nature of these effects. Moreover, the transportation analyses (and transportation-related traffic and air quality) used the Alameda County Congestion Management Analysis (ACCMA) travel demand model which requires inputs at the traffic analysis zones (TAZ) level.

TABLE IV-1
LIST OF RELEVANT CUMULATIVE PROJECTS FROM THE CITY'S MAJOR PROJECT LIST (MAR-APRIL 2008)

Project Name	Components
Emerald Views Development Project (Formerly 222 19th Street Development Project)	▪ 370 residential units ▪ 933 s.f. cafe
1938 Broadway	▪ approx. 85,200 s.f. retail/fitness club ▪ approx. 829,500 s.f. commercial space ▪ 220 residential units ▪ 384 parking stalls ▪ Rehabilitation of the Tapscott Building
401 Alice Street	▪ 58 condominium units ▪ 5 flex units
1309 Madison Street	▪ 72 condominium units
Uptown Parcel 4 (Telegraph/19th Street)	▪ 370 residential units
1443 Alice Street	▪ 245 residential units
325 7th Street	▪ 382 residential units ▪ 9,000 s.f. commercial
Broadway West Grand (formerly known as Negherbon Mixed Use Project) 2345 Broadway	Parcel B ▪ 367 residential units ▪ 8,500 s.f. retail
1640 Broadway Mixed Use Project	▪ 177,600 s.f. of office ▪ 4,710 s.f. ground floor retail ▪ Structured parking ▪ Alternative approved for 254 residential units with ground floor retail
Jack London Square Redevelopment	▪ 1.2 million s.f. of mixed-use retail, commercial, and office ▪ 1,700 seat movie theater ▪ 250 room hotel ▪ Supermarket, restaurants, and offices
Mandela Transit Village 1357 5th Street	▪ 120 residential units ▪ 38,500 s.f. commercial
188 11th Street	▪ 287 residential units ▪ 3,660 s.f. retail
Valdez & 23rd Street Project	▪ 281 residential units ▪ 500 car parking structure including 250 public spaces ▪ 12,000 s.f. retail
2538 Telegraph Ave	▪ 97 residential units ▪ 9,000 s.f. commercial space

TABLE IV-1 (CONTINUED)
LIST OF RELEVANT CUMULATIVE PROJECTS FROM THE CITY'S MAJOR PROJECT LIST (MAR-APRIL 2008)

Project Name	Components
Gateway Community Development Project	▪ 810 residential units ▪ 26,000 s.f. commercial
MacArthur Transit Village Project	▪ ± 540 residential units ▪ 30,000 s.f. retail/commercial space
Mandela Grand Mixed Use Project	▪ 1,577 residential units ▪ approx. 300,000 s.f. non-residential
Oak Knoll Project	▪ 960 residential units (408 SFD, 248 townhomes, 304 condominiums) ▪ 82,000 s.f. commercial
Oak to Ninth Mixed Use Development	▪ General Plan Amendment to Estuary Policy Plan (Central City East Redevelopment Plan Amendment) and Central District Urban Renewal Plan Amendment ▪ New Planned Waterfront Zoning District Zoning Map Amendments ▪ 3,100 residential units ▪ 200,000 s.f. commercial ▪ 3,950 structured parking spaces ▪ 32 acres public open space ▪ 2 renovated marinas; 170 boat slips ▪ Wetlands restoration area
Wood Street Development (formerly "Central Station")	▪ 1557 residential units (including 186 live/work units) ▪ 13,000 s.f. commercial ▪ 1.39 acres public open space ▪ 2.82 acres private open space ▪ Renovation of train station
Kaiser Permanente Medical Center Building	▪ Master Plan for new Hospital Phase II ▪ 1,216 space parking structure ▪ Hospital building (346 beds,approx. 1.06 MSF) ▪ Central utility plant Phase III ▪ Demolition of existing hospital tower and low-rise (except for recent Emergency Department addition and Fabiola Building) ▪ Conversion of ground-floor ▪ Parking on Site 7 (38 spaces) to accommodate an additional 6,000 SF. of retail ▪ Conversion of Emergency Department addition to temporary medical services use ▪ Construction of parking lot of approximately 189 spaces ▪ Construction of a new Central Administration MSB (approx. 60,000 SF)

SOURCE: City of Oakland, 2010

References – Setting

City of Oakland, CEDA Major Projects List, March-April, 2008

City of Oakland, Uniformly Applied Development Standards and Conditions of Approval, 2008

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A. Aesthetics, Shadow and Wind

This section describes the existing visual conditions of the Kaiser Center Project Site and vicinity and analyzes how the Proposed Project may affect the existing aesthetic character in the area surrounding the Project Site. The analysis includes how the Proposed Project may affect the visual quality and visual character of the area, as well as scenic vistas and resources viewed from surrounding public areas, and lighting and glare. Further, this section presents a shadow study of the Proposed Project's effects. This section also summarizes the results of the wind test that was conducted to establish how the Proposed Project would alter ground-level wind speeds in the vicinity of the Project Site. Appropriate City of Oakland SCAs are listed and mitigation measures are identified for significant effects, followed by identification of the residual impact significance after mitigation measures are implemented.

Environmental Setting

Visual Character

Project Vicinity

Overview

The Project Site is located in a developed urban area, within the northeastern corner of Oakland Central Business District (CBD). The general Project vicinity is fully urbanized and is characterized by a mix of commercial and office buildings that vary in terms of age, architectural style and height The vicinity is visually dominated by urbanized development (roadways, concrete and asphalt, parking, etc.), however, Lakeside Park and the open waters of Lake Merritt is located immediately east of the Project Site, and Snow Park is located immediately southeast of the Project Site. The Project vicinity is a flat terrain.

West

The visual character of areas immediately west of the Project Site is developed with low- to mid-rise commercial structures, 25 to 65 feet in height, and surface parking lots. This area lacks any particularly distinctive visual characteristics that would make it unique. Further west is the Broadway transportation corridor, which includes local retail, restaurants, and commercial office buildings and apartments ranging from three stories to more than ten stories in height. Further southeast is the downtown area, which contains primarily mid-rise and high-rise commercial and civic structures.

South

Land uses directly south of the Project Site consist of interspersed commercial office buildings, ranging in heights of three to more than twenty stories. Lake Merritt Plaza (1999 Harrison Street), at 371 feet tall, is the closest and most prominent high-rise structure just south of the Project Site. Further south, the visual character is dominated by mid- and high-density residential complexes. As noted above, directly southeast of the Project Site is the 4.2-acre Snow Park, a manicured park that includes a miniature course and golf putting green. The park acts as a visual continuation of the Lake Merritt recreational areas and also provides views of the Project Site.

East

Just beyond Harrison Street and Lakeside Drive which border the east side of the Project Site is the 3.4-acre Lake Merritt and surrounding Lakeside Park. The Park provides open space and recreational facilities, including a walking promenade along the perimeter of the lake, tennis facilities, and a local boating center. The Lake and the surrounding recreational areas characterize the area east of the existing Kaiser Center office tower that dominates the eastern portion of the Project Site, and these open space areas possess high visual quality associated with the open waters and vegetation (grasses, shrubs and trees). The visual character of areas visible to the east of Lake Merritt include primarily dense residential neighborhoods comprised of multifamily and single-family residences, fairly uniform in scale and size.

North

Uses north of the Project Site, opposite 21st Street, include a variety of commercial services uses and interspersed office buildings, including the Pacific Bell/City National Bank Building (313 feet tall), the Ordway Building (404 feet tall), the AT&T Building (125 feet tall), and a scattering of surface parking lots. One block northeast of the Project Site is The Cathedral of Christ the Light (57 feet tall), a contemporary structure constructed in the shape of a cone, giving it a distinctive appearance. Northeast of the Project Site, uses include a number of high-density apartment/condominium developments along Grand Avenue, which abuts the northern perimeter of Lake Merritt. North of Grand Avenue uses include residential neighborhoods with low-rise apartment buildings in a dense development pattern.

The Project Site is also in close proximity to major roadways, including two major transportation corridors, Grand Avenue and Broadway, as well as Harrison Street and Lakeside Drive. These roadways are four to six lanes wide and contribute to the visual character of the Project vicinity.

Project Site

The Project Site is located in the western portion of the already developed Kaiser Center Complex, which also includes four high-rise office buildings, a secondary parking facility, and the Cathedral of Christ the Light. The four high-rise office buildings are the Kaiser Building (a 29-story tower at 300 Lakeside Drive), Ordway Building (a 28-story tower at One Kaiser Plaza), Lake Merritt Tower (a 10-story building at 155 Grand Avenue), and the Caltrans Building/ Nicholas C. Petris State Building (a 15-story building at 111 Grand Avenue).

The Project Site itself is currently occupied by a 5-story parking structure that contains 1,340 parking stalls, and approximately 38,190 square feet of commercial space on the ground level (known as the “Webster Street Mall” and “20th Street Mall”, or together as “Mall structure”), which provides a wide range of services, including a fitness center, drugstore, bank and several restaurants.

The Kaiser Center roof garden exists on the roof of the parking structure and includes landscaped walkways, sitting areas, and three small manmade pools. While the existing Mall structure (the 20th Street Mall and Webster Street Mall, together), built in a contemporary/utilitarian style with dolomite panels and projecting eave, does not exhibit any distinctive visual characteristics, the landscaped roof garden is considered to offer a high aesthetic quality.

Views of the Project Site

The photographs of existing conditions presented in this section collectively reflect the baseline condition against which the Proposed Project's effects to visual character and scenic resources views are measured. The viewpoint locations are shown in **Figure IV.A-1**.

In views from West Grand Avenue near Bay Place looking southwest (see **Figure IV.A-2**), the Ordway Building and the Cathedral of Christ the Light dominate the midrange, with the Kaiser Center office tower seen in the distance on the left side of the view. The Grand Avenue streetscape, containing limited vegetation of either side, is seen in the foreground and reaches toward the horizon to the right. A portion of Lake Merritt's northernmost shore is visible, however views from this viewpoint are of urbanized development that includes high-rise towers and other moderately scaled commercial buildings.

From Broadway at 20th Street looking east toward the Project Site (see **Figure IV.A-3**), the view is dominated by the urban environment along 20th Street, with the five-story building on the northeastern corner of this intersection dominating the foreground. Beyond that, the low-rise California Bank building is visible, with the top portion of the Kaiser Center office tower seen in the distance beyond the bank building. A few street trees along Broadway and 20th Streets can also be seen. Views of the Project Site are not available from this vantage point due to intervening buildings.

Existing view from Webster Street at 17th Street looking northeast (see **Figure IV.A-4**) illustrates the Webster Street streetscape, with low-rise commercial buildings in the foreground and high-rise towers along or to the right of Webster Street in the background. Available in the distance are the partial views of the Ordway Building in the center of the visual corridor, and portions of the Kaiser Center office tower and Lake Merritt Plaza on the right hand side. In the distance (two blocks away), the scale of the southern façade of the 20th Street Mall on the Project Site is visible, although individual building elements are not discernable from this distance.

Existing view from Lakeside Drive near Madison Street looking northwest (see **Figure IV.A-5**) shows the northernmost edge of Lake Merritt and the Lakeside Drive streetscape in the foreground. High-rise structures surrounding the Project Site are visible in the distance. The curved eastern façade of the Kaiser Center office tower dominates this view. To the right of the Kaiser Center office tower are the Ordway building and the Cathedral of Christ the Light; to the left is the partially obscured Lake Merritt Plaza. The Project Site itself is hidden by these other structures and cannot be easily seen from this vantage point.

2 Candidate Simulation Photo Viewpoint

SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-1
Simulation Photo Viewpoint Locations

Existing view from West Grand Avenue near Bay Place looking southwest

Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

SOURCE: Environmental Vision

Figure IV.A-2
Visual Simulation - View #1

Existing view from Broadway at 20th Street looking east

Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-3
Visual Simulation - View #2


Existing view from Webster Street at 17th Street looking northeast


Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

SOURCE: Environmental Vision

Figure IV.A-4
Visual Simulation - View #3

Existing view from Lakeside Drive near Madison Street looking northwest

Visual simulation of proposed project

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

SOURCE: Environmental Vision

Figure IV.A-5
Visual Simulation - View #4

Light and Glare

The Project Site is located in a built-out urban environment that has existing sources of light and glare associated with nearby land uses typical for an urban setting. Major light and glare sources in the area include the street lighting along Webster, 20th and 21st Streets; building lights from the existing retail and parking uses on the Project Site; and lighting emanating from other commercial and parking uses in the immediate area.

Shadow

The existing Mall structure on the Project Site is approximately three stories in height and is generally built to the edge of the property lines along the northern, western, and southern boundaries, with set backs from the boundary line that range from about 5 to about 50 feet. The 386-foot tall, 29-story curved Kaiser Center office tower and other existing high-rise structures in the Project area are the primary sources of existing shadow on the Project Site. Parcels south and north of the Project Site include a number of high-rise office towers, which generate existing shadow in the Project area.

Shadow diagrams that illustrate the existing shadow environment are provided in **Figures IV.A-6** through **IV.A-17**. (These figures also illustrate the Proposed Project's shadow effects, which are discussed under *Impacts* further in this Section.) The figures depict existing shadow for representative times of day (9:00 a.m., 12:00 noon, and 3:00 p.m.) at the spring equinox (March 21st), on the summer solstice (June 21st), at the autumn equinox (September 21st), and on the winter solstice (December 21st). Shadows on any other day of the year would be within the range of shadows presented during the seasons and times of day.

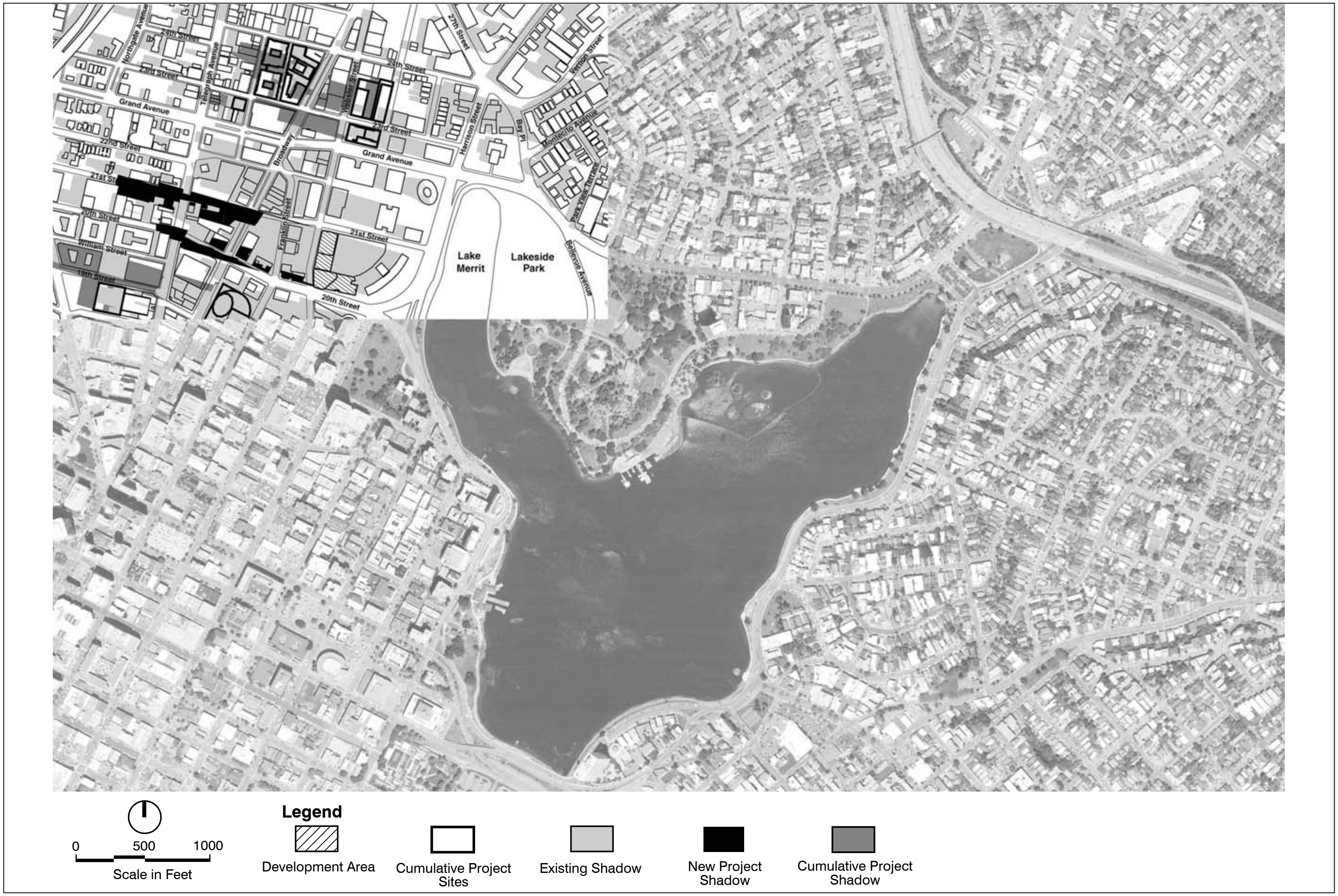
Overall, existing shadow cast on the Project Site occurs primarily in the morning and afternoon hours during late fall and early winter, when the sun is lowest on the horizon.

The site reconnaissance conducted for this analysis by the EIR preparers, in addition to review of the City's inventory of solar facilities (as of August 6, 2010), did not identify any passive solar heat collectors, solar collectors for hot water heating, or photovoltaic solar collectors in the areas adjacent to the Project Site. A solar facility at 555 19th Street, located mid-way between Telegraph Avenue and San Pablo Avenue east of the Project Site, approximately 1,700 feet away, is the nearest to the Project Site. No Project shadow is cast near that location at any time of the year.

Wind

General Wind Conditions

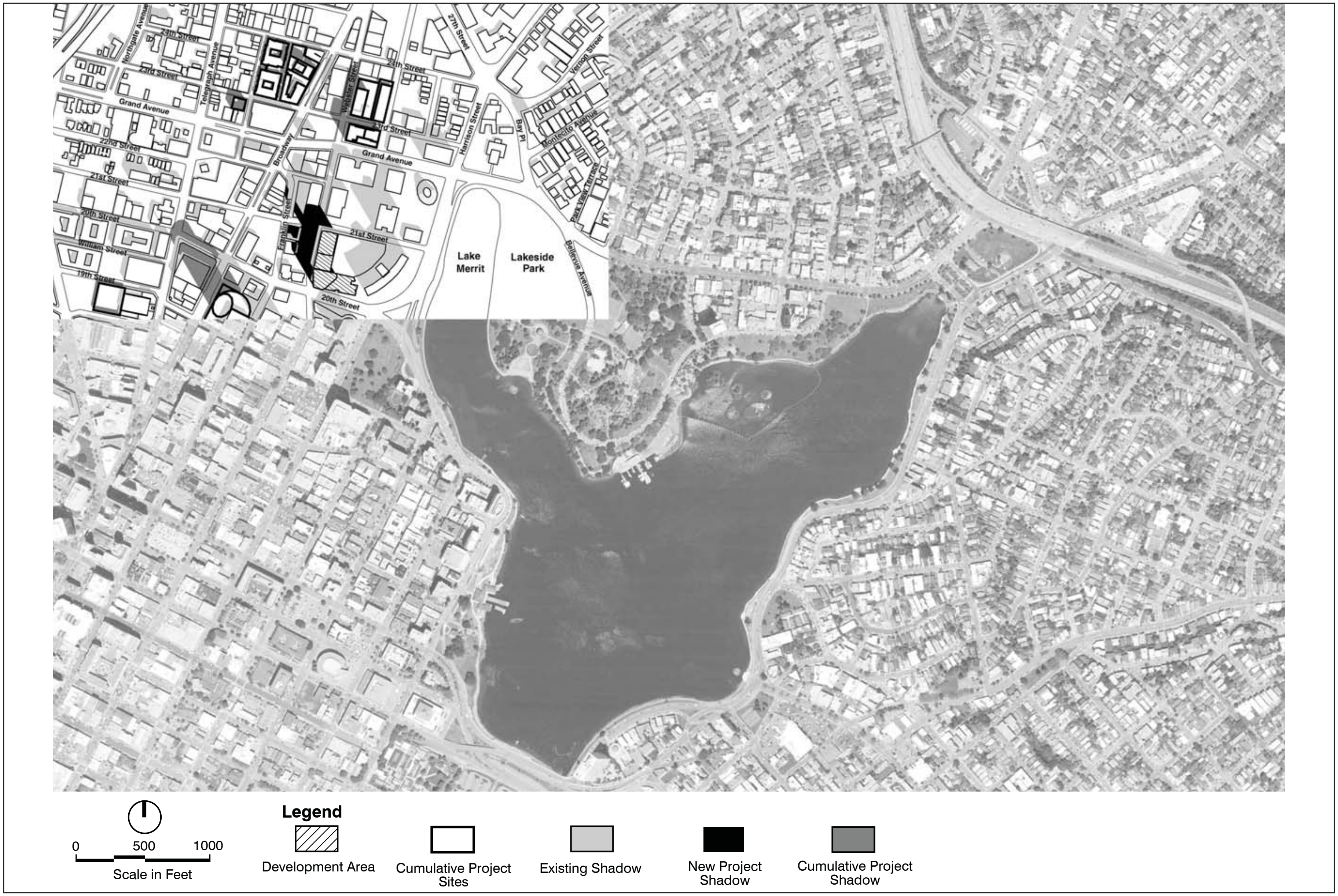
The Project Site lies within a climatological sub region of the San Francisco Bay Area Air Basin where the marine air that travels through the Golden Gate, as well as across San Francisco and the San Bruno Gap, is a dominant weather factor. The Oakland-Berkeley Hills cause the westerly flow of marine air to split off to the north and south of Oakland; this phenomenon tends to diminish wind speeds in Oakland.



SOURCE: Environmental Vision

Kaiser Oakland . 206213

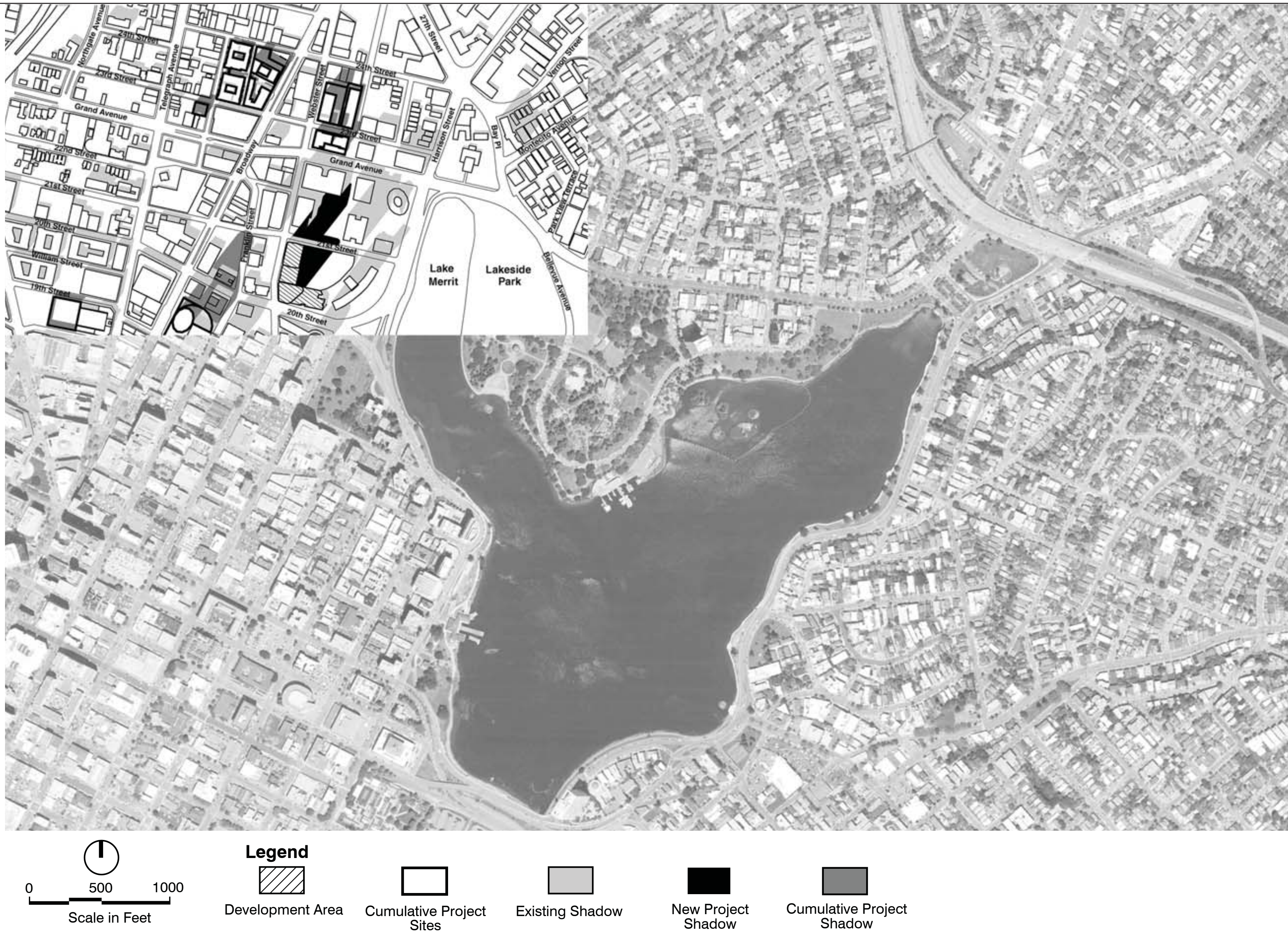
Figure IV.A-6
Project and Cumulative Shadow, March 21, 9:00 am PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

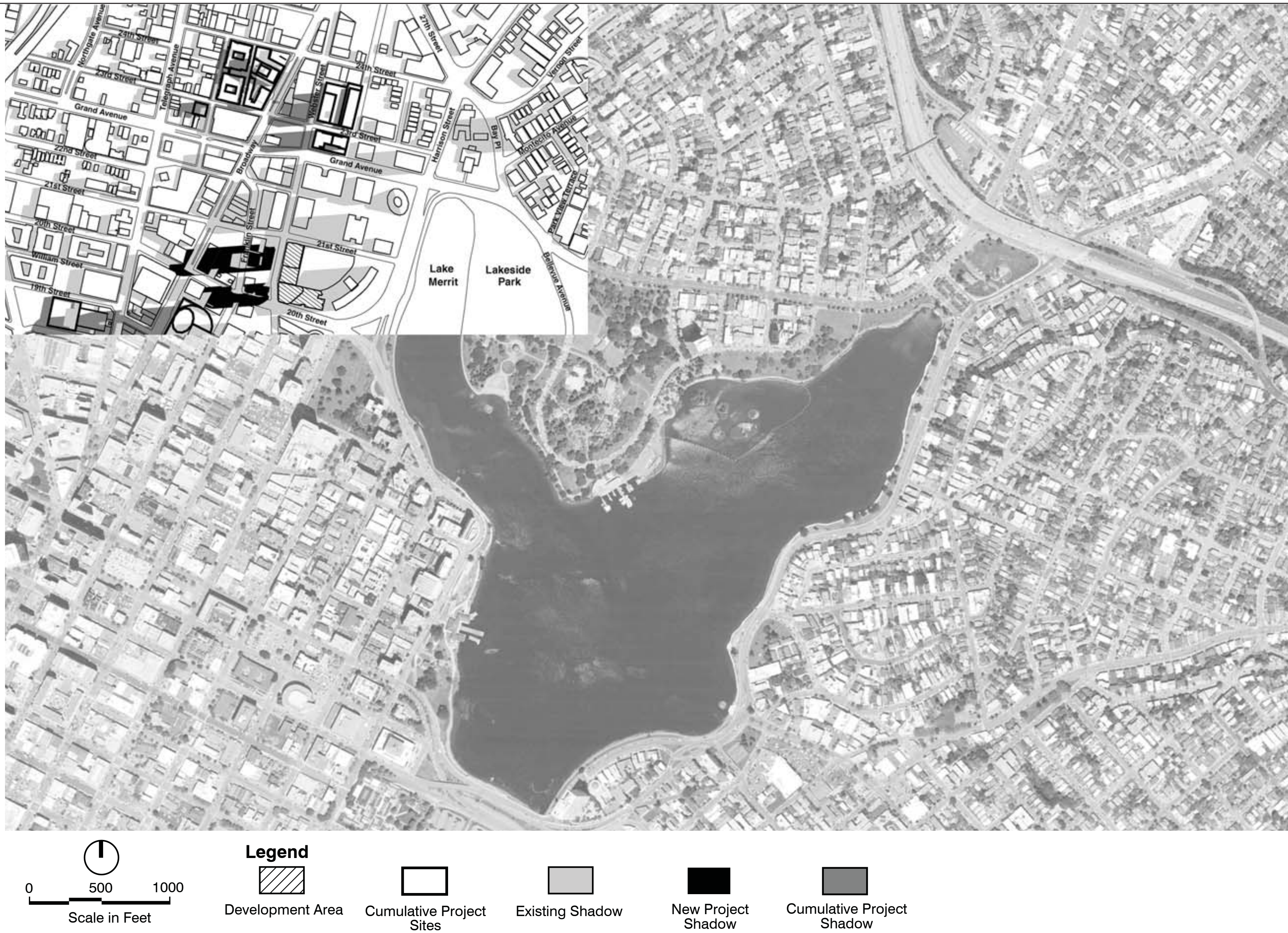
Figure IV.A-7
Project and Cumulative Shadow,
March 21, 12:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

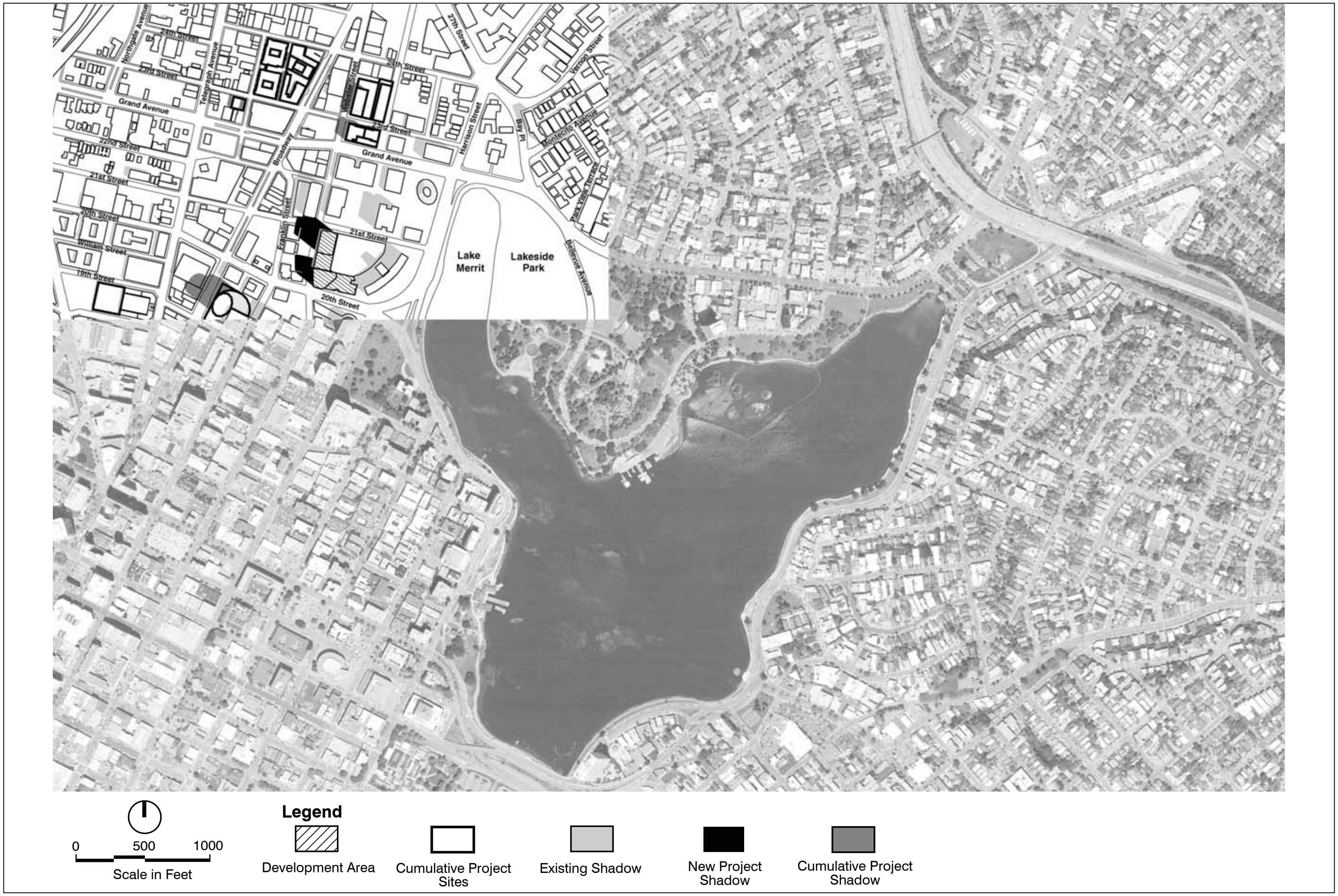
Figure IV.A-8
Project and Cumulative Shadow,
March 21, 3:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-9
Project and Cumulative Shadow,
June 21, 9:00 am PDT

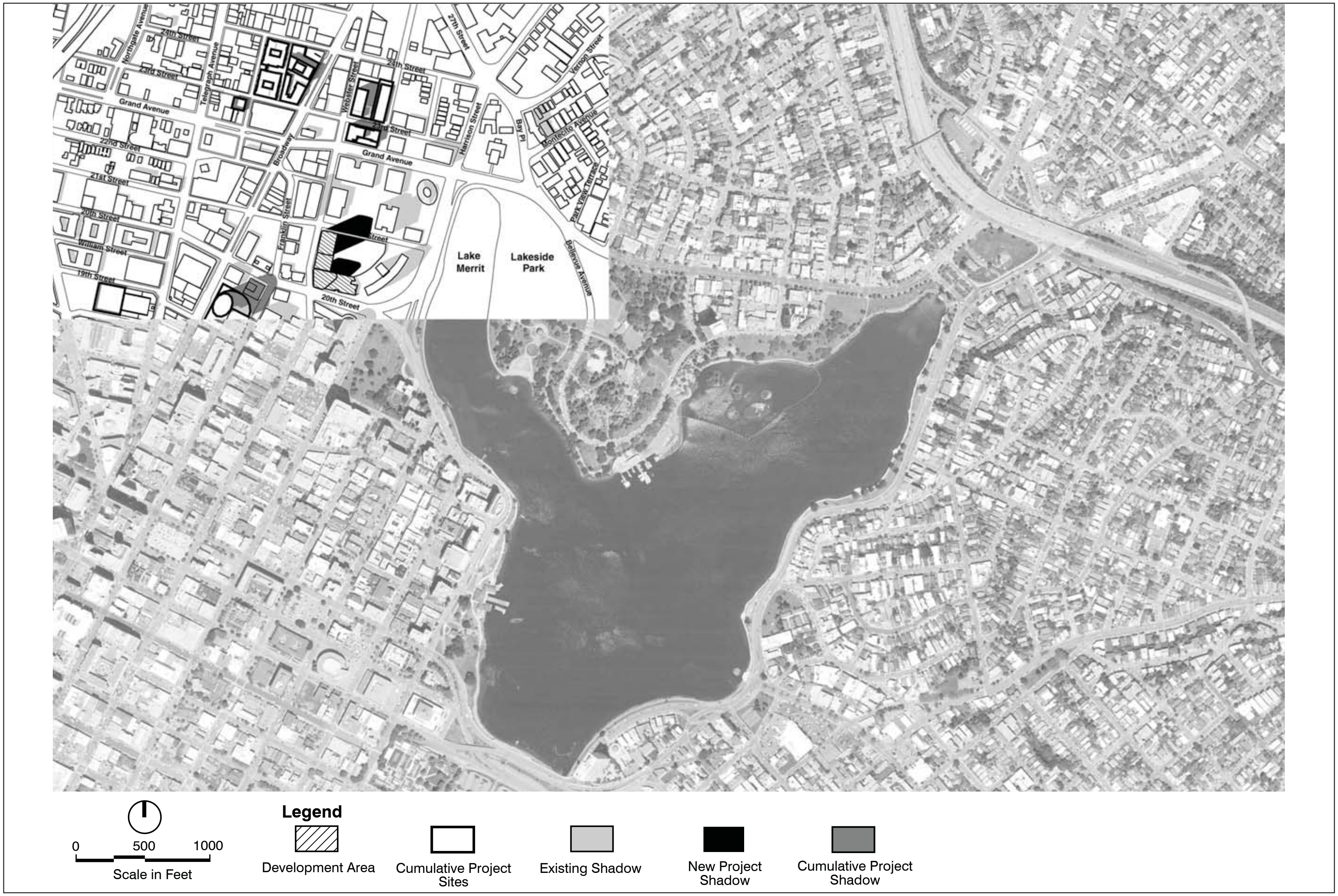


SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-10

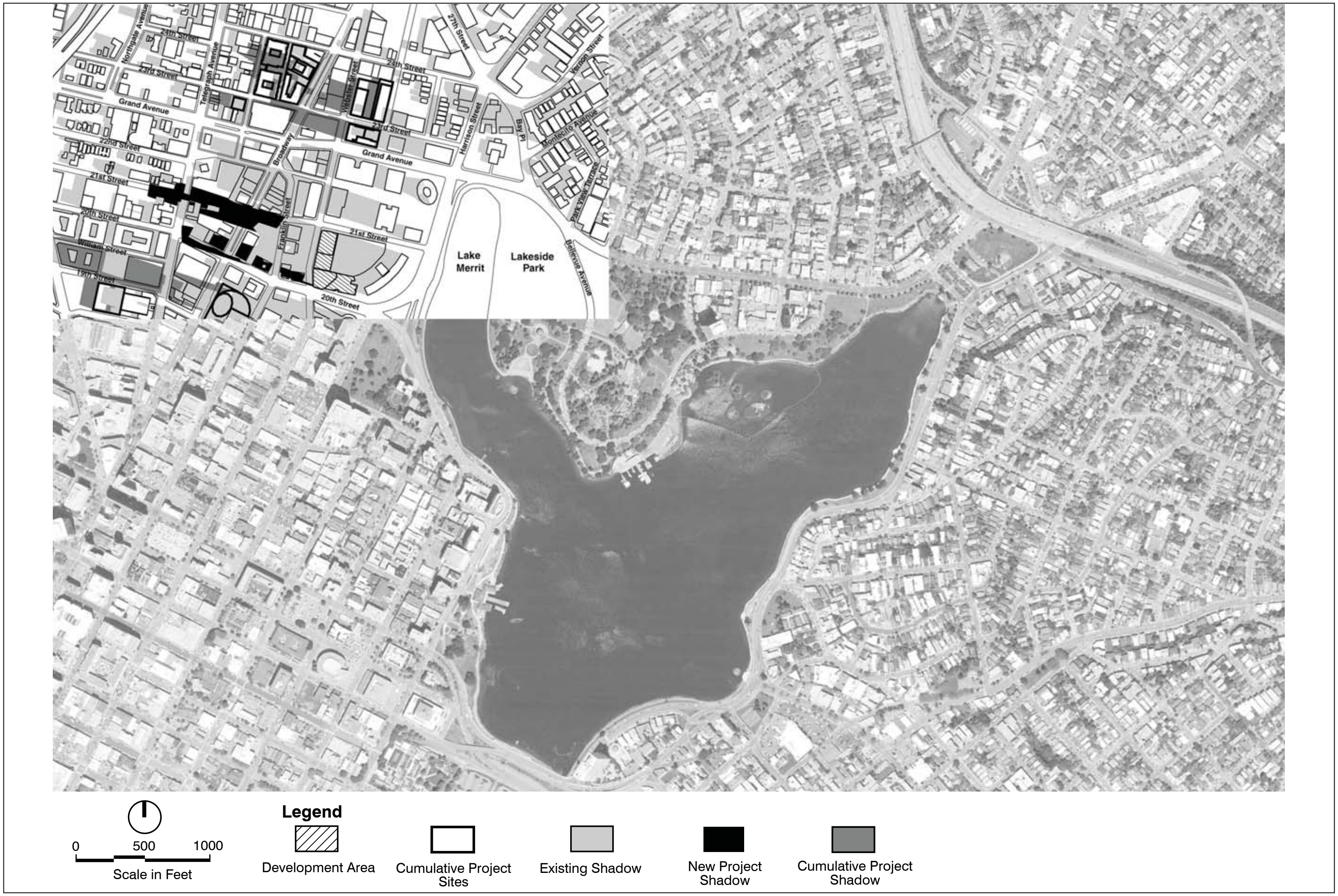
Project and Cumulative Shadow, June 21, 12:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

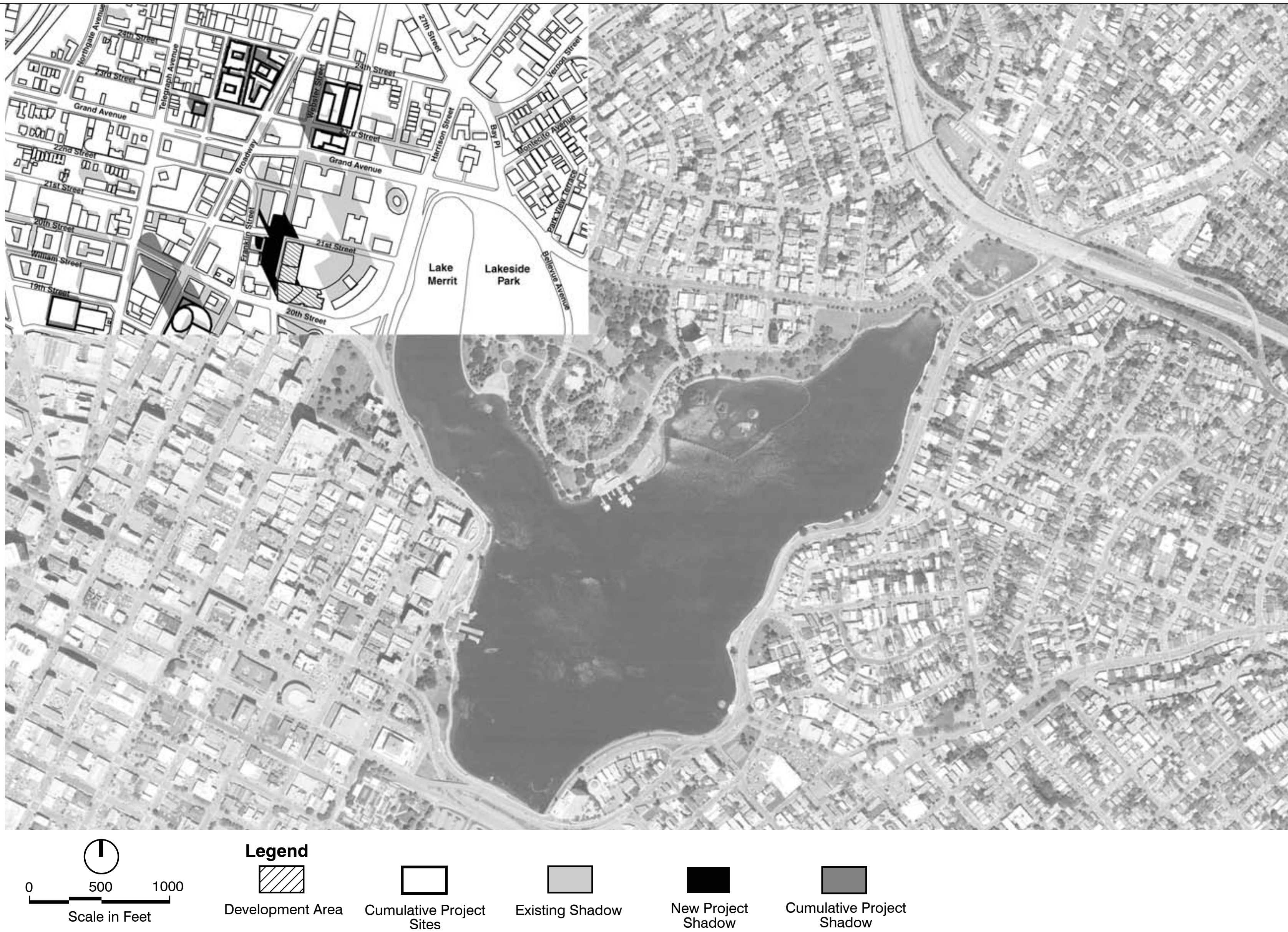
Figure IV.A-11
Project and Cumulative Shadow,
June 21, 3:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

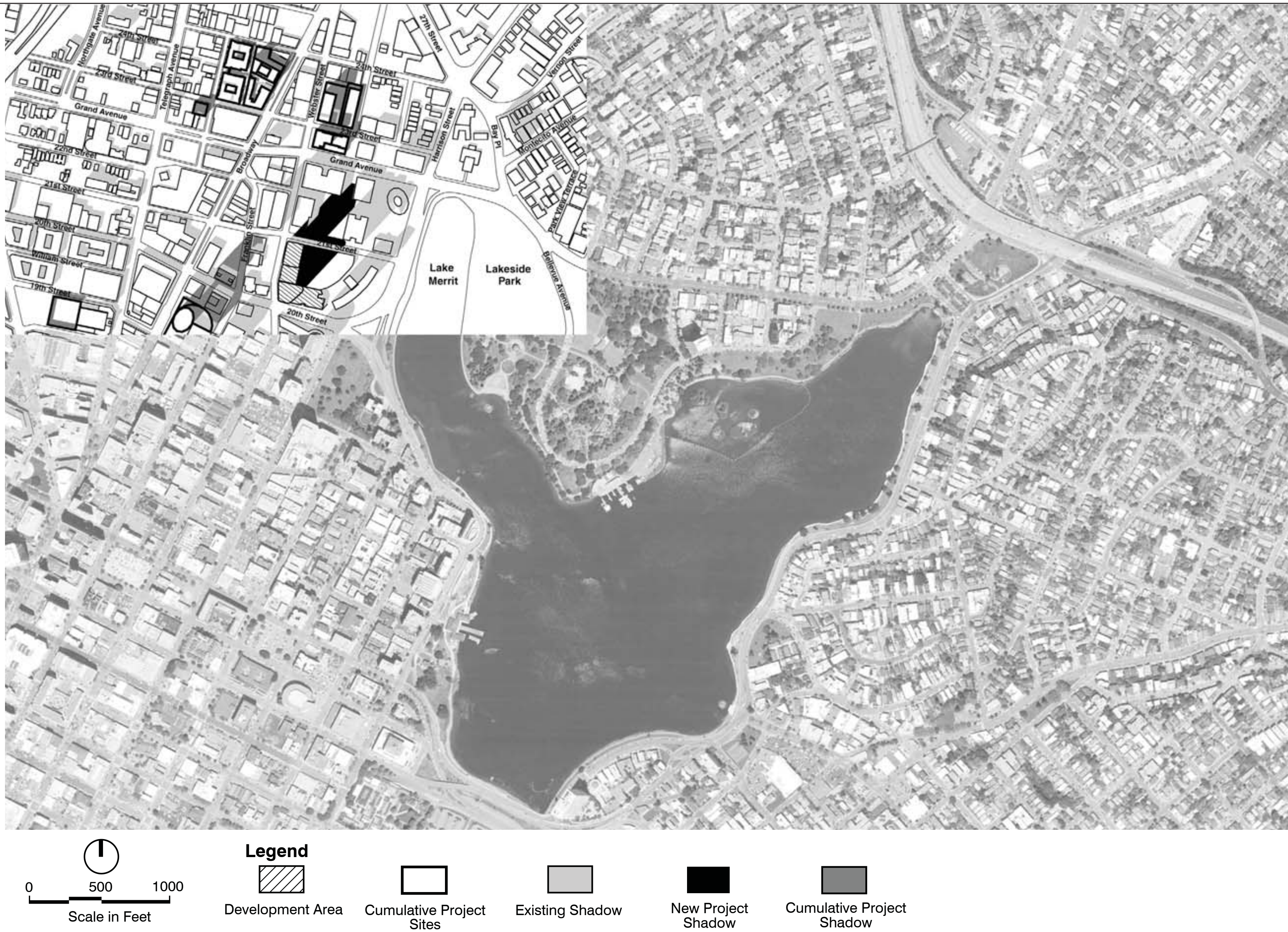
Figure IV.A-12
Project and Cumulative Shadow, September 21, 9:00 am PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

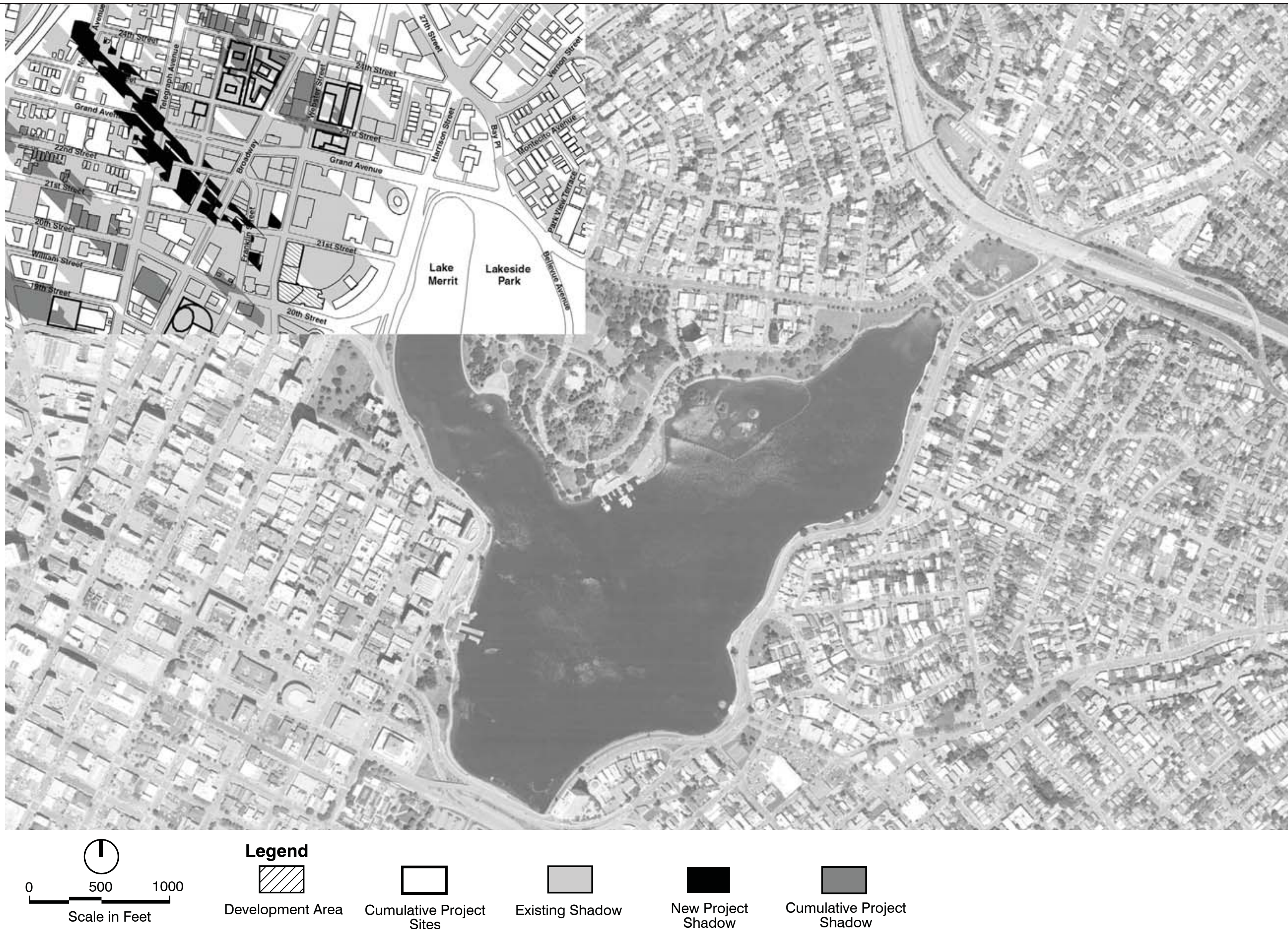
Figure IV.A-13
Project and Cumulative Shadow,
September 21, 12:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

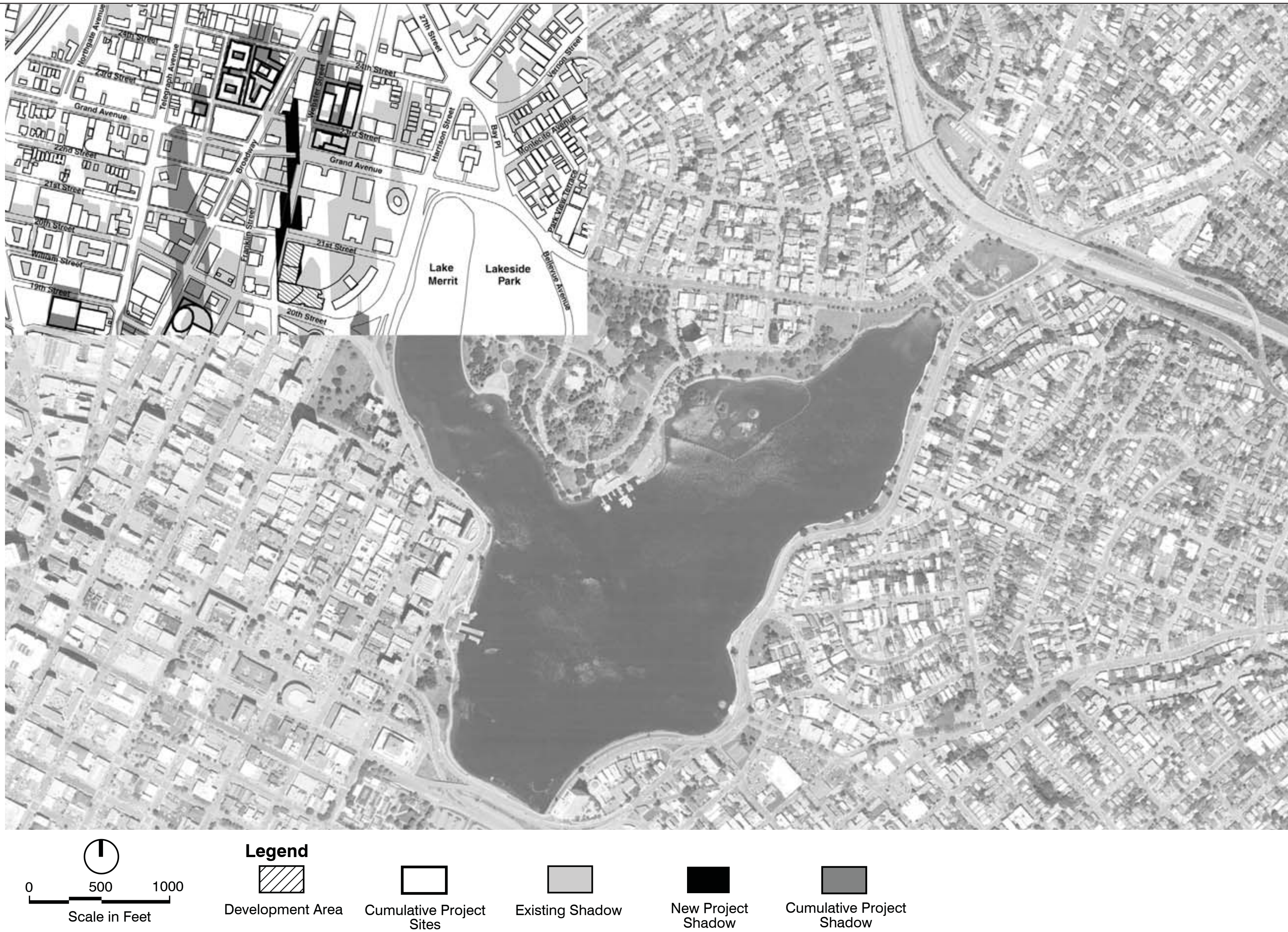
Figure IV.A-14
Project and Cumulative Shadow,
September 21, 3:00 pm PDT



SOURCE: Environmental Vision

Kaiser Oakland . 206213

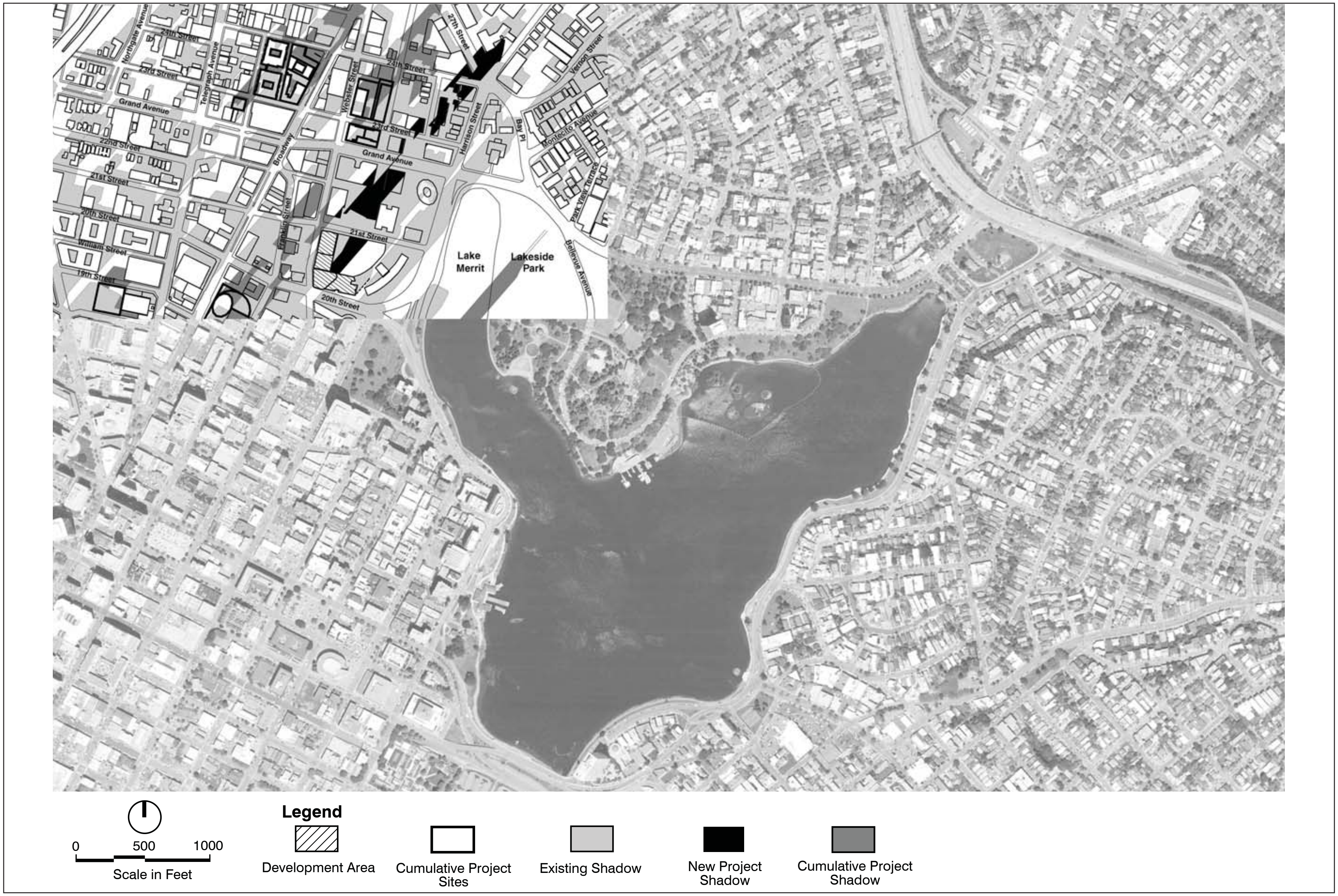
Figure IV.A-15
Project and Cumulative Shadow, December 21, 9:00 am PST



SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-16
Project and Cumulative Shadow,
December 21, 12:00 pm PST



SOURCE: Environmental Vision

Kaiser Oakland . 206213

Figure IV.A-17
Project and Cumulative Shadow, December 21, 3:00 pm PST

Wind data from airport meteorological stations show that the predominant wind flow for the higher speed components of the wind is generally from the west; winds from the west-southwest, west and west-northwest account for nearly 40 percent of winds, each with mean wind speeds between 10.0 and 10.5 miles per hour (mph). Average wind speeds vary from season to season with the strongest average winds occurring during summer and the lightest average winds during winter. In addition to the predominant westerly winds, higher velocity winds from the north-northwest and south-southeast are often associated with storms. Together, the west, north-northwest and south-southeast winds are the most frequent winds that exceed 25 mph.

Wind conditions within the city result from the interaction of the approaching wind with the physical features of the environment – buildings, topography and landscape. In cities, groups of structures tend to slow the winds near ground level, due to the friction and drag of the structures themselves, but this leaves the air mass that flows well overhead to continue with little slowing. However, a building that is much taller than surrounding buildings will intercept and redirect winds that might otherwise flow overhead, and bring those winds down the vertical face of the building to ground level, where they create ground-level wind and turbulence. These redirected winds can be relatively strong and also relatively turbulent, and can be incompatible with the intended uses of nearby ground-level spaces such as plazas and sidewalks. Moreover, structures that present very large surfaces square to strong winds can create ground-level winds that can be hazardous to pedestrians.

The Project Site includes the existing 3-story Mall structure that is built to the edge of the property lines along the northern and western boundaries, but with set backs from the boundary property line that range from about 5 to 50 feet. The 386-foot tall, 29-story curved Kaiser Center office tower stands at the east/southeast corner of the Project Site. Several high-rise buildings exist immediately to the north and to the south of the Project Site, and the bulk of the high-rise buildings of the Oakland downtown core exist further southwest of the Project Site. Other than these high-rise buildings, only low- and mid-rise buildings located primarily to the west of the Project Site exist to slow the strongest winds. Together, these are the only buildings that provide some sheltering from the approaching strong winds for the two new high-rise towers proposed by the Project. Thus, although approaching winds in Oakland are slowed by topography, the Project Site is almost fully exposed to the strongest of the approaching winds there, winds from the west, north-northwest, and south-southeast.

Regulatory Framework

Local Plans and Policies

City of Oakland General Plan

City of Oakland General Plan policies that pertain to aesthetics, shadow and wind relevant to the Proposed Project are contained within the General Plan Open Space, Conservation and Recreation (OSCAR) Element, and the Land Use and Transportation Element (LUTE) of the General Plan. Applicable policies include the following:

OSCAR Element

- Policy OS-101: Particular attention should be paid to (a) views of the Oakland Hills from the flatlands; (b) views of downtown and Lake Merritt; (c) views of the shoreline; and (d) panoramic views from Skyline Boulevard.
- Policy OS-10.2: New development should minimize adverse visual impacts and take advantage of opportunities for new vistas and scenic enhancement.
- Policy OS-10.3: Oakland's underutilized visual resources, including the waterfront, creeks, San Leandro Bay, architecturally significant buildings or landmarks, and major thoroughfares should be enhanced.
- Policy OS-11: To maintain and develop plazas, pocket parks, pedestrian walkways, and rooftop gardens in Oakland's major activity centers and enhance the appearance of these and other public spaces with landscaping and art.

LUTE Element

- Policy T6.2: The city should make major efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian-oriented and include lighting, directional signs, trees, benches, and other support facilities.

Scenic Highways Element

The City's Scenic Highways Element of the General Plan (adopted 1974) includes a number of policies that pertain to visual resources identified as part of the Caltrans Scenic Highway Program. Policies within the City's Highways Element aim to limit signage and visual intrusions and protect panoramic vistas along scenic corridors, and to ensure that new construction within scenic corridors demonstrate "architectural merit" and are "harmonious" with the surrounding landscape. The entire length of MacArthur Freeway (I-580) within Alameda County is identified as part of the Caltrans Scenic Highways Program. I-580, an Officially Designated State Scenic Highway, is about three quarters of a mile to the east of the Project Site.

Oakland Planning Code

The design of new projects in Oakland are subject to the following performance criteria that are utilized as part of the City's design review process:

Non Residential Facilities and Signs

- That the proposal will help achieve or maintain a group of facilities which are well related to one another and which, when taken together, will result in a well-composed design, with consideration given to site, landscape, bulk, height, arrangement, texture, materials, colors, and appurtenances; the relation of these factors to other facilities in the vicinity, and the relation of the proposal to the total setting as seen from key points in the surrounding area. Only elements of design which have some significant relationship to outside appearance shall be considered, except as otherwise provided in Section 17.136.060.
- That the proposed design will be of a quality and character which harmonizes with, and serves to protect the value of, private and public investments in the area;
- That the proposed design conforms in all significant respects with the Oakland General Plan and with any applicable design review guidelines or criteria, district plan, or

development control map which have been adopted by the Planning Commission or City Council.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The City's SCAs relevant to reducing visual, light and glare, wind, and shade/shadow impacts due to the Proposed Project are listed below. If the project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to aesthetic resources. The SCAs are incorporated and required as part of the project, so they are not listed as mitigation measures.

- **SCA AES-1 Lighting Plan:** (*Prior to the issuance of an electrical or building permit)* - The proposed lighting fixtures shall be adequately shielded to a point below the light bulb and reflector and that prevent unnecessary glare onto adjacent properties. Plans shall be submitted to the Planning and Zoning Division and the Electrical Services Division of the Public Works Agency for review and approval. All lighting shall be architecturally integrated into the site.

Other standard conditions would also serve to reduce impacts to visual, light and glare, wind, and shade/shadow, including:

- SCA BIO-5 Bird Collision Reduction (Section IV.C, *Biological Resources)*

Impacts and Mitigation Measures

Significance Criteria

The project would have a significant aesthetics impact if it would:

1. Have a substantial adverse effect on a scenic vista;
2. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state or locally designated scenic highway;
3. Substantially degrade the existing visual character or quality of the site and its surroundings;
4. Create a new source of substantial light or glare which would substantially and adversely affect day or nighttime views in the area;
5. Introduce landscape that would now or in the future cast substantial shadows on existing solar collectors (in conflict with California Public Resource Code Section 25980-25986);
6. Cast shadow that substantially impairs the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors;
7. Cast shadow that substantially impairs the beneficial use of any public or quasi-public park, lawn, garden, or open space;
8. Cast shadow on an historic resource, as defined by CEQA Section 15064.5(a), such that the shadow would materially impair the resource's historic significance by materially altering those physical characteristics of the resource that convey its historical significance and that justify its inclusion on or eligibility for listing in the National Register of Historic Places,

California Register of Historical Resources, Local register of historical resources, or a historical resource survey form (DPR Form 523) with a rating of 1-5;

9. Require an exception (variance) to the policies and regulations in the General Plan, Planning Code, or Uniform Building Code, and the exception causes a fundamental conflict with policies and regulations in the General Plan, Planning Code, and Uniform Building Code addressing the provision of adequate light related to appropriate uses; or

10. Create winds that exceed the wind hazard criterion during daytime hours during the year. [The wind analysis applies if the project's height is 100 feet or greater (measured to the roof) and one of the following conditions exist: (a) the project is located adjacent to a substantial water body (i.e., Oakland Estuary, Lake Merritt or San Francisco Bay); or (b) the project is located in Downtown Oakland (as defined by the General Plan)]

    The hazard criterion is a full-hour average wind speed in excess of 26 mph. When the hazard criterion is converted to the one-minute time-scale that applies to the meteorological data and pedestrian comfort criteria, it is restated as 36 mph.

Project Impacts and Mitigation Measures

Scenic Vistas or Resources

Impact AES-1: The Proposed Project would not adversely affect a scenic vista or substantially damage scenic resources. (Less than Significant)

The analysis of the Proposed Project's effect on scenic vistas and whether the Project would substantially damage scenic resources, focuses on changes to existing major public viewsheds that would result from the implementation of the Project. Urban development with high-rise towers surround the Project Site therefore, scenic resources and views at and through the site and vicinity are generally limited to short-range views of Lake Merritt to the east and long-range views of the Oakland hills to the north. However, due to intervening development in the Project area and patches of landscaping surrounding the Lake, views of Lake Merritt are restricted to portions of Harrison Street and Lakeside Drive and glimpses from several segments of 20th and 21st Streets. Existing development in the area likewise precludes most long range views of the Oakland-Berkeley hills, which are only available when looking between buildings or across Lake Merritt.

By constructing a 42-story tower at the northwest corner of the site and a 34-story tower at the southwest corner of the site, the Project would further limit certain short-range views of Lake Merritt and certain long-range views of the Oakland-Berkeley Hills from areas at and surrounding the site. However, because such views are already limited, this impact would not be considered substantial as views of these resources would continue to be available.

Views

Four locations were selected to analyze the public views to the site. These viewpoints are shown in Figure IV.A-1 and include the following locations:

- Viewpoint 1 – View from West Grand Avenue near Bay Place looking southwest.
- Viewpoint 2 – View from Broadway at 20th Street looking east.
- Viewpoint 3 – View from Webster Street at 17th Street looking northeast.
- Viewpoint 4 – View from Lakeside Drive near Madison Street looking northwest.

These four viewpoints are shown in Figures IV.A-2 through IV.A-5, respectively. In each of the figures above, the top photo shows the existing setting and the bottom figure is the same view with a simulation of the Proposed Project placed within the view. Although some views show the height of the Proposed Project structures as being much taller than some of the adjacent buildings, the new development would occur within an urban downtown setting and the structures appear to be within the context of the site's surroundings. Existing public views of Lake Merritt and of the San Francisco Bay and City skyline would not be affected by the Proposed Project.

Scenic Highways Program

The Caltrans Scenic Route Program identifies the Oakland segment of I-580 as an Officially Designated State Scenic Highway. Closest to the Project Site, I-580 is about three quarters of a mile to the east. The Scenic Highways Element of the Oakland General Plan defines the I-580 scenic corridor, which is intended to protect "the area most critical to the scenic quality of the route in question." Although the Project Site is not within the area designated as a scenic corridor, it is only about one quarter mile to areas that are within the corridor boundary, and is visible from the segment of I-580 closest to the site. However, as noted above, the Project Site is within an existing developed urban environment with other high-rise towers nearby. Therefore, while the Project would be noticeable from I-580 and may minimally obscure some long-range views from this freeway, its impacts would be considered limited because it would not disrupt or alter these views substantially.

In addition, the Proposed Project would be required to undergo design review and comply with development standards consistent with its Planned Unit Development (PUD) status and its location within an S-4 Zone. This process would ensure that the Proposed Project design is consistent with the goals and objectives identified for the Kaiser Center Complex. The City's design review criteria assess how multiple buildings "relate to one another" and result in "a well-composed design, with consideration given to site, landscape, bulk, height, arrangement, texture, materials, colors, and appurtenances," as well as how these factors relate "to other facilities in the vicinity…and the total setting as seen from key points in the surrounding area" (Oakland Planning Code Section 17.136.050). Further, the criteria address whether "the proposed design will be of a quality and character which harmonizes with, and serves to protect the value of, private and public investments in the area" and that "that the proposed design conforms in all significant respects with the Oakland General Plan and with any applicable design review guidelines or criteria, district plan, or development control map which have been adopted by the Planning Commission or City Council." The City will review compliance with these criteria based thorough review of all Proposed Project plans and field study. Therefore, the Proposed Project is not expected to substantially degrade any views from any scenic resources in the area and would result in less than significant effects with regard to scenic vistas and resources.

In summary, because the Proposed Project would only minimally affect short-range views of Lake Merritt and long-range views of the East Bay Hills in the immediate vicinity of the Project Site, and because the Proposed Project would not substantially damage views from a designated scenic highway, the Proposed Project would have a less than significant impact on scenic resources or scenic vistas.

Mitigation: None required.

Visual Character

Impact AES-2: The Proposed Project would alter the existing visual conditions on the Project Site, but would not substantially degrade the existing visual character or quality of the site and its surroundings. (Less than Significant)

The Project site is located within the Central Business District between Downtown Oakland and Lake Merritt, which is surrounded by similar land uses including high rise office towers and street level retail. The Proposed Project would replace the existing low rise retail and office structures with 36- and 42- story office towers. The towers would be the tallest buildings in the immediate vicinity but would not be out of character for the area. It is likely that occupants of the towers in the upper floors (generally above the 19th story) would be afforded unobstructed views of the city, including downtown landmarks such as City Hall and the Oakland Tribune building toward the south-southwest, San Francisco Bay and the Bay Bridge toward the south, and the residential areas along the Oakland Hills toward the east. The Proposed Project would be visible to motorists traveling on I-580, located approximately 0.75 mile east. However, as stated above under Scenic Highways Program, while the Project would be noticeable from I-580 and may minimally obscure some long-range views from this freeway, its impacts would be considered limited because it would not disrupt or alter these views substantially.

While the construction of the buildings proposed under the Project would remove the northwesternmost portion of the existing Kaiser Center roof garden, the Project would provide a net gain in roof garden area of approximately 4,500 square feet as a new garden area would be constructed to the south of the existing garden (see Figure III-4).

The Proposed Project would result in a substantial change to the visual character of the Project Site by the proposed demolition of existing on-site structures and the new construction of two high-rise office towers. Project construction is anticipated to occur over two phases. The first phase would construct the south tower (replacing the 20th Street Mall building), while the second phase would construct the north tower (replacing the Webster Street Mall building).

The proposed towers would be constructed in a contemporary style and would be similar in cladding and architectural elements, although the south tower would be trapezoidal in plan while the north tower would be rectangular in plan. Both towers would have a façade consisting of steel and non-reflective glass, with vertical and horizontal bands. The vertical bands would emphasize the towers' vertical form while the horizontal bands would define each floor. The floor plate of each tower would be uniform along the length of the towers, with the lowest five stories serving as a base for both towers.

The new South Tower would span 34 stories or 469 feet in height while the North Tower would span 42 stories or 573.5 feet in height. The proposed structures would be built along the lot lines to the north and west and would continue to be set back from southern lot lines by sidewalks and landscaping. In general, new structures would be much more visually prominent within their context that the current buildings on the site, although the character of the pedestrian environment at the ground level would remain virtually unaltered, since the site already contains retail uses on the ground level.

The proposed office towers would not noticeably contrast with the existing visual environment in the Project Site and the surrounding vicinity, where several other high-rise buildings have similar height and massing. As noted in the setting, the Central Business District neighborhood is interspersed with high-density uses, including the Kaiser Center, which includes a 29-story high-rise office tower, and additional high-rise buildings on surrounding blocks, with the tallest one being the Ordway Building (at 404 feet tall). Therefore, in terms of size and massing, the proposed towers, at 34 and 42 stories, would continue and complement the current development trends that exists in the Project area and would not result in a noticeable change in character as compared to existing conditions.

The Proposed Project would relocate the approximately 18,369 square feet of the existing historic roof garden to the southern portion of the new roof, which would result in a net gain of public open space of approximately 4,500 square feet. The Project would also increase public access to the roof garden by installing a grand staircase to the roof garden from 20th Street, and would add new access to the roof garden through the proposed new office towers. The existing roof garden is a visually engaging element of the existing site and adds to the site's uniqueness. With the implementation of Mitigation Measure CR-2 (Historically-Sensitive Roof Garden Design), described in Section IV.D, *Cultural Resources*, the Project Applicant would be required to preserve the cultural integrity of the garden by ensuring that its character-defining features, such as its axial plan, geometrically shaped lawns, and curvilinear pathways, are either retained or recreated as part of the Proposed Project. With the implementation of this mitigation measure, the garden, in its new form, would continue to add value to the visual character of the Project Site as a whole, and the Project would not have an adverse impact on the visual character of the site.

As a standard requirement, because the Project is a PUD, prior to the issuance of any building permits, at both phases, the Project Applicant would submit the final project design – as a Final Development Plan (FPD) - including all exterior design details, proposed signs, and the final selection of exterior materials, colors and textures to the Planning and Zoning Division. The final design, or FDP, would be subject to the approval by the Planning Commission.

As a result of the design review required by both staff and the Planning Commission (as part of the proposed PUD as well as the proposed S-4 Zone), as discussed above under Impact AES-1, the Proposed Project would not degrade the visual quality of the site or the vicinity and would be consistent with the high-density development within Oakland's Business District.

Mitigation: None required.

Light and Glare

Impact AES-3: The Proposed Project would create a new source of light or glare, but would not adversely affect day or nighttime views in the area. (Less than Significant)

As discussed in the *Environmental Setting*, the Project Site contains street and building lighting associated with both the existing uses on the site and with the surrounding structures in the Project vicinity. Existing lighting sources currently provide a source of illumination typical of an urban area and noticeable in the site vicinity, particularly at night.

Although no detailed architectural plans have been prepared for the Proposed Project, the Project would likely increase the amount of night lighting from decorative and functional lighting associated with the proposed two high-rise office towers, and may increase the incidence of glare from window glazing, minimized by measures required by applicable SCA's discussed below. However, the type and intensity of lighting resulting from the Proposed Project would be consistent with the type and intensity of lighting already established in the area, and is not expected to result in a substantial increase in lighting over existing conditions. While the Proposed Project's height and mass would make light from the Project noticeable from off-site locations, it would be absorbed fairly well into the overall lighting patterns that already exist in the area. The street lighting surrounding the Project block is not anticipated to change substantially from the existing conditions.

The Project Applicant would be required to comply with SCA AES-1 that would minimize potential impacts resulting from Project related lighting and ensure that lighting and glare effects associated with the Project remain less than significant. Moreover, the Applicant would be required to implement mandatory measures and best management practices (BMPs) identified in SCA BIO-5, Bird Collision Reduction, that work to minimize mirrored and reflective glass effects on exterior building facades, as well as operational and design strategies to minimize internal and external lighting associated with the Project.

Mitigation: None required.

Shadow

Impact AES-4: The Proposed Project would result in additional shadow on adjacent areas. However, it would not cast shadow that would substantially impair the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; would not cast shadow that would substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space; and would not cast shadow on a historic resource. (Less than Significant)

The Project's shadow effects were analyzed for representative times of day (9:00 a.m., 12:00 noon, and 3:00 p.m.) during the following four times of year:

- March 21st at the spring equinox, when shadows are midway through a period of shortening;

- June 21st on the summer solstice, when the sun is at its highest and shadows are at their shortest;
- September 21st at the autumn equinox, when shadows are midway through a period of lengthening; and
- December 21st on the winter solstice, when the sun is at its lowest and shadows are at their longest.

Shadows on any other day of the year would be within the range of shadows presented during the seasons and times of day described above. Figures IV.A-6 through IV.A-17 illustrate the shading effects associated with the Proposed Project for the aforementioned times of day and seasons. These diagrams are generalized, though accurate, and convey the relative shadow effects for Project area. The Project's greatest shadow effects would occur during late fall and early winter, when the sun is lowest on the horizon. As discussed in more detail, below, the proposed 28 and 36-story towers on the Project Site would generate additional shadow relative to the existing conditions. New shadow is described by season.

In March and September, morning shadow would fall in a westerly direction, newly shading the sidewalks along 20th and 21st Streets.[1] At noon, Project shadow would extend in a northwesterly direction, shading portions of the surface parking lots located on blocks east of Webster Street. New shading would also extend on the Kaiser Center roof garden. By 3:00 p.m., Project shadow would extend in a northeasterly direction and result in new shade along large portions of the roof garden as well as the surface parking lot north of 21st Street.

In June, when shadows are shortest, shadows would be cast in a westerly and southwesterly direction at 9:00 a.m. At this time, off-site shadow would extend just beyond Broadway Street, shading some low-rise buildings, sidewalks and surface parking lots west of Webster Street. By noon, Project shadow would cast a very minimal shadow that would extend only slightly onto the adjacent block to the west and onto sidewalks along Webster and 21st Streets. At 3:00 p.m., the Project would cast a shadow in a northeasterly direction, shading portion of the Kaiser Center roof garden, 21st Street, and the surface parking lot directly across 21st Street from the Project Site.

In December, when shadows are longest, at 9:00 a.m. Project shadow would fall in a northwesterly direction, extending as far as Northgate Street and shading portions of sidewalks on Franklin, Broadway, Northgate, 21st, 22nd, and 23rd Streets and Telegraph and Grand Avenues. The area shaded contains mostly low-rise office buildings and surface parking lots. By noon, Project shadow would extend in a northwesterly direction, resulting in shade along portions of the Kaiser Center roof garden as well as sidewalks along Webster Street. Shadow at this time would extend just beyond 23rd Street. At 3:00 p.m., the Project shadow would reach in a northeasterly directly toward 27th Street, stretching just beyond the intersection of 27th and Harrison Streets. During this time, shadow generated by the proposed towers would cast the greatest amount of shadow, and new shading would affect the Kaiser Center roof garden and few low-rise commercial buildings, surface parking lots and negligible portions of sidewalks northeast of the site. Most sidewalks, however, are already in

1 March and September shadows are similar in length and direction, although they are offset by one hour from one another because March is during standard time, while September is during daylight saving time.

shadow from existing development and would not be affected by the Project. The Cathedral of Christ the Light, located at the southwestern corner of the intersection between Grand Avenue and Harrison Street, would not receive any additional shading from the Project, during this or any other time (see Figures IV.A-6 through IV.A-17).

Overall, new shadows cast by the Proposed Project would affect parcels to the north of the Project Site along Webster and 21 Streets. Existing development in the Project area currently casts shadows onto these areas, although the Project would generate shadow on areas that are currently not shaded by existing development, particularly some low-rise buildings, sidewalks and surface parking lots immediately west and north of the site. The newly cast shadows generated by the Project would be extended during the mid-day hours (noon to 3:00 p.m.) in the late fall and winter.

As previously indicated in the *Environmental Settin*g discussion, site reconnaissance and staff review of the City's inventory of solar facilities (as of August 6, 2010) conducted for this analysis did not observe any passive solar heat collectors, solar collectors for hot water heating, or photovoltaic solar collectors in the areas adjacent to the Project Site or that might be affected by Project shadow. A solar facility at 555 19th Street, located mid-way between Telegraph Avenue and San Pablo Avenue east of the Project Site, approximately 1,700 feet away, is the nearest to the Project Site. No Project Shadow is cast near that location at any time of year. However, the potential exists for any of these systems to be installed on one of more of the surrounding buildings in the future.

Although there are no solar systems in the Project Site vicinity that would be affected by Project building or landscaping shadow, there is a potential for buildings to install such systems in the future. However, due to the existing shading in the Project area, any additional shadow generated by the proposed towers would be incremental and would not substantially impair the function of a building that may use a solar heating in the future.

Shadow patterns cast on the roof garden in particular would change under proposed conditions, primarily due to the two towers to be located at the northwestern and southwestern corners of the Project Site. Shadow effects to the roof garden are discussed herein, as well as under Impact CUL-3 in Section IV.D, *Cultural Resources*, which includes Figure IV.D-1, a close-up view of shadow effects on the roof garden in worst case shadow conditions. The total amount of shading would increase over existing conditions, particularly in the late fall and winter. Approximately one-quarter to one-half of the entire roof garden would be newly shaded throughout late fall and winter days. However, no new shadow would be cast on the northeastern portion of the garden, closest to the existing Kaiser Center office tower, as under existing conditions. The shadow effects would not substantially detract from the use or enjoyment of the garden since on most days of the year and times of the day, at least a portion of the garden would remain free of shade. Furthermore, the Project would result in a net increase of roof garden area by approximately 4,500 square feet, which would also provide some shade-free opportunities for use in the southern portion of the roof garden. Therefore, the Proposed Project would have a less-than-significant shadow impact on the Kaiser Center roof garden.

With respect to the Proposed Project's affects on nearby public or quasi-public park, lawn, garden, or open space that would be affected by Project shadow, with the exception of the Kaiser Center roof garden, no other public open space, including the nearby Snow Park and Lakeside Park, and Lake Merritt, would be shaded by the Proposed Project. Both of these parks and the lake are located south and east of the areas that would be affected by the shadows generated by the Project. There are no other nearby public or quasi-public park, lawn, garden, or open space that would be affected by Project shadow. Based on the above, the Project's impact with respect to shadow would be less than significant.

Mitigation: None required.

Provision of Adequate Light

Impact AES-5: The Proposed Project would be consistent with the policies and regulations addressing the provision of adequate light related to appropriate uses. (Less than Significant)

The Proposed Project would require a number of discretionary approvals pursuant to the Oakland Planning Code, however it would not require a General Plan Amendment or Rezoning as the Project would be consistent with the current zoning designations on the Project Site. As discussed in Section III, *Project Description*, the Proposed Project would be built as a PUD within the C-55/S-17/S-4 Design Review Combining Zone (which was changed to CBD-C on July 21, 2009). Both of these factors would necessitate Design Review of the proposed new structures by the City of Oakland Planning Department. Through the Design Review process and final building plan approval and permitting process for the Project, (discussed under AES-1) the City will ensure project consistency with the light and ventilation section (Section 1203) of the Uniform Building Code and the City's Outdoor Lighting Standards (City of Oakland, 2002). Additionally, the Proposed Project is consistent with the General Plan policies regarding the provision of useable open space (*OSCAR OS 11-1 Civic Open Spaces*).

Moreover, the existing maximum development intensity allowed by the existing General Plan classifications would accommodate that proposed by the Project. Actual development would be restricted by the limits, standards, and guidelines (building height, setbacks, etc.) prescribed by the current applicable zoning designation and at the discretion of the City through the discretionary review of the Project.

Although the Proposed Project would cast shadow on nearby buildings, particularly during the winter and fall seasons at certain times of the day, indirect sunlight would still be available to windows of nearby buildings. Furthermore, the intensity of commercial development proposed is consistent with the surrounding context in which the site is located and with level of sunlight, noise, and privacy is consistent with that typically found and anticipated for commercial developments within Oakland's CBD.

The Project would result in a net increase of usable outdoor open space by expanding the existing roof garden, which would continue to receive sunlight during most days of the year and times of the day, as analyzed in Impact AES-5, above. Thus, the Proposed Project is consistent with relevant policies and regulations regarding the provision of light and usable open spaces and therefore would not have a significant impact.

Mitigation: None required.

Wind

Impact: AES-6: The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. (Potentially Significant)

To determine the existing and potential future wind conditions on the Project Site, an Atmospheric Boundary Layer Wind Tunnel was used to test large-area scale models of the Oakland vicinity, the Project Site, the proposed Project and other potential cumulative development. Wind speeds were measured at 28 selected locations for existing conditions, with the Project and for cumulative conditions. The test results were scaled using long-term wind speed and direction data from meteorological stations in order to develop reliable estimates of the winds at the Project Site under the Existing, Project and Cumulative development scenarios.

Scaling the wind test results to the meteorological data yields an “equivalent wind speed” *vs.* frequency-of-occurrence distribution for each wind test point that is partially described by two related numbers: the first is the wind speed that is exceeded only 10% of the time[2] and is used to evaluate general wind conditions for pedestrians; and, the second is a wind speed that may be exceeded only one hour per year and is used to assess the level of wind hazard[3] to pedestrians.

Figure IV.A-18 shows the locations of the 28 wind test measurement points. **Tables IV.A-1** and **IV.A-2** summarize the findings of the wind tunnel test for all three scenarios – Existing, Project and Cumulative. The computer output tables and printout listings from the tests are contained in EIR **Appendix B**.

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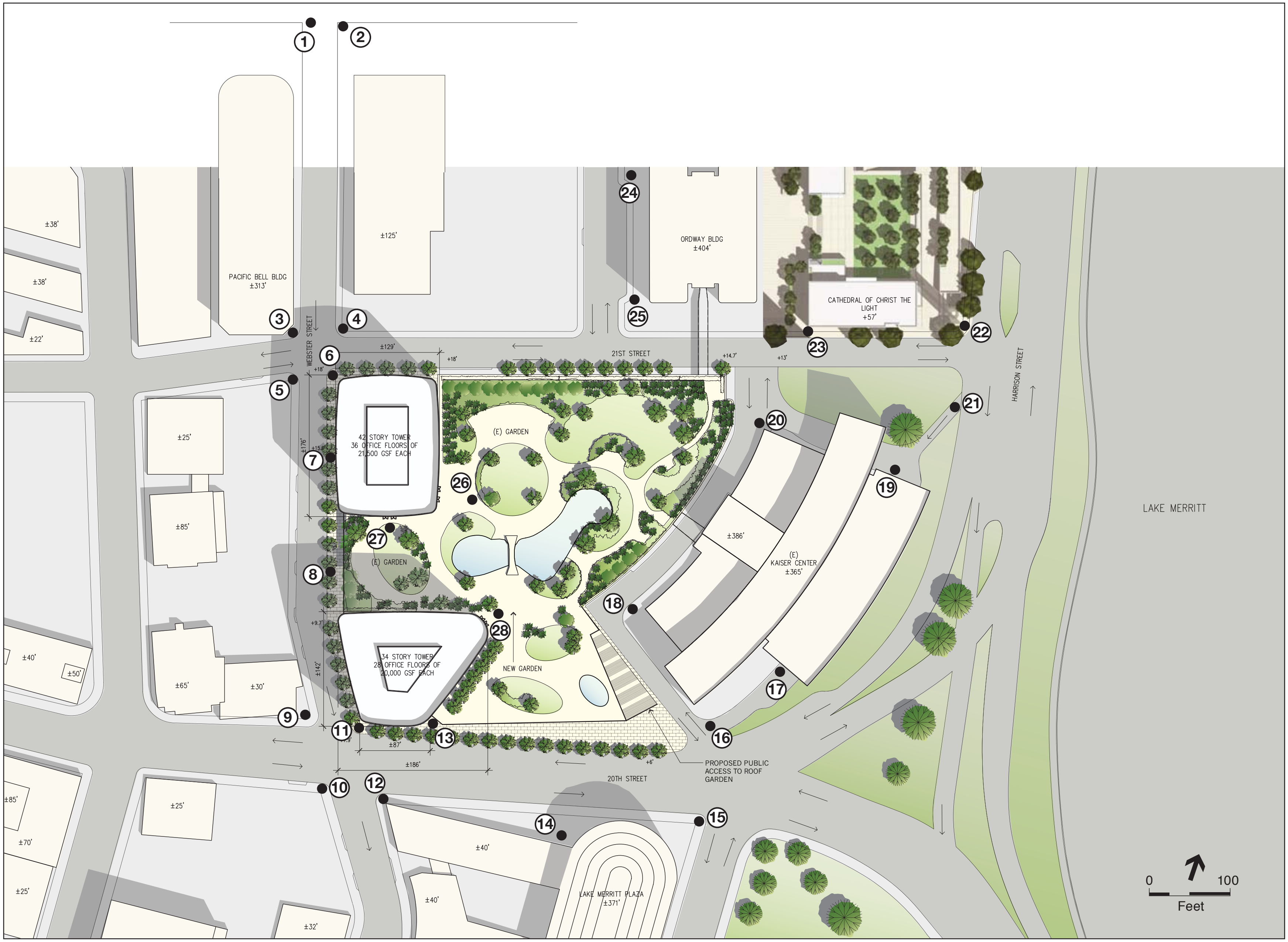
2 As a corollary, wind speeds would be less than this speed 90% of the time.

3 The speed of the wind normally varies substantially over time. Gusts add to the average speed and lulls reduce it. The measured wind speed depends upon the averaging time over which the measurement is made. In general, the longer the averaging time, the lower the speed measured. The wind hazard criterion is based on research that identified a 3-second gust of wind at 44 mph as being strong enough to destabilize pedestrians. Starting with this value and using an appropriate wind speed distribution, the following wind speeds characterize the “same” hazardous wind, for each of three averaging times. Each interval could contain the hazardous wind event:

Averaging time	Speed	Note
1 hour	26 mph	Full-hour average wind speed
1 minute	36 mph	Weather Bureau one-minute average wind data
3 seconds	44 mph	Mean velocity of highest 3-second gust

Exceeding the City wind hazard criterion requires more than a full hour of wind averaging 26 mph. However, for convenience and consistency in reporting and comparing tested wind speeds, the 1-minute average speeds are used here: 1) to compare with the 36 mph value for the hazard criterion; and, 2) to report winds exceeded 10% of the time (because they are more appropriate for discussions of general wind conditions for pedestrians).



SOURCE: SOM: ESA

Kaiser Oakland . 206213

Figure IV.A-18

Wind Study Test Point Locaitons

TABLE IV.A-1
GENERAL WIND CONDITIONS SUMMARY

References		Existing			Project				Cumulative			
Test Location Number	Wind Comfort Criterion Speed, miles/hour	Equivalent Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Speed Exceeds Criterion	SOURCE	Equivalent Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Speed Exceeds Criterion	Speed Change Relative to Existing, miles/hour	SOURCE	Equivalent Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Speed Exceeds Criterion	Speed Change Relative to Project, miles/hour	SOURCE
1	11	14	*20*	**e**	14	*21*		**e**	**14**	*21*		**e**
2	11	10	*8*		11	*11*	1		11	*10*		
3	11	10	*8*		12	*12*	1	**p**	11	*11*		**-**
4	11	11	*10*		11	*11*	1		11	*11*		
5	11	12	*14*	**e**	11	*11*	-1	**-**	11	*11*		
6	11	9	*6*		11	*12*	2		11	*11*		
7	11	9	*3*		11	*12*	3		12	*13*		**s**
8	11	11	*11*		9	*4*	-2		8	*4*	-1	
9	11	17	*31*	**e**	19	*35*	2	**e**	18	*33*	-1	**e**
10	11	13	*18*	**e**	14	*23*	1	**e**	14	*22*		**e**
11	11	19	*33*	**e**	20	*38*	1	**e**	18	*34*	-1	**e**
12	11	16	*26*	**e**	15	*25*	-1	**e**	15	*24*		**e**
13	11	15	*23*	**e**	14	*24*	-1	**e**	14	*21*	-1	**e**
14	11	12	*16*	**e**	12	*13*	-1	**e**	11	*11*		**-**
15	11	14	*20*	**e**	14	*18*	-1	**e**	14	*19*		**e**
16	11	14	*17*	**e**	12	*14*	-1	**e**	12	*15*		**e**
17	11	10	*7*		10	*8*			9	*6*	-1	
18	11	16	*24*	**e**	8	*3*	-7	**-**	8	*2*	-1	
19	11	13	*20*	**e**	11	*10*	-2	**-**	13	*18*	2	**s**
20	11	16	*26*	**e**	13	*16*	-3	**e**	11	*10*	-2	**-**
21	11	17	*33*	**e**	15	*28*	-2	**e**	14	*24*	-1	**e**
22	11	15	*26*	**e**	13	*19*	-2	**e**	13	*18*		**e**
23	11	19	*33*	**e**	18	*33*		**e**	18	*32*		**e**
24	11	11	*11*		11	*11*			11	*11*		
25	11	15	*28*	**e**	19	*36*	4	**e**	18	*34*	-1	**e**
26	11	11	*9*		17	*27*	6	**p**	16	*28*	-1	**p**
27	11	14	*23*	**e**	17	*31*	3	**e**	13	*17*	-4	**e**
28	11	20	*32*	**e**	23	*46*	3	**e**	23	*46*		**e**
Ave. of 10%		**13.8 mph**			**13.9 mph**		**0.1 mph**		**13.5 mph**		**-0.3 mph**	
	Percent:		***19%***			***20%***				***18%***		
Total Exceedances:		**Total**	**19**		**Total**		**18**		**Total**		**17**	
Subtotals by type:		*Existing*	**19**	**e**	*Existing*		**16**	**e**	*Existing or Project*		**15**	**e/p**
					New, due to Project		**2**	**p**	*New, due to Cumulative*		**2**	**s**
					New, at new location		**0**	**n**	*New, at new location*		**0**	**n**
SOURCE: Environmental Science Associates					*Eliminated by Project*		**3**	**-**	*Eliminated by Cumulative*		**3**	**-**

NOTE: Equivalent wind speeds and percentages are rounded to integer values.
Any apparent discrepancies in column sums and speed changes in rows are due to rounding.

Bold e, **s** or **p** denotes wind speed in excess of 11 mph.
Locations 26, 27 and 28 are on Kaiser Center roof garden

SOURCE: ESA, 2009

TABLE IV.A-2
WIND HAZARD SUMMARY

References		Existing			Project				Cumulative			
Test Location Number	Wind Hazard Criterion Speed, miles/hour	1-hour/year Equivalent Wind Speed, miles/hour	Wind Hazard Criterion Exceeded, hours/year	SOURCE	1-hour/year Equivalent Wind Speed, miles/hour	Wind Hazard Criterion Exceeded, hours/year	Hazard Hours Change Relative to Existing	SOURCE	1-hour/year Equivalent Wind Speed, miles/hour	Wind Hazard Criterion Exceeded, hours/year	Hazard Hours Change Relative to Project	SOURCE
1	36	35			36	*1*	*1*	**p**	35		*-1*	**-**
2	36	32			34				36			
3	36	36			36	*1*	*1*	**p**	36	*1*		**p**
4	36	34			33				35			
5	36	36			35				36			
6	36	27			43	*15*	*15*	**p**	43	*15*		**p**
7	36	23			26				27			
8	36	25			22				23			
9	36	39	*3*	**e**	42	*8*	*5*	**p**	41	*7*	*-1*	**p**
10	36	30			36				39	*2*	*2*	**s**
11	36	44	*13*	**e**	44	*12*	*-1*	**e**	42	*6*	*-6*	**p**
12	36	38	*2*	**e**	35		*-2*	**-**	34			
13	36	34			32				31			
14	36	28			25				24			
15	36	37	*1*	**e**	34		*-1*	**-**	32			
16	36	38	*4*	**e**	32		*-4*	**-**	30			
17	36	28			29				21			
18	36	37	*1*	**e**	20		*-1*	**-**	17			
19	36	31			26				30			
20	36	37	*2*	**e**	27		*-2*	**-**	23			
21	36	39	*4*	**e**	36		*-4*	**-**	35			
22	36	38	*4*	**e**	28		*-4*	**-**	28			
23	36	42	*8*	**e**	42	*8*		**e**	42	*9*	*1*	**s**
24	36	28			26				25			
25	36	33			42	*9*	*9*	**p**	40	*5*	*-4*	**p**
26	36	23			39	*3*	*3*	**p**	36		*-3*	**-**
27	36	31			44	*18*	*18*	**p**	50	*47*	*29*	**s**
28	36	48	*26*	**e**	52	*60*	*34*	**p**	52	*59*	*-1*	**p**
Ave. 1-hr:		**34 mph**			**34 mph**				**34 mph**			
	Total hrs:		***68 hr***			***135 hr***	***67 hr***			***151 hr***	***16 hr***	

References	Existing			Project			Cumulative		
Total Exceedances:	**Total**	**11**		**Total**	**10**		**Total**	**9**	
Subtotals by type:	*Existing*	**11**	**e**	*Existing*	**2**	**e**	*Existing or Project*	**6**	**e/p**
		.		*New or increased time*	**8**	**p**	*New or increased time*	**3**	**s**
				New, at new location	**0**	**n**	*New, at new location*	**0**	**n**
SOURCE: Environmental Science Associates				*Eliminated by Project*	**7**	**-**	*Eliminated by Cumulative*	**2**	**-**

NOTE: Equivalent wind speeds and percentages are rounded to integer values.
Any apparent discrepancies in column sums and speed changes in rows are due to rounding.

Bold e, **s** or **p** denotes wind speed exceedence over hazard threshold. Hazard hours durations and changes are in adjoining columns. Locations 26, 27 and 28 are on Kaiser Center roof garden.

SOURCE: ESA, 2009

Existing General Wind Conditions at the Project Site

Wind tunnel testing shows that existing general wind speeds[4] at sidewalk locations in the Project area now range from 9 mph to 20 mph, where those speeds are the equivalent wind speeds that are exceeded only 10 percent of the time.

- On 20th Street, existing conditions are windy to very windy. Only two of the eight test locations recorded a wind speed of less than 14 mph; the highest wind speeds, 17 and 19 mph, occur on the north side of 20th Street at its intersection with Webster.
- On Webster Street north of 20th Street, existing conditions range from moderate to windy. Only one of eight locations recorded a wind speed as high as 14 mph, which occurs at the intersection of 22nd and Webster, while the lowest speeds occur at the middle and north end of the block.
- On 21st Street, existing conditions vary widely from moderate to very windy. Wind speeds generally are higher closer to Harrison Street; the highest, 19 mph, occurs on the north side of 21st Street. Conditions are windy all along the Harrison Street frontage of the Project block, around the tower, and on the interior driveways to the garage, as well.
- On the roof garden, existing conditions vary from moderate to very windy, with wind speeds ranging from 11 mph to 20 mph, depending upon the wind sheltering available.

Existing Wind Hazard Conditions at the Project Site

Wind tunnel testing also shows that existing winds exceed the City's wind hazard criterion during daytime hours during the year at ten sidewalk locations in the Project area. These locations, and the individual durations of each hazard, are as follows:

- Three locations at the intersection of 20th and Webster streets – on the northwest corner (3 hours), on the northeast corner (13 hours), and on the southeast corner. (2 hours)
- Two locations on 20th Street at Harrison Street – one on the north side (4 hours) and one on the south side (1 hour).
- Three locations at the intersection of 21st and Harrison streets – on the northwest corner (4 hours), on the southwest corner (4 hours), and on the north side of 21st Street, west of the intersection (8 hours).
- Two locations on the interior driveways to the garage – one north (2 hours) and one south (1 hour).

In addition to these ten existing sidewalk hazards, at least one existing wind hazard occurs atop the roof garden (26 hours).

[4] Unless otherwise noted, throughout this discussion, "wind speed" refers to an "equivalent wind speed" that is exceeded 10% of the time. An "equivalent wind speed" is a metric defined as the mean wind speed multiplied by the quantity (1 + 3 x Turbulence Intensity) and divided by 1.45. Because high values of turbulence generally make winds much more unpleasant for people, this definition includes a factor that amplifies the calculated velocity whenever the turbulence is greater than 0.15 or 15%, a low value.

Thus, nearly 40% of the 28 individual wind test locations[5] have wind speeds that exceed the wind hazard criterion for 1 hour or more during daylight hours during the year. The duration of each is typically less than 10 hours per year, but at two locations near buildings and where wind speed and turbulence are increased the duration of the hazard is also longer.

In summary, wind hazards occur on-site and in the immediate vicinity under existing conditions. Based on wind testing, the total duration of the wind hazard is currently estimated at 68 hours per year. The highest wind speed that now occurs for 1 hour per year is 48 mph; this occurs at a location where the winds exceed the wind hazard criterion for a total of 26 hours during the course of the year.

Wind tunnel test measurements were made for the Project in the existing vicinity setting. The locations of the 28 wind test measurement points are shown in Figure IV.A-18, while the columns headed "Project" in Tables IV.A-1 and IV.A-2 summarize the results of the test.

General Wind Conditions at the Project Site with the Project

The Project would result in wind speeds at sidewalk locations in the Project area that would range from 8 mph to 23 mph, where those are equivalent wind speeds that are exceeded only 10% of the time. The average of the 10% exceeded wind speeds at the 28 locations would increase 0.2 mph. Wind speed changes greater than 1 mph, compared to existing winds, would occur as follows:

- Of the eight locations on 20th Street, only the one, at the northwest corner of 20th and Webster would increase as much as 2 mph; the highest wind speeds, 19 and 20 mph, would occur on the north side of the intersection of 20th and Webster Streets.
- Of the eight locations on Webster Street north of 20th Street, one would increase by 2 mph and one by 3 mph, while one would decrease by 2 mph. As now exists, only one location would have a wind speed as high as 14 mph, still at the intersection of 22nd and Webster. The lowest wind speed would occur at the middle of the Project block.
- On 21st Street, wind speeds would be higher mid-block and lower closer to Harrison Street, due to speed decreases of 2 mph and 3 mph at four locations at the north end of the high-rise tower and an increase of 4 mph to a new value, 19 mph, at one location on the north side of 21st Street. Speed decreases of 3 mph and 7 mph would occur at the north and south ends of the interior driveway, respectively.
- On the open space of the roof garden, wind speeds at the three locations would increase by 3 mph to 6 mph, to reach speeds of 17 mph to 23 mph.

Wind Hazard Conditions with the Project

The Project would result in wind speeds that exceed the wind hazard criterion during daytime hours during the year at seven sidewalk locations in the Project area. Those changes – in hazard locations and their individual durations – are as follows:

[5] Although a large number (and percentage) of hazard criterion exceedances were found in each scenario of wind testing, it cannot be assured that every individual existing hazard location has been identified. However, the testing is sufficient to characterize the wind environment and disclose potential adverse wind impacts.

- One of three existing hazards at the intersection of 20th and Webster Streets would be eliminated by the Project. The duration of one remaining on the northwest corner (3 hours) would increase to 8 hours, while the duration of the other on the northeast corner (13 hours) would decrease to 12 hours. The net would be a 2-hour increase.
- Three new hazards would be added on Webster Street between 21st and 22nd Streets – two 1-hour hazards would result on the west side of Webster at the intersections, and one 15-hour hazard would result at the southeast corner of Webster and 21st Streets. The increase in duration due to these three new hazards would be 17 hours.
- Both existing hazards on 20th Street at Harrison Street would be eliminated. The net change would be a 5-hour decrease in duration.
- Two of the three existing hazards at the intersection of 21st and Harrison Street – one on the northwest corner (4 hours) and one on the southwest corner (4 hours) – would be eliminated. The existing 8-hour hazard on the north side of 21st Street and west of the intersection would remain unchanged. The net would be an 8-hour decrease in duration.
- Both existing hazards on the interior driveways to the garage would be eliminated. The net change would be a 3-hour decrease in duration.
- A new 9-hour hazard would occur on the north side of 21st Street, at the northeast corner of the intersection with Kaiser Plaza, as a result of the Project.

Thus, seven existing wind hazards on public sidewalks and streets with 18 hours of duration would be eliminated, one existing hazard would be reduced by 1-hour duration, and four new hazards with a total duration of 26 hours would be created by the Project. The net result would be an overall increase of 7 hours in the duration of the wind hazard.

In addition, at least two new wind hazards (3 hours and 18 hours) would occur atop the roof garden, in addition to the one existing hazard that would also increase in duration to 60 hours. These would increase the total wind hazard duration on the roof garden by 55 hours.

Thus, with the Project nearly 36% of the 28 individual wind test locations have wind speeds that exceed the wind hazard criterion for 1 hour or more during daytime hours during the year. As is the case for the existing winds, the duration of each hazard identified is typically less than 10 hours per year, but in a four locations near buildings and where wind speed and turbulence are increased the duration of the wind hazard is also longer.

Based on wind testing, the total duration of wind hazards for the Project is currently estimated at 135 hours per year, including 81 hours of wind hazard on the roof garden. The highest wind speed that would occur for 1 hour per year is 52 mph; at this location, winds would exceed the hazard criterion for 60 hours during the year.

Building large new high-rise structures amidst surrounding high-rise buildings usually results in general reductions in wind speed and so decreases the number and durations of occurrence of wind hazard in the vicinity. The fact that the Project Site is currently quite open and is exposed to the three strongest of the prevailing winds means that the anticipated reductions in ground-level wind speed due to infilling will not be fully realized until other infill high-rise buildings, such as indicated under the Cumulative Development scenario, are also constructed upwind.

Excluding effects on the roof garden, the total duration of the Project wind hazard (54 hours) and the existing wind hazard (55 hours) on public sidewalks are essentially equal, although as should be expected there are differences in the locations at which these hazards would occur.

For the Project, the largest adverse effect is on the Project's own roof garden, which is exposed to downwash winds from the new towers. Since the designs of the towers and the roof garden are not complete, wind testing included no wind-protective structures or measures to redirect downwash winds away from the roof garden open space. However, there are many opportunities to develop, as a part of final Project and landscaping design, simple and effective design or structural measures to control, reduce or eliminate the manageable wind hazard conditions identified on the roof garden. Such measures are usually practical, straightforward and reliable in controlling adverse wind conditions.

Because wind speeds would exceed the wind speed hazard threshold on the roof garden, a significant impact would result. There are structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. However, until such protective design features are tested and proved using the wind model, results cannot be quantified to determine if wind speeds would actually be reduced below the City wind threshold. Therefore, impacts resulting from wind would remain significant and unavoidable until such time that the design features can be tested.

Mitigation Measure

Measure AES-1: At the time of submittal of the Final Development Plan, the Applicant shall develop and, at the time of construction pursuant to the Final Development Plan, the Applicant shall implement a wind reduction plan that reduces wind hazards at the street level and roof garden to the maximum feasible extent, subject to review and approval by the City. The wind reduction plan shall include the results of wind tunnel testing for hazardous wind speeds of the Project conducted on the Project consistent with the Final Development Plan. The wind reduction plan shall include, but not be limited to, structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. Examples of these measures include tree plantings, dense bamboo planting, arbors, canopies and lattice fencing. The Applicant shall develop the wind reduction plan in coordination with the required landscape plan for the roof garden and be submitted to the City's Landmarks Preservation Advisory Board (LPAB) for review and recommendation to the Planning Commission, consistent with Mitigation Measure CUL -2.1 Historically-Sensitive Roof Garden Design. The LPAB will make advisory recommendations to the Planning Commission for its approval as part of its approval of the Final Development Plan, and the Applicant shall implement the approved wind reduction plan. However, implementation of the measures cannot determine if these design features will be effective in reducing this impact to a less than significant impact until they are in place.

Significance after Mitigation: Conservatively Deemed Significant and Unavoidable.

Cumulative Impacts

Impact AES-7: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in cumulative impacts related to visual character, views, aesthetics, shadow, or light and glare. (Potentially Significant)

Geographic Context

The geographic context used for the cumulative aesthetics assessment (views, visual character, light and glare, and shadow) of the Proposed Project includes areas surrounding the Project Site, which are depicted in existing setting photographs in Figures IV.A-2 through IV.A-5 and **Figure IV.A-19**, with the map of the areas shown in Figure IV.A-1, and in the shadow diagrams in Figures IV.A-6 through IV.A-17. In addition, a more detailed list of specific projects used for the cumulative shadow analysis is presented in **Table IV.A-3**, below; these cumulative projects include several from the City's Major Project's List (as shown in Table IV-1), as well as other projects in the vicinity that contribute to the aesthetics assessment of the Project but that are not considered "major projects." The cumulative projects considered for cumulative wind effects are those listed in Table IV.-1.

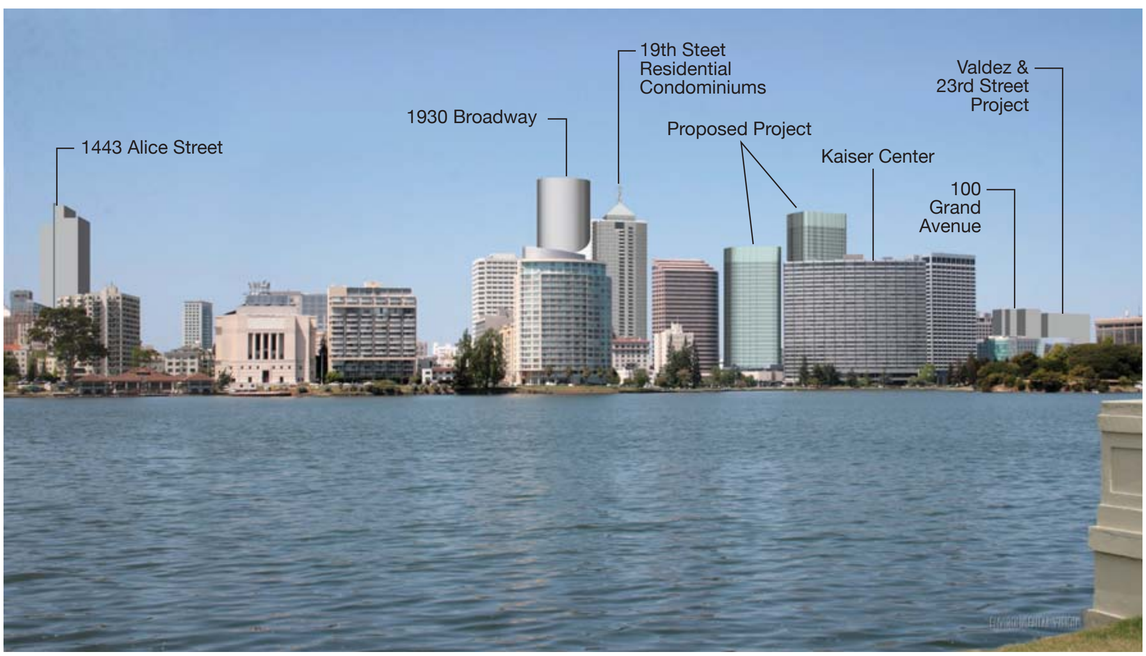
Impacts

Aesthetics

Figure IV.A-19 presents the cumulative visual simulation along with an annotated view, looking west toward the Kaiser Center site from across Lake Merritt, and Figures–IV.A-6 through IV.A-17 present cumulative shadow simulations three different times of day (9:00 a.m.; 12:00 p.m.; 3:00 p.m.) in March, June, September and December.

As shown in these analyses, implementation of the Proposed Project in combination with combined with cumulative development in the defined geographic area, including past, present, existing, pending and other reasonably foreseeable development in the Project vicinity, would not result in significant adverse changes to the visual environment, including visual character and views, light and glare, and shadow. New multifamily residential and commercial redevelopment may occur within the Project Site vicinity, generally in the Downtown and Uptown Oakland areas and along the Broadway Corridor. New development would, in general, occur as redevelopment projects, by replacing existing development with more intense development as the Project Site vicinity is largely built out. In addition, all development that could occur in the Project Site vicinity has and would continue to be required to adhere to established restrictions, guidelines, policies, and criteria that address building appearance, height, bulk, and configuration, and the type of land use.

Existing view from Lakeshore Avenue near Athol Plaza looking northwest



Visual simulation of proposed project with cumulative development

Note: This conceptual visual simulation is intended to portray building massing, not specific architectural design.

SOURCE: Environmental Vision

Figure IV.A-19
Cumulative Visual Simulation - View #5

TABLE IV.A-3
PROPERTIES INCLUDED IN CUMULATIVE SHADOW ANALYSIS
KAISER CENTER EIR

City of Oakland Site Identification	Project Name/Location
Proposed Projects (Reasonably Foreseeable)	
14	Uptown Parcel 4 (Telegraph/19th Street)
15	1443 Alice Street
17	1309 Madison Street
18	226 13th Street
21	Emerald Views (formerly 19th Street Residential Condominiums)
31	1938 Broadway
33	459 23rd Street
42	460 Grand Avenue
48	Valdez & 23rd Street Project
59	1331 Harrison Project
61	100 Grand
67	Uptown Project
74	Jackson Courtyard Condominiums
75	1930 Broadway
76	Kaiser Center
81	Fox Courts
85	1640 Broadway Mixed Use Project
86	Broadway West Grand (formerly Negherbon Mixed Use Project)
Completed Projects	
6	Madison Lofts
9	Uptown Project
29	Telegraph Gateway Project
35	The Essex-Lake Merritt
39	Cathedral of Christ the Light
40	Center 21
43	17th Street Parking Garage
44	Thomas Berkeley Square
48	Broadway West Grand (formerly Negherbon Mixed Use Project)
54	Fox Theater
60	1111 Jackson Street – Phase 1

SOURCE: City of Oakland, CEDA Major Projects List, June 2009

Therefore, it is reasonable to assume that the Proposed Project and cumulative development would not necessarily constitute an adverse effect on views, the visual character of the area, or generate substantial amounts of new light and glare, and shadow. Thus, there would be no significant cumulative aesthetic impacts resulting from the Proposed Project in combination with other past, present, pending and reasonably foreseeable projects.

Mitigation: None required.

Wind

The columns headed "Cumulative" in Tables IV.A-1 and IV.A-2 summarize the results of the wind tunnel test for the Cumulative Scenario.

General Cumulative Wind Conditions

Compared to Project wind conditions, the Cumulative Scenario would result in few material changes in wind speeds at sidewalk locations in the Project area. The average of the 10% exceeded wind speeds at all locations would decrease by 0.4 mph. Wind speed changes greater than 1 mph, compared to Project conditions, would occur only at two locations at the north end of the existing Kaiser tower, where winds would increase by 2 mph at one location and decrease by 2 mph at the other.

Wind Hazard Cumulative Conditions

The Cumulative scenario would result in wind speeds at seven sidewalk locations in the Project area that exceed the City's wind hazard criterion for 1 hour or more during daylight hours during the year (City's wind hazard criterion). The changes in these hazards – in locations and their individual durations – in comparison to the Project hazards are as follows:

- The two Project hazards at the intersection of 20th and Webster Streets would be reduced in duration by the Cumulative scenario, and one new 2-hour hazard would be created on the southwest corner. The duration of the one on the northwest corner (8 hours) would be decreased to 7 hours, while the duration of the other on the northeast corner (12 hours) would decrease to 6 hours. The net change would be a 5-hour decrease in duration.
- One of the three new Project hazards on Webster Street between 21st and 22nd Streets would be eliminated. The decrease in duration would be 1 hour.
- The Project hazard on the north side of 21st Street and west of the intersection would remain, but its duration would increase to 9 hours. The net would be a 1-hour increase in duration.
- The duration of the 9-hour Project hazard on the north side of 21st Street, at the northeast corner of the intersection with Kaiser Plaza, would be reduced to 5 hours. The net would be a 4-hour decrease.

Thus, one 1-hour Project wind hazard would be eliminated; the duration of three Project hazards would be reduced by 11 hours; the duration of one Project hazard would be increased by 1 hour; and, one new 2-hour hazard would be created by the Cumulative scenario. The overall result would be a net decrease of 9 hours in the duration of the wind hazard on the sidewalks.

In addition, the lesser of the two Project wind hazards (3 hours and 18 hours) atop the roof garden would be eliminated, while the duration of another would be increased by 29 hours and the duration of the Existing wind hazard would be reduced by 1 hour. The net effect would be an increase in the total wind hazard duration on the roof garden by 25 hours.

Thus, with the Cumulative scenario nearly 29% of the 28 individual wind test locations would have wind speeds that exceed the wind hazard for 1 hour or more during daytime hours during the year (City's wind hazard criterion). As is the case for the existing winds, the duration of each hazard identified is typically less than 10 hours per year, but in four locations, both near buildings and where wind speed and turbulence are increased, the duration of the hazard would also increase.

Based on wind testing, the total duration of wind hazard for the Cumulative Development scenario is currently estimated at 151 hours per year, including 106 hours of hazard on the roof garden. The highest wind speed that would occur for 1 hour per year is 52 mph; winds at this location would exceed 36 mph for 59 hours a year.

Excluding the roof garden, the total duration of the Cumulative scenario wind hazard (45 hours) is less than the existing wind hazard (55 hours) and less than the Project wind hazard (54 hours). Again as expected, there are differences between the Existing, Project and Cumulative scenarios in the locations at which these hazards would occur.

The results showing the effects of Cumulative Development reinforces the point made previously that the anticipated general reductions in ground-level wind speed (from Project high-rise development) will not be fully realized until other infill high-rise buildings, such as indicated under the Cumulative Development scenario, are also constructed.

For the Project under Cumulative Development, the largest adverse effect would be on the Project's own roof garden, which would continue to be exposed to downwash winds from the new towers. Because wind speeds will exceed the hazard threshold on the roof garden, this would result in a significant impact. As discussed under Impact AES-6, there exist structural and landscape design features that could be included in the tower design and/or installed on the roof garden that would either re-direct winds away from the roof garden or reduce wind speeds there. It is anticipated that wind speeds would be reduced below the hazard threshold by implementing such design features. However, this impact would remain significant and unavoidable until it can be shown that those design elements would mitigate the adverse effect.

Mitigation Measure

Measure AES-2: Implement Mitigation Measure AES-1.

Significance after Mitigation: Conservatively Deemed Significant and Unavoidable.

References – Aesthetics, Shadows and Wind

California Department of Transportation, The California Scenic Highway System, http://www.dot.ca.gov/hq/LandArch/scenic/cahisys.htm, accessed December 2, 2008.

City of Oakland, Community and Economic Development Agency (CEDA) Major Projects List, March-April 2009 (www.oaklandnet.com)

City of Oakland, *Envision Oakland: City of Oakland General Plan, Land Use and Transportation Element (LUTE)*, March 24, 1998, as amended.

City of Oakland, *Open Space, Conservation and Recreation (OSCAR), An Element of the Oakland General Plan*, June 1996.

City of Oakland, *Scenic Highways: An Element of the Oakland Comprehensive (General) Plan*, adopted September 1974.

ESA, Wind Study Model and Testing, 2009.

B. Air Quality and Greenhouse Gases

This section presents an overview of region-specific information related to air quality, including a description of current air quality conditions in the Project vicinity and sensitive land uses that could be affected by air pollution. The impact analysis discusses the expected emissions associated with the Proposed Project, evaluates potential effects on sensitive receptors in the vicinity, and includes appropriate City SCAs. Mitigation measures are identified for significant effects, followed by identification of the residual impact significance after mitigation measures are implemented. An analysis of the Project's contribution to global climate change and greenhouse gases (GHG) emissions is also included at the end of this section.

Air Quality Setting

Regulatory Context for Air Quality

Federal

The Federal Clean Air Act (FCAA) requires the U.S. Environmental Protection Agency (USEPA) to identify National Ambient Air Quality Standards (NAAQS or "national standards") to protect public health and welfare. National standards have been established for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide, respirable particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). **Table IV.B-1** shows current national and state ambient air quality standards and provides a brief discussion of the related health effects and principal sources for each pollutant.

Pursuant to the 1990 FCAA amendments, the USEPA classifies air basins (or portions thereof) as "attainment" or "nonattainment" for each criteria air pollutants, based on whether or not the NAAQS had been achieved. **Table IV.B-2** shows the current attainment status of the Project vicinity.

The FCAA requires each state to prepare an air quality control plan referred to as the State Implementation Plan (SIP). The FCAA amendments added requirements for states containing areas that violate the NAAQS to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is a living document that is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of air basins as reported by the agencies with jurisdiction over them. The USEPA has responsibility to review all state SIPs to determine if they conform to the mandates of the FCAA amendments and will achieve air quality goals when implemented. If the USEPA determines a SIP to be inadequate, it may prepare a Federal Implementation Plan (FIP) for the nonattainment area and may impose additional control measures. Failure to submit an approvable SIP or to implement the plan within mandated timeframes can result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

TABLE IV.B-1
STATE AND NATIONAL CRITERIA AIR POLLUTANT STANDARDS, EFFECTS, AND SOURCES

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone	1 hour	0.09 ppm	---	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when reactive organic gases (ROG) and nitrogen oxides (NOx) react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial / industrial mobile equipment.
	8 hours	0.07 ppm[1]	0.075 ppm		
Carbon Monoxide	1 hour	20 ppm	35 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm		
Nitrogen Dioxide	1 hour	0.18 ppm	---	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
	Annual Avg.	0.030	0.053 ppm		
Sulfur Dioxide	1 hour	0.25 ppm	---	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	3 hours	---	0.5 ppm		
	24 hours	0.04 ppm	0.14 ppm		
	Annual Avg.	---	0.03 ppm		
Respirable Particulate Matter (PM-10)	24 hours	50 µg/m^3	150 µg/m^3	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	Annual Avg.	20 µg/m^3	---		
Fine Particulate Matter (PM-2.5)	24 hours	---	35 µg/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.
	Annual Avg.	12 µg/m^3	15 µg/m^3		
Lead	Monthly Avg.	1.5 µg/m^3	---	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Quarterly	---	1.5 µg/m^3		
Hydrogen Sulfide	1 hour	0.03 ppm	No National Standard	Geothermal Power Plants, Petroleum Production and refining	Nuisance odor (rotten egg smell), headache and breathing difficulties (higher concentrations)
Sulfates	24 hour	25 µg/m^3	No National Standard	Produced by the reaction in the air of SO2.	Breathing difficulties, aggravates asthma, reduced visibility
Visibility Reducing Particles	8 hour	Extinction of 0.23/km; visibility of 10 miles or more	No National Standard	Reduces visibility, reduced airport safety, lower real estate value, discourages tourism.	See PM2.5.

ppm = parts per million; µg/m^3 = micrograms per cubic meter.

1. This concentration was approved by the Air Resources Board on April 28, 2005 and became effective May 17, 2006.

SOURCE: California Air Resources Board, 2008a, California Air Resources Board, 2005a.

TABLE IV.B-2
BAY AREA ATTAINMENT STATUS

	Designation/Classification	
Pollutant	**Federal Standards**	**State Standards**
Ozone – one hour	No Federal Standard[1]	Nonattainment
Ozone – eight hour	Nonattainment	Nonattainment
PM10	Unclassified	Nonattainment
PM2.5	Unclassified/Attainment	Nonattainment
CO	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead	No Designation	Attainment
Hydrogen Sulfide	No Federal Standard	Unclassified
Sulfates	No Federal Standard	Attainment
Visibility Reducing Particles	No Federal Standard	Unclassified

1. Federal One Hour Ozone National Ambient Air Quality Standard was revoked on June 15, 2005
2. The State 8-hour ozone standard was approved by the CARB on April 28, 2005, and became effective May 17, 2006.

SOURCE: BAAQMD, 2008a.

Regulation of Toxic Air Contaminants (TACs), termed Hazardous Air Pollutants (HAPs) under federal regulations, is achieved through federal, State and local controls on individual sources. The 1977 FCAA amendments required the USEPA to identify National Emission Standards for Hazardous Air Pollutants (NESHAPs) to protect public health and welfare. These substances include certain volatile organic chemicals, pesticides, herbicides, and radionuclides that present a tangible hazard, based on scientific studies of exposure to humans and other mammals. There is uncertainty in the precise degree of hazard.

State

The California Air Resources Board (CARB) manages air quality, regulates mobile emissions sources, and oversees the activities of county Air Pollution Control Districts and regional Air Quality Management Districts. CARB establishes state ambient air quality standards and vehicle emissions standards.

California has adopted ambient standards that are more stringent than the federal standards for the criteria air pollutants and include air quality standards for some pollutants for which there is no corresponding national standard. These are shown in Table IV.B-1. Under the California Clean Air Act (CCAA) patterned after the FCAA, areas have been designated as attainment or nonattainment with respect to the state standards. Table IV.B-2 summarizes the attainment status with California standards in the Project vicinity.

Toxic Air Contaminants

The Health and Safety Code defines TACs as air pollutants which may cause or contribute to an increase in mortality or in serious illness, or which may pose a present or potential hazard to human health. The State Air Toxics Program was established in 1983 under Assembly Bill (AB) 1807

(Tanner). A total of 243 substances have been designated TACs under California law; they include the 189 (federal) HAPs adopted in accordance with AB 2728. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risk from air toxics sources; however, AB 2588 does not regulate air toxics emissions. Toxic air contaminant emissions from individual facilities are quantified and prioritized. "High-priority" facilities are required to perform a health risk assessment and, if specific thresholds are violated, are required to communicate the results to the public in the form of notices and public meetings.

In August of 1998, ARB identified particulate emissions from diesel-fueled engines (diesel particulate matter, or DPM) as TACs. CARB subsequently developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB, 2000). The document represents proposals to reduce diesel particulate emissions, with the goal of reducing emissions and associated health risks by 75 percent in 2010 and by 85 percent in 2020. The program aims to require the use of state-of-the-art catalyzed diesel particulate filters and ultra low sulfur diesel fuel on diesel-fueled engines.

In April 2005, CARB published *Air Quality and Land Use Handbook*: A Community Health Perspective (CARB, 2005b). This handbook is intended to give guidance to local governments in the siting of sensitive land uses, such as residences, schools, daycare centers, playgrounds, or medical facilities, near sources of air pollution.

Regional

The regional agency primarily responsible for developing air quality plans for the Bay Area is the Bay Area Air Quality Management District (BAAQMD), the agency with permit authority over most types of stationary emission sources of air pollutants in the Bay Area.

Air Quality Plans

The 1977 FCAA amendments require that regional planning and air pollution control agencies prepare a regional *Air Quality Plan* to outline the measures by which both stationary and mobile sources of pollutants can be controlled in order to achieve all standards specified in the Clean Air Act. The 1988 CCAA also requires development of air quality plans and strategies to meet state air quality standards in areas designated as non-attainment (with the exception of areas designated as non-attainment for the state PM standards). Maintenance plans are required for attainment areas that had previously been designated non-attainment in order to ensure continued attainment of the standards. Air quality plans developed to meet federal requirements are referred to as *State Implementation Plans*.

Bay Area plans are prepared by the BAAQMD with the cooperation of the Metropolitan Transportation Commission ("MTC") and the Association of Bay Area Governments ("ABAG"). Currently, there are three plans for the Bay Area. These are:

- The *Revised San Francisco Bay Area Ozone Attainment Plan for the 1-Hour National Ozone Standard* (ABAG, 2001) developed to meet federal ozone air quality planning requirements

- The *Bay Area 2005 Ozone Strategy* (BAAQMD, 2006) developed to meet planning requirements related to the state ozone standard; and

- The *1996 Carbon Monoxide Redesignation Request and Maintenance Plan for Ten Federal Planning Areas*, developed by the air districts with jurisdiction over the ten planning areas including the BAAQMD to ensure continued attainment of the federal carbon monoxide standard. In June 1998, the USEPA approved this plan and designated the ten areas as attainment. The maintenance plan was revised most recently in 2004 (CARB, 2004).

The Bay Area 2001 *Ozone Attainment Plan* was prepared as a proposed revision to the Bay Area part of California's plan to achieve the national ozone standard. The plan was prepared in response to USEPA's partial approval and partial disapproval of the Bay Area's 1999 *Ozone Attainment Plan* and finding of failure to attain the national ambient air quality standard for ozone. The revised plan was adopted by the Boards of the co-lead agencies at a public meeting and approved by the CARB in 2001. In July 2003, the USEPA approved the plan. The USEPA also made an interim final determination that the plan corrects deficiencies identified in the 1999 plan. Following three years of low ozone levels (2001, 2002 and 2003), in October 2003, USEPA proposed a finding that the Bay Area had attained the national one-hour standard and that certain elements of the 2001 plan (attainment demonstration, contingency measures and reasonable further progress) were no longer required. In April 2004, USEPA made final the finding that the Bay Area had attained the one-hour standard and approved the remaining applicable elements of the 2001 plan: emissions inventory; control measure commitments; motor vehicle emission budgets; reasonably available control measures; and commitments to further study measures.

The USEPA recently transitioned from the national one-hour standard to a more health protective 8-hour standard. Defined as "concentration-based," the new national ozone standard is set at 85 parts per billion averaged over eight hours. The new national 8-hour standard is considered to be more health protective because it protects against health effects that occur with longer exposure to lower ozone concentrations. In April 2004, USEPA designated regions as attainment and non-attainment areas for the 8-hour standard. These designations took effect on June 15, 2004. USEPA formally designated the Bay Area as a non-attainment area for the national 8-hour ozone standard and classified the region as "marginal" according to five classes of non-attainment areas for ozone, which range from marginal to extreme. Marginal non-attainment areas were charged with attaining the national 8-hour ozone standard by June 15, 2007. While certain elements of Phase 1 of the 8-hour implementation rule are still undergoing legal challenge, USEPA signed Phase 2 of the 8-hour implementation rule on November 9, 2005. Although the Bay Area did not achieve attainment by the June 2007 deadline, it is not currently anticipated that marginal areas will be required to prepare attainment demonstrations for the 8-hour standard, though other planning elements may be required. The Bay Area plans to address all requirements of the national 8-hour standard in subsequent documents.

For state air quality planning purposes, the Bay Area is classified as a serious non-attainment area for ozone. The "serious" classification triggers various plan submittal requirements and transportation performance standards. One such requirement is that the Bay Area update the *Clean Air Plan* ("CAP") every three years to reflect progress in meeting the air quality standards and to incorporate new information regarding the feasibility of control measures and new emission inventory data. The Bay Area's record of progress in implementing previous measures must also be reviewed. On January 4, 2006, the BAAQMD adopted the most recent revision to the CAP - the *Bay Area 2005 Ozone Strategy*. The control strategy for the *2005 Ozone Strategy* is to implement all feasible measures on an expeditious schedule in order to reduce emissions of ozone precursors and consequently reduce ozone levels in the Bay Area and reduce transport to downwind regions. The 2010 CAP is currently in a draft stage and has yet to be adopted as of publication of this Draft EIR.

In April 2005, CARB established a new eight-hour average ozone standard of 0.070 ppm, which became effective on May 17, 2006. CARB is currently working on designations and implementation guidance for the new standard. The one-hour state standard of 0.090 ppm has been retained. The San Francisco Bay Area has not attained the state eight-hour standards and will be taking action as necessary to address those standards once the planning requirements have been established.

Local

City of Oakland General Plan

The Open Space, Conservation, and Recreation (OSCAR) Element of the Oakland General Plan contains the following Air Quality objective and policies that would apply to the Proposed Project (City of Oakland, 1996).

- To improve air quality in Oakland and the surrounding Bay Region. *(Objective CO-12:Air Resources)*
- Promote land use patterns and densities which help improve regional air quality conditions by: (a) minimizing dependence on single passenger autos; (b) promoting projects which minimize quick auto starts and stops, such as live-work development, mixed use development, and office development with ground floor retail space; (c) separating land uses which are sensitive to pollution from the sources of air pollution; and (d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis. *(Policy CO-12.1)*
- Require that development projects be designed in a manner which reduces potential adverse air quality impacts. This may include: (a) the use of vegetation and landscaping to absorb carbon monoxide and to buffer sensitive receptors; (b) the use of low-polluting energy sources and energy conservation measures; and (c) designs which encourage transit use and facilitate bicycle and pedestrian travel. *(Policy CO-12.4)*
- Require construction, demolition and grading practices which minimize dust emissions *(Policy CO-12.6)*

City of Oakland Municipal Code

Per the City of Oakland Municipal Code, Title 15 Buildings and Construction, Chapter 15.36 Demolition Permits, 15.36.100 Dust Control Measures,

> "Best Management Practices" shall be used throughout all phases of work, including suspension of work, to alleviate or prevent fugitive dust nuisance and the discharge of smoke or any other air contaminants into the atmosphere in such quantity as will violate any city or regional air pollution control rules, regulations, ordinances, or statutes. Water or dust palliatives or combinations of both shall be applied continuously and in sufficient

quantity during the performance of work and at other times as required. Dust nuisance shall also be abated by cleaning and sweeping or other means as necessary. A dust control plan may be required as condition of permit issuance or at other times as may be deemed necessary to assure compliance with this section. Failure to control effectively or abate fugitive dust nuisance or the discharge of smoke or any other air contaminants into the atmosphere may result in suspension or revocation of the permit, in addition to any other applicable enforcement actions or remedies. (Ord. 12152 § 1, 1999) .

City of Oakland Standard Conditions of Approval & Uniformly Applied Development Standards

The City's SCAs are incorporated into projects as conditions of approval regardless of a project's environmental determination. As applicable, the SCAs are adopted as requirements of an individual project when it is approved by the City and are designed to, and will, substantially mitigate environmental effects. For Proposed Project, the relevant SCAs regarding air quality will be incorporated as part of the Project. If an SCA would reduce a potentially significant impact to less than significant, the impact will be determined to be less than significant and no mitigation is imposed. Where there are impacts associated with a Project Site that will result in significant environmental impacts despite implementation of the SCA, additional mitigation measures are recommended.

The City's SCAs relevant to air quality impacts are shown below.

- **SCA AIR-1 Construction-Related Air Pollution Controls (Dust and Equipment Emissions)** (*Ongoing throughout demolition, grading, and/or construction)*

  During construction, the project applicant shall require the construction contractor to implement all of the following applicable measures recommended by the Bay Area Air Quality Management District (BAAQMD):

  a. Water all exposed surfaces of active construction areas at least twice daily (using reclaimed water if possible). Watering should be sufficient to prevent airborne dust from leaving the site. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water should be used whenever possible.

  b. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard (i.e., the minimum required space between the top of the load and the top of the trailer).

  c. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

  d. Pave all roadways, driveways, sidewalks, etc. as soon as feasible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.

  e. Enclose, cover, water twice daily or apply (non-toxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.).

  f. Limit vehicle speeds on unpaved roads to 15 miles per hour.

  g. Idling times shall be minimized either by shutting equipment off when not is use or reducing the maximum idling time to five minutes (as required by the California airborne toxics control measure Title 13, Section 2485, of the California Code of

Regulations. Clear signage to this effect shall be provided for construction workers at all access points.

h. All construction equipment shall be maintained and properly tuned in accordance with the manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

i. Post a publicly visible sign that includes the contractor's name and telephone number to contact regarding dust complaints. When contacted, the contractor shall respond and take corrective action within 48 hours. The telephone numbers of contacts at the City and BAAQMD shall also be visible. This information may be posted on other required on-site signage.

The enhanced measures below apply to construction projects involving 1) land uses that exceed the BAAQMD construction screening criteria (e.g., 240 or more multi-family residential units); 2) a demolition permit; 3) simultaneous occurrence of more than two construction phases (e.g., grading and building construction occurring simultaneously); 4) extension site preparation (i.e., over four acres in size); or 5) extensive soil transport (i.e., 10,000 or more cubic yards of soil import/export).

j. All exposed surfaces shall be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.

k. All excavation, grading, and demolition activities shall be suspended when average wind speeds exceed 20 mph.

l. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.

m. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for one month or more).

n. Designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of dust offsite. Their duties shall include holidays and weekend periods when work may not be in progress.

o. Install appropriate wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of the construction site to minimize wind blown dust. Wind breaks must have a maximum 50 percent air porosity.

p. Vegetative ground cover (e.g., fast-germinating native grass seed) shall be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.

q. The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time shall be limited. Activities shall be phased to reduce the amount of disturbed surfaces at any one time.

r. All trucks and equipment, including tires, shall be washed off prior to leaving the site.

s. Site accesses to a distance of 100 feet from the paved road shall be treated with a 6 to 12 inch compacted layer of wood chips, mulch, or gravel.

t. Minimize the idling time of diesel-powered construction equipment to two minutes.

u. The project applicant shall develop a plan demonstrating that the off-road equipment (more than 50 horsepower) to be used in the construction project (i.e., owned, leased, and subcontractor vehicles) would achieve a project wide fleet-average 20 percent NOx reduction and 45 percent particulate matter (PM) reduction compared to the most recent California Air Resources Board (CARB) fleet average. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as they become available.

v. Use low VOC (i.e., ROG) coatings beyond the local requirements (i.e., BAAQMD Regulation 8, Rule 3: Architectural Coatings).

w. All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NOx and PM.

x. Off-road heavy diesel engines shall meet the CARB's most recent certification standard.

- **SCA AIR-2 Construction Emissions** (*Prior to issuance of a demolition, grading or building permit.)*

  To minimize construction equipment emissions during construction, the Project Applicant shall require the construction contractor to:

  a. Demonstrate compliance with BAAQMD Regulation 2, Rule 1 (General Requirements) for all portable construction equipment subject to that rule. BAAQMD Regulation 2, Rule 1 provides the issuance of authorities to construct and permits to operate certain types of portable equipment used for construction purposes (e.g., gasoline or diesel-powered engines used in conjunction with power generation, pumps, compressors, and cranes) unless such equipment complies with all applicable requirements of the "California Air Pollution Control Officers Association (CAPCOA)" Portable Equipment Registration Rule" or with all applicable requirements of the Statewide Portable Equipment Registration Program. This exemption is provided in BAAQMD Rule 2-1-105.

  b. Perform low- NOx tune-ups on all diesel-powered construction equipment greater than 50 horsepower (no more than 30 days prior to the start of use of that equipment). Periodic tune-ups (every 90 days) should be performed for such equipment used continuously during the construction period.

- **SCA AIR-3 Asbestos Removal in Structures** (*Prior to issuance of a demolition permit.)*

  If asbestos-containing materials (ACM) are found to be present in building materials to be removed, demolished and disposed, the Project Applicant shall submit specifications signed by a certified asbestos consultant for the removal, encapsulation, or enclosure of the identified ACM in accordance with all applicable laws and regulations, including but not necessarily limited to: California Code of Regulations, Title 8; Business and Professions Code; Division 3; California Health & Safety Code 25915-25919.7; and Bay Area Air Quality Management District, Regulation 11, Rule 2, as may be amended.

In addition, the following SCAs located in other sections of this EIR would also serve to reduce VMT, thus reducing pollutant emissions:

- TRANS-1: Transportation Demand Management Plan (Section IV.L, *Traffic and Circulatio*n)
- UTIL-1: Waste Reduction and Recycling (Section IV.M, *Utilities and Service Systems*)

Physical Setting for Air Quality

Climate and Meteorology

Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. The Project Site is located in the City of Oakland and is within the boundaries of the San Francisco Bay Area Air Basin (Bay Area). The Bay Area Air Basin encompasses the nine-county region including all of Alameda, Contra Costa, Santa Clara, San Francisco, San Mateo, Marin and Napa counties, and the southern portions of Solano and Sonoma counties. The climate of the Bay Area is determined largely by a high-pressure system that is almost always present over the eastern Pacific Ocean off the West Coast of North America. During winter, the Pacific high-pressure system shifts southward, allowing more storms to pass through the region. During summer and early fall, when few storms pass through the region, emissions generated within the Bay Area can combine with abundant sunshine under the restraining influences of topography and subsidence inversions to create conditions that are conducive to the formation of photochemical pollutants, such as ozone and secondary particulates, such as nitrates and sulfates.

More specifically, the site lies approximately 3 miles east of San Francisco Bay in the Northern Alameda and Western Contra Costa Counties climatological subregion. This subregion stretches from Richmond to San Leandro with San Francisco Bay as its western boundary and its eastern boundary defined by the Oakland-Berkeley Hills. In this area, marine air traveling through the Golden Gate, as well as across San Francisco and the San Bruno Gap, is a dominant weather factor. The Oakland-Berkeley Hills cause the westerly flow of air to split off to the north and south of Oakland, which causes diminished wind speeds. The air pollution potential in this subregion is relatively low for portions close to the Bay, due to the largely good ventilation and less influx of pollutants from upwind sources (BAAQMD, 1999).

Wind measurements taken at Oakland International Airport indicate that the predominant wind flow is out of the west-northwest. Northwest winds occur approximately 46 percent of the time. Average wind speeds vary from season to season with the strongest average winds occurring during summer and the lightest average winds during winter. Average wind speeds are 9.7 miles per hour (mph) during summer and 7.4 mph during winter. Temperatures in Oakland average 58 ^{o}F annually, ranging from an average of 40^{o}F on winter mornings to an average of mid-70s in the late summer afternoons. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby ocean. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the “rainy” period from early November to mid-April. Oakland averages 18 inches of precipitation annually, but because much of the area’s rainfall is derived from the fringes of mid-latitude storms, a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and near drought conditions.

Existing Air Quality

The BAAQMD operates a regional monitoring network that measures the ambient concentrations of the six criteria air pollutants. Existing and probable future levels of air quality in Oakland can generally be inferred from ambient air quality measurements conducted by the BAAQMD at its nearby monitoring stations. The monitoring stations closest to the Project area are the Alice Street and International Boulevard stations in Oakland, 0.8 mile southwest and 6.5 mile southeast from the Project Site, respectively. The Alice Street station monitored ozone (1-hour and 8-hour) and carbon monoxide for year 2005, and the International Boulevard station monitored ozone (1-hour and 8-hour), particulate matter ($PM_{2.5}$), carbon monoxide, and nitrogen dioxide for year 2007 through 2009. Data for 2006 was not available near the Project Site. Since the major pollutants of concern in the San Francisco Bay Area are ozone, and particulate matter, **Table IV.B-3** shows a four-year summary of monitoring data (2005 and 2007 through 2009) for these pollutants from the Alice Street and International Boulevard stations. Due to the proximity of the Project to the stations in Oakland, air quality measurements gathered in Oakland are felt to be generally representative of conditions in the Project area. Table IV.B-3 also compares measured pollutant concentrations with state and national ambient air quality standards.

TABLE IV.B-3
AIR QUALITY DATA SUMMARY (2005-2009) FOR THE PROJECT AREA[a]

Pollutant	State Standard[b]	National Standard[b]	Monitoring Data by Year 2005	2007	2008	2009
Ozone hourly						
Highest 1-hour average, ppm [c]	0.09	NA	0.068	0.040	0.086	0.092
Days over State Standard			0	0	0	0[f]
Ozone 8-hour						
Highest 8-hour average, ppm [c]	0.07	0.075	0.045	0.036	0.064	0.062
Days over National Standard			0	0	0	0
Days over State Standard			0	0	0	0
PM2.5						
Highest 24-hour average, µg/m3 [c]	NA	35	NA	22.8	30.1	36.3
Estimated days over National Standard [d]			NA	0 [e]	0	3

a Data for 2004 and 2005 are from the BAAQMD's Alice Street station in Oakland, approximately 0.8 mile southwest of the Project Site; data for 2007 and 2008 are from the BAAQMD's International Boulevard station in Oakland, approximately 6.5 mile southeast from the Project Site; data for 2006 was not available near the Project Site. PM_{10} data was not available near the Project Site.
b Generally, state standards and national standards are not to be exceeded more than once per year.
c ppm = parts per million; µg/m3 = micrograms per cubic meter.
d Exceedance based on the previous National Standard of 65µg/m3.
e The CARB states that an exceedance is not necessarily a violation.
f A violation occurs only if the standard is exceeded. Because 0.092 rounds to 0.09, it is not considered a violation. A recorded concentration of 0.095 or greater would constitute a violation of the state standard.

NA = Not Available or Not Applicable.

SOURCE: California Air Resources Board (CARB), 2008b.

Criteria Air Pollutants

Ozone (O_3)

Short-term exposure to ozone can irritate the eyes and cause constriction of the airways. Besides causing shortness of breath, ozone can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. Ozone is not emitted directly into the atmosphere, but is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NOx). ROG and NOx are known as precursor compounds for ozone. Significant ozone production generally requires ozone precursors to be present in a stable atmosphere with strong sunlight for approximately three hours. Ozone is a regional air pollutant because it is not emitted directly by sources, but is formed downwind of sources of ROG and NOx under the influence of wind and sunlight. Ozone concentrations tend to be higher in the late spring, summer, and fall, when the long sunny days combine with regional subsidence inversions to create conditions conducive to the formation and accumulation of secondary photochemical compounds, like ozone.

Carbon Monoxide (CO)

Ambient carbon monoxide concentrations normally are considered a local effect and typically correspond closely to the spatial and temporal distributions of vehicular traffic. Wind speed and atmospheric mixing also influence carbon monoxide concentrations. Under inversion conditions, carbon monoxide concentrations may be distributed more uniformly over an area that may extend some distance from vehicular sources. When inhaled at high concentrations, carbon monoxide combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart, and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia, as well as for fetuses.

Carbon monoxide concentrations have declined dramatically in California due to existing controls and programs and most areas of the state including the Project region have no problem meeting the carbon monoxide state and federal standards. CO measurements and modeling were important in the early 1980s when CO levels were regularly exceeded throughout California. In more recent years, CO measurements and modeling have not been a priority in most California air districts due to the retirement of older polluting vehicles, fewer emissions from new vehicles, and improvements in fuels. The clear success in reducing CO levels is evident in the first paragraph of the executive summary of the California Air Resources Board *2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for Ten Federal Planning Areas* (CARB, 2004), which states:

> The dramatic reduction in carbon monoxide (CO) levels across California is one of the biggest success stories in air pollution control. Air Resources Board (ARB or Board) requirements for cleaner vehicles, equipment and fuels have cut peak CO levels in half since 1980, despite growth. All areas of the State designated as non-attainment for the federal 8-hour CO standard in 1991 now attain the standard, including the Los Angeles urbanized area. Even the Calexico area of Imperial County on the congested Mexican border had no violations of the federal CO standard in 2003. Only the South Coast and Calexico continue to violate the more protective State 8-hour CO standard, with declining levels beginning to approach that standard.

Nitrogen Dioxide (NO_2)

NO_2 is a reddish brown gas that is a by-product of combustion processes. Automobiles and industrial operations are the main sources of NO_2. NO_2 may be visible as a coloring component of a brown cloud on high pollution days, especially in conjunction with high ozone levels.

Nitrogen dioxide is an air quality concern because it acts as a respiratory irritant and is a precursor of ozone. Nitrogen dioxide is a major component of the group of gaseous nitrogen compounds commonly referred to as nitrogen oxides (NOx). Nitrogen oxides are produced by fuel combustion in motor vehicles, industrial stationary sources (such as industrial activities), ships, aircraft, and rail transit. Typically, nitrogen oxides emitted from fuel combustion are in the form of nitric oxide (NO) and nitrogen dioxide (NO_2). NO is often converted to NO_2 when it reacts with ozone or undergoes photochemical reactions in the atmosphere. Therefore, emissions of NO_2 from combustion sources are typically evaluated based on the amount of NOx emitted from the source.

Sulfur Dioxide (SO_2)

SO_2 is a combustion product of sulfur or sulfur-containing fuels such as coal and diesel. SO_2 is also a precursor to the formation of atmospheric sulfate, particulate matter and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain.

Particulate Matter (PM)

PM_{10} and $PM_{2.5}$ consist of particulate matter that is 10 microns or less in diameter and 2.5 microns or less in diameter, respectively. (A micron is one-millionth of a meter). PM_{10} and $PM_{2.5}$ represent fractions of particulate matter that can be inhaled into the air passages and the lungs and can cause adverse health effects. Some sources of particulate matter, such as wood burning in fireplaces, demolition, and construction activities, are more local in nature, while others, such as vehicular traffic, have a more regional effect. Very small particles of certain substances (e.g., sulfates and nitrates) can cause lung damage directly, or can contain adsorbed gases (e.g., chlorides or ammonium) that may be injurious to health. Particulates also can damage materials and reduce visibility. Large dust particles (diameter greater than 10 microns) settle out rapidly and are easily filtered by human breathing passages. This large dust is of more concern as a soiling nuisance rather than a health hazard. The remaining fraction, PM_{10} and $PM_{2.5}$, are a health concern particularly at levels above the federal and state ambient air quality standards. $PM_{2.5}$ (including diesel exhaust particles) is thought to have greater effects on health, because these particles are so small and thus, are able to penetrate to the deepest parts of the lungs. Scientific studies have suggested links between fine particulate matter and numerous health problems including asthma, bronchitis, acute and chronic respiratory symptoms such as shortness of breath and painful breathing. Recent studies have shown an association between morbidity and mortality and daily concentrations of particulate matter in the air. Children are more susceptible to the health risks of PM_{10} and $PM_{2.5}$ because their immune and respiratory systems are still developing.

Mortality studies since the 1990s have shown a statistically significant direct association between mortality (premature deaths) and daily concentrations of particulate matter in the air. Despite important gaps in scientific knowledge and continued reasons for some skepticism, a comprehensive evaluation of the research findings provides persuasive evidence that exposure to fine particulate air pollution has adverse effects on cardiopulmonary health (Dockery and Pope 2006).

Lead (Pb)

Ambient lead concentrations meet both the federal and state standards in the Project area. Lead has a range of adverse neurotoxin health effects, and was formerly released into the atmosphere primarily via leaded gasoline products. The phase-out of leaded gasoline in California resulted in decreasing levels of atmospheric lead. The Proposed Project would not introduce any new sources of lead emissions; consequently, lead emissions are not required to be quantified and are not further evaluated in this analysis.

Toxic Air Contaminants (TACs)

Non-criteria air pollutants or TACs are airborne substances that are capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer causing) adverse human health effects (i.e., injury or illness). TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes approximately 200 compounds, including particulate emissions from diesel-fueled engines.

In 2001, the CARB assessed the statewide health risks from exposure to diesel exhaust and to other toxic air contaminants. It is difficult to distinguish the health risks of diesel emissions from the other air toxics, since diesel exhaust contains about 40 different TACs. The CARB study (CARB, 2000) detected diesel exhaust by using ambient air carbon soot measurements as a surrogate for diesel emissions. The Study reported that in 2000, the statewide cancer risk from exposure to diesel exhaust was about 540 per million (i.e., 540 cancers per million people) as compared to a total risk for exposure to all ambient air toxics of 760 per million. This estimate of risk from diesel exhaust, which accounts for about 70 percent of the total risk from TACs, included both urban and rural areas in the state. It can be considered as an average worst-case for the state, since it assumes constant exposure to outdoor concentrations of diesel exhaust and does not account for expected lower concentrations indoors, where people spend most of their time.

Odorous Emissions

Though offensive odors from stationary sources rarely cause any physical harm, they still remain unpleasant and can lead to public distress generating citizen complaints to local governments. The occurrence and severity of odor impacts depend on the nature, frequency and intensity of the source; wind speed and direction; and the sensitivity of receptors. The *CEQA Guidelines* recommends that odor impacts be considered for any proposed new odor sources located near existing receptors, as well as any new sensitive receptors located near existing odor sources. Generally, increasing the distance between the receptor and the source will mitigate odor impacts.

Sensitive Land Uses

Some receptors are considered more sensitive than others to air pollutants. The reasons for greater than average sensitivity include pre-existing health problems, proximity to emissions source, or duration of exposure to air pollutants. Land uses such as schools, children's day care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress and other air quality-related health problems. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas, because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses are also considered sensitive, due to the greater exposure to ambient air quality conditions, and because the presence of pollution detracts from the recreational experience. The Project consists of retail and office space. As stated within the *Significance Criteria for Air Quality*, below, residential uses, schools, parks, daycare centers, nursing homes, and medical centers are considered sensitive receptors for the evaluation of TACs; each of these uses, except parks, is considered a sensitive receptor for the evaluation of odor impacts. The City also considers the roof garden on the 6th level of the Kaiser Center to also be a sensitive land use as it is an outdoor area accessible by occupants and visitors to the Project.

A residential senior community facility is located approximately 700 feet southeast of the Project Site, and high-density apartments are located approximately 600 feet north, at Grand Avenue. Lake Merritt Lakeside Park is located approximately 500 feet east of the Project Site, and Children's Fairyland at Lake Merritt is located approximately 1,200 feet northeast of the Project Site. Snow Park is approximately 250 feet east of Phase 1 and approximately 500 feet southeast of Phase 2, and the Kaiser Center outdoor roof garden is located within the Project Site (6th Floor) and accessible by occupants and visitors to the Project. (All distances measured perpendicular from edge of Project Site.)

Air Quality Impacts and Mitigation Measures

Significance Criteria for Air Quality

The Proposed Project would result in a significant impact to air quality if it would:

Project-level Impacts

1. During project construction result in average daily emissions of 54 pounds per day of ROG, NO_x, or $PM_{2.5}$ or 82 pounds per day of PM_{10};

2. During project operation result in average daily emissions of 54 pounds per day of ROG, NO_x, or $PM_{2.5}$ or 82 pounds per day of PM_{10}; or result in maximum annual emissions of 10 tons per year of ROG, NO_x, or $PM_{2.5}$ or 15 tons per year of PM_{10};

3. Contribute to carbon monoxide (CO) concentrations exceeding the California Ambient Air Quality Standards (CAAQS) of nine parts per million (ppm) averaged over eight hours and 20 ppm for one hour [**NOTE:** Pursuant to BAAQMD Guidelines, localized CO concentrations should be estimated for projects in which (1) project-generated traffic would conflict with an applicable congestion management program established by the county congestion management agency or (2) project-generated traffic would increase traffic volumes at affected intersections to more than 44,000 vehicles per hour (or 24,000 vehicles per hour where vertical and/or horizontal mixing is substantially limited, such as tunnels, parking garages, bridge underpasses, natural or urban street canyons, and below-grade roadways).];

4. During either project operation or project construction expose persons by siting a new source or a new receptor to substantial levels of Toxic Air Contaminants (TACs) resulting in (a) a cancer risk level greater than 10 in one million, (b) a non-cancer risk (chronic or acute) hazard index greater than 1.0, or (c) an increase of greater than 0.3 micrograms per cubic meter of annual average $PM_{2.5}$ [**NOTE:** Pursuant to BAAQMD Guidelines, when siting new TAC sources consider receptors located within 1,000 feet, and when siting new receptors consider TAC sources located within 1,000 feet including, but not limited to, stationary sources, freeways, major roadways (10,000 or greater vehicles per day), truck distribution centers, ports, and rail lines. The cumulative analysis should consider the combined risk from all existing and reasonably foreseeable future sources. For this threshold receptors include residential uses, schools, parks, daycare centers, nursing homes, and medical centers] or;

5. Frequently and for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial number of people [**NOTE**: For this threshold sensitive receptors include residential uses, schools, daycare centers, nursing homes, and medical centers.].

Project-Level Cumulative Impacts

1. During either project operation or project construction expose persons by siting a new source or a new receptor to substantial levels of TACs resulting in (a) a cancer risk level greater than 100 in a million, (b) a non-cancer risk (chronic or acute) hazard index greater than 10.0, or (c) an increase of greater than 0.8 micrograms per cubic meter of annual average $PM_{2.5}$.

Thresholds regarding impacts to climate change are presented in the GHG Emissions and Climate Change analysis part of this Section, following the Cumulative Air Quality Analysis.

Construction Dust

Impact AIR-1: Construction and demolition activities associated with new development under the Proposed Project would generate short-term emissions of fugitive dust. (Less than Significant)

The BAAQMD's approach to analyses of fugitive dust emissions from construction is to emphasize implementation of effective and comprehensive dust control measures rather than detailed quantification of emissions. The BAAQMD considers any project's construction-related impacts to be less than significant if the required dust-control measures are implemented. Without these measures, the impact is generally considered to be significant, particularly if sensitive land uses are located in the project vicinity. In addition, through its Municipal Code, the City of Oakland requires demolition projects to use best management practices for dust control.

Construction activities would occur intermittently at the Project Site throughout the phases of construction. Although the related impacts would be temporary, construction related activities could cause adverse effects on the local air quality, primarily from dust emissions.

Construction activities would include site preparation, earthmoving and general construction. Site preparation includes activities such as demolition, general land clearing, and grubbing. Earthmoving activities would include cut-and-fill operations, trenching, soil compaction and grading. General construction includes adding improvements such as roadway surfaces, structures and facilities. These activities would result in dust emissions (including PM_{10} and $PM_{2.5}$) primarily from "fugitive" sources (i.e., emissions released through means other than through a stack or tailpipe) such as soil disturbance.

Construction-related fugitive dust emissions at the Project Site would vary from day to day, depending on the level and type of activity, silt content of the soil and the weather. Without mitigation, construction activities would result in significant quantities of dust and as a result, local visibility and PM_{10} and $PM_{2.5}$ concentrations would be adversely affected.

The Project would be subject to dust control measures recommended by BAAQMD, which are included in SCA AIR-1, listed above, and to City of Oakland Municipal Code 15.36.100 Dust Control Measures. Implementation of the measures would reduce impacts from fugitive dust to on- and off-site receptors to a less-than-significant level.

Mitigation: None Required.

Construction Emissions

Impact AIR-2: Activities associated with demolition, site preparation, and construction throughout development of the Proposed Project would generate emissions of criteria pollutants, including equipment exhaust emissions. (Potentially Significant Phase 2 ROG emissions.)

Construction activities would result in the emission of ROG, NO_x, CO, SO_x and particulates (PM_{10} and $PM_{2.5}$) from equipment exhaust, construction-related vehicular activity and construction worker automobile trips. Emission levels for construction activities would vary depending on the number and type of equipment use, duration of use, operation schedules (the time and frequency) and the number of construction workers traveling to the worksite by motorized vehicle. Criteria pollutant emissions of ROG and NO_x from these emissions sources would incrementally add to the regional atmospheric loading of ozone precursors during construction. The Project would be subject to SCA AIR-2, listed above, which would further reduce impacts from construction equipment emissions.

Construction would also increase DPM, but the toxic effects of the DPM would be minimal, and less than significant, because the construction would be temporary and would not last over the long-term timeframes used in DPM Health Risk Analyses (e.g., continuous exposure over a 70-year period).

The significance criterion considers the potential effect of sensitive land uses located within 1,000 feet of TAC sources. [1] As previously described under *Sensitive Land Uses*, nearby sensitive receptors considered by BAAQMD include a residential senior community facility located approximately 700 feet southeast and high-density apartments located approximately 600 feet north of the Project Site (a potential TAC source during certain construction activities). The City also considers parks a sensitive receptor, which includes Lake Merritt Lakeside Park (approx. 500 feet east of the overall Project Site) and Children's Fairyland (approx. 1,200 feet northeast of the overall Project Site), Snow Park (approx. 250 feet east of Phase 1 and approx. 500 feet southeast of Phase 2 of the Project Site), and the Kaiser Center outdoor roof garden located within the Project Site (6th Floor) and accessible by occupants and visitors to the Project.

Each of these sensitive receptors is located within 1,000 feet of the Project Site, except Children's Fairyland, with is approximately 1,200 feet away. Screening tables published by BAAQMD for evaluation of air toxic risks from construction activities indicate that for a 2.2 acre commercial land use construction site, a distance of at least 328 feet from sensitive receptorswould result in less than significant localized cancer risks, TAC exposure hazard risks and $PM_{2.5}$concentration risks (BAAQMD, May 2010).

Of the sensitive receptors in the Project area, only Snow Park, a 4.1-acre neighborhood park located approximately 250 feet from the Project Site (measured between property lines) would be located within the 328-foot offset distance of significance. It is reasonable to assume, however, that receptor (park user) in a park would have a substantially reduced exposure frequency than those of a residential receptor for which the risk values and distances in the screening tables were derived. This would likely be true for both the number of days of exposure per year (given seasonal use of the Park) as well as the number of hours of exposure in a given day (given that the duration of park use is relatively short-term and would be substantially less than the duration of time one spends in a residence). The park is located in an urban location and bound by roadways with high traffic volumes (Harrison and 19th Streets and Lakeside Drive). There are no children's play facilities or areas located within the park. A putting green exists in the southwest area of the park, and neither it nor any other user facilities exist within the 78-foot (328 minus 250 feet) offset distance of significance from the Project Site that would cause a park user to be repetitively present in this area. Therefore, construction-related TAC exposure hazard risks and $PM_{2.5}$concentration risks at Snow Park are considered to be less than significant.

Access and use of the roof garden during demolition and construction activities would be restricted and prohibited for safety reasons during earthwork and building erection when the majority of diesel powered equipment would be operating and $PM_{2.5}$ emissions generated. Therefore construction risk and hazard air quality impacts would be considered to be less than significant.

1 BAAQMD defines sensitive receptors as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples include schools, hospitals and residential areas, and the City also specifies parks, daycare centers, nursing homes.

The URBEMIS2007 model of the California Air Resources Board was used to quantify construction emissions. Construction-related exhaust emissions are presented in **Table IV.B-4**. These emissions estimated consider the following construction phases: demolition, excavation/grading, building construction, asphalt paving and application of architectural coatings. The estimation of construction emissions of Phase 1 assumed demolition of the existing 3-story retail/office building. Phase 1 grading emissions also considered the excavation and removal of 31,000 cubic yards of material for the South Tower. Generally construction emissions associated for Phase 2 are projected to be less than Phase 1 because no cut and fill activities are proposed with Phase 2 development. While there would potentially be a few months of concurrent overlap of construction activities of the two phases, peak average daily emissions are not projected to occur during this period.

TABLE IV.B-4
AVERAGE DAILY CONSTRUCTION-RELATED POLLUTANT EMISSIONS (POUNDS PER DAY)

Year	ROG	NO_x	CO	SO2	PM-10	PM-2.5	CO_2
Phase 1							
2012	1.65	16.5	8.66	<0.1	0.9	0.78	2,469
2013	2.95	21.9	37.2	<0.1	1.0	0.95	6,184
2014	30.8	17.1	43.4	<0.1	1.04	0.95	6,336
2015	50.8	19.3	44.1	<0.1	1.26	1.15	6,841
BAAQMD Construction Threshold	**54**	**54**	**None**	**None**	**82**	**54**	**None**
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Phase 2 / Buildout							
2015	0.90	6.84	5.48	<0.1	0.4	0.37	1,124
2016	2.79	15.7	47.0	<0.1	0.80	0.72	8,083
2017	40.3	14.2	45.3	<0.1	0.85	0.77	8,038
2018	**80.0**	16.0	45.8	<0.1	0.99	0.90	8,552
BAAQMD Construction Threshold	**54**	**54**	**None**	**None**	**82**	**54**	**None**
Significant Impact?	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**

SOURCE: URBEMIS2007

BAAQMD has adopted new daily mass significance thresholds for construction-related activities in its *Air Quality Guidelines*. These thresholds are 54 pounds per day of either ROG, NOx or $PM_{2.5}$ and 82 pounds per day for PM_{10}. BAAQMD has indicated that these standards are to be compared to average daily emissions, not peak daily emissions (Tholen, 2010). Therefore daily emissions in Table IV.B-4 are an average over the entire year. As can be seen from the data in Table IV.B-4, construction-related exhaust emissions from Phase 1 would not exceed any of the BAAQMD thresholds. Construction-related emissions from Phase 2 would exceed the ROG threshold. Table IV.B-4 also shows that construction-related exhaust emissions from Phase 2 would exceed the ROG threshold in year 2018, which could be reduced to a less-than-significant level (from 80.0 pounds per day to a mitigated 37.8 pounds per day)by use of low volatile organic compounds (VOC) architectural coatings.

Project construction would require the demolition of existing buildings at the Project Site. Buildings constructed prior to 1980 often include building materials containing asbestos.

Airborne asbestos fibers pose a serious health threat. The CARB Enforcement Division is responsible for enforcing the NESHAP regulation under Title 40 Code of Federal Regulations (CFR) Part 61, Subpart M. The Asbestos NESHAP requires a thorough inspection of the facility, by an accredited inspector, be conducted for all renovations and all demolitions. According to the BAAQMD CEQA Guidelines, the demolition, renovation or removal of asbestos-containing building materials is subject to the limitations of District Regulation 11, Rule 2: Hazardous Materials; Asbestos Demolition, Renovation and Manufacturing. The District's Enforcement Division should be consulted prior to commencing demolition of a building containing asbestos building materials. Any demolition activity subject to but not complying with the requirements of District Regulation 11, Rule 2 would be considered to have a significant impact.

The Project would be subject to SCA AIR-2, listed above which would reduce impacts from airborne asbestos fibers to a less than significant level under existing BAAQMD thresholds. Under the thresholds, Phase 2 ROG emissions would be significant.

> **Mitigation Measure AIR-1:** To reduce the significant Phase 2 ROG emissions, the Project applicant shall use low VOC architectural coatings. Use of low VOC coatings will reduce ROG emissions to below significance thresholds (37.8 pounds per day).
>
> **Significance after Mitigation and Standard Condition:** Less than Significant.

Operational Criteria Pollutant Emissions

Impact AIR-3: The Proposed Project would result in increased emissions of criteria pollutants. (Significant PM_{10} emissions at Buildout)

The Proposed Project would result in an increase in criteria air pollutant emissions from a variety of emissions sources, including on-site area sources (e.g., natural gas combustion for space and water heating, landscape maintenance, use of consumer products such as hairsprays, deodorants, cleaning products, etc.) and mobile on-road sources (automobile and truck trips). Exhaust emissions from passenger vehicle travel associated with the Project were calculated by using the URBEMIS2007 program, which uses EMFAC2007 (CARB's vehicle emissions model for cars and trucks). URBEMIS2007 calculates area source emissions based on the size of the project.

Table IV.B-5 summarizes mobile and area emissions for the Project area, with and without implementation of the Project and the resulting net emissions as a result of the Project. The existing land uses (without the Project) and Project emissions are compared using year 2015 emissions factors, while the Project, which includes construction of both towers to be completed in 2018, uses year 2020 emission factors. As indicated in Table IV.B-5, no impact would occur in Phase 1.

BAAQMD has adopted new daily mass significance thresholds for operational-related activities in its *Air Quality Thresholds*. These thresholds are 54 pounds per day of either ROG, NOx or $PM_{2.5}$ and 82 pounds per day for PM_{10}. As can be seen from the data in Table IV.B-5, operation-related exhaust emissions from the Project would exceed the PM_{10} threshold.

TABLE IV.B-5
ESTIMATED DAILY EMISSIONS FOR THE PROPOSED PROJECT (POUNDS PER DAY)[a]

Air Pollutant	Existing Uses	Project Uses	Net New Emissions	Significance Threshold	Threshold Comparison	Significant (Yes or No)?
Phase 1						
NOx	36	61	25	54	-26	No
PM10	61	110	49	82	-33	No
PM2.5	12	21	9	54	-45	No
ROG	22	45	23	54	-31	No
CO [C]	260	474	214	None	None	No
Phase 2						
NO_x	36	77	41	54	**-15**	No
PM10	61	172	111 [D]	82	**+29 [D]**	**Yes [D]**
PM2.5	12	33	21	54	-33	No
ROG	22	64	42	54	-12	No
CO [C]	260	609	349	None	None	No

a Emission factors were generated by the Air Board's URBEMIS2007 model for Alameda County and assume a default vehicle mix (see Appendix C). All daily estimates are for wintertime conditions (most conservative). Both Existing Uses and Project Uses emissions are based on Year 2014 emission factors. Emission include both vehicular and area sources.
b Net PM_{10} emission would be reduced to 86 pounds per day with implementation of a 10 percent vehicle reduction through TDM and Clean Car Standards regulations, pursuant to AB 1493, which would exceed the significance threshold by 4.0 pounds per day.
c Projects for which mobile source CO emissions exceed 550 pounds per day do not necessarily have a significant air quality impact, but are required to estimate localized CO concentrations.

NOTE: The addition of the subtotals may not equal the total due to rounding.

SOURCE: ESA, 2009

The Proposed Project would also be subject to the transportation-related SCAs (e.g., TRANS-1 Transportation Demand Management Plan), listed in Section IV.L of this EIR, which would serve to reduce air pollutant emissions. Transportation-related SCAs are anticipated to reduce vehicle trips 10 to 20 percent (and preliminarily and conservatively assumed to achieve a 10 percent reduction in the GHG analysis in this Draft EIR, pending completion of a TDM Plan for the Project) equating to a reduction of about 100 pounds per day. Implementation of Pavley Standards (pursuant to AB 1493 and also referred to as “Clean Car Regulations”) standards for automobiles will reduce emissions by approximately 14 percent by 2020 (CARB, 2008d) to 86 pounds per day. Therefore, with application of TRANS-1 and AB1493, Project emissions of PM_{10} with the Proposed Project would remain significant as they would exceed the BAAQMD significance threshold of 82 pounds per day by 4.0 pounds per day.

Mitigation: Not feasible because none available. PM_{10} emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduce vehicle GHG emissions, including PM_{10}, but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project’s Applicant’s control are known to reduce vehicle trips and related emissions

Significance after Standard Conditions: Significant and Unavoidable PM_{10} emissions.

As discussed above, implementation of a TDM (required as SCA TRANS-1) to reduced SOV trips by up to 10 percent and incorporation of Clean Car Standards could reduce the significant impact, but not to less than significant. A TDM Plan to effect a greater reduction in SOV trips could effectively reduce the impact to less than significant reducing PM_{10} by at least 5.0 pounds per day. However, until a final TDM Plan is prepared and implemented, the effectiveness of the TDM can not be known. Therefore, the impact determination remains significant and unavoidable.

Parking Garage

Impact AIR-4: The Proposed Project would not result in increased emissions of criteria pollutants due to poor ventilation in the Parking Garage. (Less than Significant)

The parking garage areas associated with the Proposed Project would be located below grade as well as at and above grade, the latter of which would be partially open. Partially open parking structures generally do not need mechanical ventilation to prevent accumulation of potentially hazardous air emissions. Section 406.4.2 of the California Building Code (Title 24, Part 2) requires that enclosed parking garages have proper ventilation and air circulation. This would ensure the Project does not result in a significant impact related to ventilation of the parking garage and prevent accumulation of pollutants.

Mitigation: None required.

CO Concentrations

Impact AIR-5: The Proposed Project would not contribute to CO concentrations exceeding the State AAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour (Less than Significant)

City of Oakland CEQA significance thresholds state that localized carbon monoxide concentrations should be estimated for projects in which project traffic would impact intersections or roadway links operating at Level of Service (LOS) D, E or F or would cause LOS to decline at intersections that operate at LOS E or F and that a project contributing to CO concentrations exceeding the State Ambient Air Quality Standard of 9 parts per million (ppm) averaged over 8 hours and 20 ppm for 1 hour would be considered to have a significant impact. BAAQMD *Guidelines* also recommend using the California Department of Transportation CALINE4 model to estimate local CO concentrations resulting from motor vehicle emissions for any projects that will generate 10,000 or more motor vehicle trips per day. While the net increase in vehicle trips per day are 7,966, the Project would generate a total of 12,968 vehicle trips per day and thus a conservative approach was taken and CALINE4 was used to estimate local CO concentrations.

Seven (7) road segments with a substantial increase in traffic volumes and projected by the traffic analysis to operate at LOS F with the Project were modeled for CO concentrations (see Appendix C for Air Quality Data). **Table IV.B-6** presents the results of the model.

TABLE IV.B-6
PROJECTED CARBON MONOXIDE CONCENTRATIONS[a]

Intersection	State Standard[b]	Existing 2007	Near Term 2015	Near Term + Project 2015	Future 2030	Future + Project 2030
Oakland Avenue/Perry Place						
1-hour	*20.0*	7.0	6.1	6.2	5.6	5.6
8-hour	*9.0*	4.7	4.1	4.2	3.7	3.7
Harrison Street/27th and 24th Streets						
1-hour	*20.0*	6.6	5.8	5.9	5.4	5.5
8-hour	*9.0*	4.4	3.9	4.0	3.6	3.7
Harrison Street/Grand Avenue						
1-hour	*20.0*	6.8	5.9	6.0	5.5	5.5
8-hour	*9.0*	4.6	4.0	4.0	3.7	3.7
Broadway Avenue/Grand Avenue						
1-hour	*20.0*	6.2	5.6	5.7	5.4	5.4
8-hour	*9.0*	4.2	3.7	3.8	3.6	3.6
Kaiser Center Access Road/21st Street						
1-hour	*20.0*	5.9	5.5	5.6	5.3	5.4
8-hour	*9.0*	4.0	3.7	3.7	3.5	3.6
Kaiser Center Garage NE/21st Street						
1-hour	*20.0*	5.8	5.4	5.6	5.3	5.4
8-hour	*9.0*	3.9	3.6	3.7	3.5	3.6
Kaiser Center Garage NW/21st Street						
1-hour	*20.0*	5.8	5.4	5.5	5.3	5.3
8-hour	*9.0*	3.9	3.6	3.7	3.5	3.5

a All values are parts per million (ppm) of carbon monoxide (CO).
b The state 1-hour CO standard (20 ppm) is more stringent than the Federal standard(the Federal 1-hour CO standard is 35 ppm). The 8-hour Federal CO standard (9 ppm) is the same as the state standard.

SOURCE: ESA, 2009

As indicated from the modeling results, concentrations of CO would remain below state and federal standards for all scenarios analyzed. Thus, the Proposed Project would not have a significant air quality impact on localized CO concentrations. Even though traffic volumes will increase over the years, future years show a decline in CO levels due to improvements in vehicle engine and retirement of older vehicles.

Mitigation: None required.

Odor

Impact AIR-6: The Proposed Project would not frequently and, for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial

number of people, specifically in residential uses, schools, daycare centers, nursing homes, or medical centers. (Less than Significant).

In general, the types of land uses that pose potential odor problems include refineries, chemical plants, wastewater treatment plants, landfills, composting facilities, and transfer stations. No such uses are proposed with the Project or located within the Project vicinity, according to review of the City's inventory of odor sources in June 2010.

Certain engines, including diesel-powered engines used for construction, can also generate objectionable odors. Diesel engines would be used for some construction equipment. Odors generated by construction equipment would be variable, depending on the location and duration of use. Diesel odors may be noticeable to some individuals at certain times, but would not affect a substantial number of people. As previously indicated within the Significance Criteria, sensitive receptors for odor impacts include residential uses, schools, daycare centers, nursing homes, and medical centers. Since the Project would not include any substantial objectionable odors, and no such odor-sensitive uses exist within approximately 700 feet of the Project Site (a residential senior community facility to the southeast), this is a less-than-significant impact.

Commercial uses at the Project Site could include a restaurant, which could generate temporary odors from cooking. However, these odors are generally not considered objectionable. Per City of Oakland Municipal Code, Chapter 8.28 Solid Waste Collection and Disposal and Recycling, every owner of any premises in the city from which solid waste is produced shall dispose of the solid waste through the City's regular solid waste collection service, made at least once a week or more often as may be required to adequately serve the premises. Therefore, odor-related impacts from the Project would be less than significant.

Mitigation: None required.

Toxic Air Contaminants and $PM_{2.5}$ Concentrations

Impact AIR-7: The Proposed Project would not generate or expose persons to substantial levels of toxic air contaminants (TACs) or $PM_{2.5}$ concentrations (Less than Significant)

A project may have an impact related to TAC emissions by either introducing a sensitive receptor population to a location where substantial TAC are already emitted or by generating TAC emission affecting a sensitive receptor population. As discussed in Impact AIR-2 (Construction Emissions), the significance criterion considers the potential effect of sensitive land uses located within 1,000 feet of TAC sources should be considered. Emissions of TAC and $PM_{2.5}$ during construction are addressed in Impact AIR-2.

There are no stationary sources of TAC or $PM_{2.5}$ emissions proposed by the Project. Thus, none of these sensitive receptors in the nearby vicinity would be affected by the Proposed Project as an "emitter" or" source." The proposed project would not introduce a new sensitive receptor to the area. The Project proposes to reconfigure the existing roof garden for continued use by Project occupants and visitors to Kaiser Center which would not be considered a new land use. A net increase of approximately 4,500 square feet would be added to the roof garden as a result its reconfiguration to accommodate the new Project towers. Thus, the Project's impact would be less than significant when considering the Project as a potential TAC source or a receptor.

Mitigation: None required.

Cumulative Air Quality Impacts (Criteria Pollutants and Precursors)

The following discussion addresses the potential air quality effects under cumulative condition.

Impact AIR-8: Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. (Significant Operational PM_{10} Emissions)

The geographic area considered for the air quality cumulative is generally the San Francisco Bay Area air basin. According to City of Oakland significance criteria, any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact. Impact AIR-3 identifies that operational emissions of PM_{10} due to Project-related traffic increases would be significant**.**

These significant Project impacts are also considered significant cumulative impacts. For the construction impacts, SCA AIR-1 and SCA AIR-2 combined with Mitigation Measure AIR-1 will reduce the potential ROG effects identified in Impact AIR-2 to less-than-significant. For operations impacts, SCA TRANS-1 (TDM Plan, as described in Section IV.L of this EIR), would also apply to the Proposed Project to reduce potential cumulative impacts from PM_{10} emissions identified in Impact AIR-3), but not to less than significant.

> **Mitigation Measure AIR-2:** *Construction*: Implement Mitigation Measure AIR-1. *Operations:* Not feasible because none available. PM_{10} emissions are most effectively reduced by reductions in motor vehicle trips generated by the Project, as targeted by a TDM required as SCA TRANS-1. Compliance with new state Clean Car Standards (i.e., amended Pavley Standards pursuant to AB 1493) would reduce vehicle GHG emissions, including PM_{10}, but compliance is not within the control of the Project Applicant. No other feasible mitigations within the Project's Applicant's control are known to reduce vehicle trips and related emissions
>
> **Significance after Mitigation and Standard Conditions:** *Construction:* Less than Significant. *Operations:* Significant and Unavoidable PM_{10} emissions.

Physical Setting for GHG Emissions and Climate Change

There is a general scientific consensus that global climate change is occurring, caused in whole or in part, by increased emissions of greenhouse gases (GHGs) that keep the Earth's surface warm by trapping heat in the Earth's atmosphere (US EPA, 2000), in much the same way as glass in a greenhouse. While many studies show evidence of warming over the last century and predict future global warming, the precise causes of such warming and its potential effects are far less certain.[2] While the greenhouse effect is responsible for maintaining a habitable climate on Earth, human activity has caused increased concentrations of these gases in the atmosphere, contributing to an increase in global temperatures and alterations of climactic conditions.

The US EPA has recently concluded that scientists have a good understanding of the following relationship and data supporting :

- "Human activities are changing the composition of Earth's atmosphere. Increasing levels of greenhouse gases like carbon dioxide (CO_2) in the atmosphere since pre-industrial times are well-documented."
- The atmospheric buildup of CO_2 and other greenhouse gases is largely the result of human activities such as the burning of fossil fuels.
- A warming trend of approximately 0.7 to 1.5°F occurred during the 20th century. Warming occurred in both the northern and southern hemispheres, and over the oceans.
- "The key greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries." It is therefore virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades. Increasing greenhouse gas concentrations tend to warm the planet. (US EPA, 2000)

At the same time, there is much uncertainty concerning the magnitude and rate of the warming. Specifically, the US EPA notes that "important scientific questions remain about how much warming will occur; how fast it will occur; and how the warming will affect the rest of the climate system, including precipitation patterns and storms. Answering these questions will require advances in scientific knowledge in a number of areas:

- Improving understanding of natural climatic variations, changes in the sun's energy, land-use changes, the warming or cooling effects of pollutant aerosols, and the impacts of changing humidity and cloud cover.
- Determining the relative contribution to climate change of human activities and natural causes.
- Projecting future greenhouse emissions and how the climate system will respond within a narrow range.
- Improving understanding of the potential for rapid or abrupt climate change." (US EPA, 2000)

2 "Global climate change" is a broad term used to describe any worldwide, long-term change in the earth's climate. "Global warming" is more specific and refers to a general increase in temperatures across the earth, although it can cause other climatic changes, such as a shift in the frequency and intensity of weather events and even cooler temperatures in certain areas, even though the world, on average, is warmer.

Greenhouse Gases (GHGs)

Carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) are the principal GHGs, and when concentrations of these gases exceed natural concentrations in the atmosphere, the greenhouse effect may be enhanced. CO_2, CH_4 and N_2O occur naturally, but are also generated through human activity. CO_2 Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Other human generated GHGs, which have much higher heat-absorption potential than CO_2, include fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFC), and sulfur hexafluoride (SF_6) which are byproducts of certain industrial processes.

Potential Effects of Human Activity on GHG Emissions

Fossil fuel combustion, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in CO_2 emissions (and thus substantial increases in atmospheric concentrations). In 1994, atmospheric CO_2 concentrations were found to have increased by nearly 30 percent above pre-industrial (c.1860) concentrations.

The effect each GHG has on climate change is measured as a combination of the volume of its emissions, and its global warming potential (GWP),[3] and is expressed as a function of how much warming would be caused by the same mass of CO_2. Thus, GHG emissions are typically measured in terms of pounds or tons of CO_2e.

Global Emissions

Worldwide emissions of GHGs in 2004 were 30 billion tons of CO_2e per year (UNFCCC, 2007) (including both ongoing emissions from industrial and agricultural sources, but excluding emissions from land-use changes).

U.S. Emissions

In 2004, the United States emitted about 8 billion tons of CO_2e or about 25 tons/year/person. Of the four major sectors nationwide — residential, commercial, industrial and transportation — transportation accounts for the highest fraction of GHG emissions (approximately 35 to 40 percent); these emissions are entirely generated from direct fossil fuel combustion.(US EPA, 2000)

State of California Emissions

In 2004, California emitted approximately 550 million tons of CO_2e, or about 6 percent of the U.S. emissions. This large number is due primarily to the sheer size of California compared to other states. By contrast, California has one of the fourth lowest per capita GHG emission rates in the country, due to the success of its energy-efficiency and renewable energy programs and commitments that have lowered the State's GHG emissions rate of growth by more than half of

3 The potential of a gas or aerosol to trap heat in the atmosphere.

what it would have been otherwise (CEC, 2007). Another factor that has reduced California's fuel use and GHG emissions is its mild climate compared to that of many other states.

The California EPA Climate Action Team stated in its March 2006 report that the composition of gross climate change pollutant emissions in California in 2002 (expressed in terms of CO_2 equivalence) were as follows:

- Carbon dioxide (CO2) accounted for 83.3 percent;
- Methane (CH4) accounted for 6.4 percent;
- Nitrous oxide (N2O) accounted for 6.8 percent; and
- Fluorinated gases (HFCs, PFC, and SF6) accounted for 3.5 percent (CalEPA, 2006).

The California Energy Commission found that transportation is the source of approximately 41 percent of the State's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 23 percent, and industrial sources at 20 percent. Agriculture and forestry is the source of approximately 8.3 percent, as is the source categorized as "other," which includes residential and commercial activities (CEC, 2007).

Bay Area Emissions

In the Bay Area, fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) is the single largest source of the Bay Area's GHG emissions, accounting for just over half of the Bay Area's 85 million tons of GHG emissions in 2002. Industrial and commercial sources were the second largest contributors of GHG emissions with about 25 percent of total emissions. Domestic sources (e.g., home water heaters, furnaces, etc.) account for about 11 percent of the Bay Area's GHG emissions, followed by power plants at 7 percent. Oil refining currently accounts for approximately 6 percent of the total Bay Area GHG emissions (BAAQMD, 2008b).

Oakland Emissions

The City of Oakland, in partnership with ICLEI – Local Governments for Sustainability (ICLEI), has developed a greenhouse gas emissions inventory estimating citywide GHG emissions for the year 2005 at approximately 3 million metric tons of CO_2e (City of Oakland, 2009).[4] This citywide GHG emissions inventory reflects all the energy used and waste produced within the Oakland city limits. When emissions from highway transportation are considered in this total, approximately 58 percent of Oakland's annual GHG emissions are associated with the transportation sector. Natural gas consumption represents approximately 22 percent of Oakland's GHG emissions, while electricity use and waste decomposition represent 16 percent and 4 percent of Oakland's total GHG emissions, respectively. As shown in **Table IV.B-7**, Oakland emitted approximately 3 million metric tons of CO_2e in 2005 from all major sources, more than half of which were from transportation.

TABLE IV.B-7
OAKLAND COMMUNITY-WIDE GHG EMISSIONS SUMMARY – 2005 (TONS/YEAR) [5]

GHG Emissions Source	Metric Tons of Carbon Dioxide Equivalent (CO_2e)	Percent of Total
Non-Highway Transportation	759,884	25%
Highway Transportation	1,006,911	33%
Commercial/Industrial Electricity	320,151	11%
Commercial/Industrial Natural Gas	288,514	10%
Residential Electricity	150,077	5%
Residential Natural Gas	350,162	12%
Landfilled Solid Waste	126,361	4%
Total	3,002,060	100%

SOURCE: City of Oakland, 2009.

Construction and Development Emissions

The construction and operation of developments, such as the Proposed Project, cause GHG emissions. Operational phase GHG emissions result from energy use associated with heating, lighting and powering buildings (typically through natural gas and electricity consumption in Oakland), pumping and processing water, as well as fuel used for transportation and decomposition of waste associated with building occupants.

New development can also create GHG emissions in its construction and demolition phases including the use of fuels in construction equipment, creation and decomposition of building materials, vegetation clearing, natural gas usage, electrical usage (since electricity generation by convention means is a major contributor of GHG emissions, discussed below), and transportation.

However, it is important to acknowledge that new development does not necessarily create entirely new GHG emissions, since most of the persons who will visit or occupy new development will come from other locations where they were already causing such GHG emissions. Further, as discussed above, it has not been demonstrated that new GHG emissions caused by a local development project can affect global climate change, or that a project's net increase in GHG emissions, if any, when coupled with other activities in the region, would be cumulatively considerable.

Potential Effects of Human Activity on Global Climate Change

Globally, climate change has the potential to impact numerous environmental resources through anticipated, though uncertain, impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. A warming of about 0.2°C (0.36°F) per decade is projected, and there are identifiable signs that global warming is taking place, including substantial loss of ice in the Arctic (IPCC, 2000).[6]

However, the understanding of GHG emissions, particulate matter, and aerosols on global climate trends remains uncertain. In addition to uncertainties about the extent to which human activity rather than solar or volcanic activity is responsible for increasing warming, there is also evidence that some human activity has cooling, rather than warming, effects, as discussed in detail in numerous publications by the International Panel on Climate Change (IPCC), namely “Climate Change 2001, The Scientific Basis”(2001).[7]

Acknowledging uncertainties regarding the rate at which anthropogenic greenhouse gas emissions would continue to increase (based upon various factors under human control, such as future population growth and the locations of that growth; the amount, type, and locations of economic development; the amount, type, and locations of technological advancement; adoption of alternative energy sources; legislative and public initiatives to curb emissions; and public awareness and acceptance of methods for reducing emissions), and the impact of such emissions on climate change, the IPCC devised a set of six “emission scenarios” which utilize various assumptions about the rates of economic development, population growth, and technological advancement over the course of the next century (IPCC, 2000).[8] These emission scenarios are paired with various climate sensitivity models to attempt to account for the range of uncertainties which affect climate change projections. The wide range of temperature, precipitation, and similar projections yielded by these scenarios and models reveal the magnitude of uncertainty presently limiting climate scientists’ ability to project long-range climate change (as previously discussed).

The projected effects of global warming on weather and climate are likely to vary regionally, but are expected to include the following direct effects, according to the IPCC (IPCC, 2000)[9]:

- Snow cover is projected to contract, with permafrost areas sustaining thawing;
- Sea ice is projected to shrink in both the Arctic and Antarctic;
- Hot extremes, heat waves, and heavy precipitation events are likely to increase in frequency;
- Future tropical cyclones (typhoons and hurricanes) will likely become more intense;
- Non-tropical storm tracks are projected to move poleward, with consequent changes in wind, precipitation, and temperature patterns. Increases in the amount of precipitation are very likely in high-latitudes, while decreases are likely in most subtropical regions; and
- Warming is expected to be greatest over land and at most high northern latitudes, and least over the Southern Ocean and parts of the North Atlantic Ocean.

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7 The IPCC was established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation.

Potential secondary effects from global warming include global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

Potential Effects of Climate Change on State of California

According to the California Air Resources Board (CARB), some of the potential impacts in California of global warming may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years.[10] Several recent studies have attempted to explore the possible negative consequences that climate change, left unchecked, could have in California. These reports acknowledge that climate scientists' understanding of the complex global climate system, and the interplay of the various internal and external factors that affect climate change, remains too limited to yield scientifically valid conclusions on such a localized scale. Substantial work has been done at the international and national level to evaluate climatic impacts, but far less information is available on regional and local impacts. In addition, projecting regional impacts of climate change and variability relies on large-scale scenarios of changing climate parameters, using information that is typically at too general a scale to make accurate regional assessments.[11]

Below is a summary of some of the potential effects reported in an array of studies that could be experienced in California as a result of global warming and climate change:

- *Air Quality* – Higher temperatures, conducive to air pollution formation, could worsen air quality in California. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect, and therefore its indirect effects, are uncertain. For other pollutants, the effects of climate change and/or weather are less well studied, and even less well understood.[12] If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thus ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the State (CCCC, 2006).[13]
- *Water Supply* – Uncertainty remains with respect to the overall impact of global climate change on future water supplies in California. For example, models that predict drier conditions (i.e., parallel climate model (PCM)) suggest decreased reservoir inflows and storage and decreased river flows, relative to current conditions. By comparison, models that predict wetter conditions (i.e., HadCM2) project increased reservoir inflows and storage, and increased river flows (Brekke, et al., 2004).

A July 2006 technical report prepared by the California Department of Water Resources (DWR) addresses the State Water Project (SWP), the Central Valley Project, and the Sacramento-San

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10 California Air Resources Board (CARB), 2006c. *Public Workshop to Discuss Establishing the 1990 Emissions Level and the California 2020 Limit and Developing Regulations to Require Reporting of Greenhouse Gas Emissions*, Sacramento, CA. December 1.

11 Kiparsky, M. and P.H. Gleick, 2003. *Climate Change and California Water Resources: A Survey and Summary of the Literature*. Oakland, CA: Pacific Institute for Studies in Development. July.

12 US EPA, 2007, op. cit.

13

Joaquin Delta. Although the report projects that "[c]limate change will likely have a significant effect on California's future water resources . . . [and] future water demand," it also reports that "much uncertainty about future water demand [remains], especially [for] those aspects of future demand that will be directly affected by climate change and warming. While climate change is expected to continue through at least the end of this century, the magnitude and, in some cases, the nature of future changes is uncertain. This uncertainty serves to complicate the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood (DWR, 2006)." DWR adds that "[i]t is unlikely that this level of uncertainty will diminish significantly in the foreseeable future (DWR, 2006)." Still, changes in water supply are expected to occur, and many regional studies have shown that large changes in the reliability of water yields from reservoirs could result from only small changes in inflows (Kiparsky, 2003; DWR, 2005; Cayan et al., 2006). Water purveyors, such as the East Bay Municipal Utilities District (EBMUD), are required by state law to prepare Urban Water Management Plans (UWMPs) (discussed below, under Regulatory Context for Greenhouse Gas Emissions and Climate Change) that consider climatic variations and corresponding impacts on long-term water supplies (California Water Code, Section 10631[c]). DWR has published a 2005 SWP Delivery Reliability Report, which presents information from computer simulations of the SWP operations based on historical data over a 73-year period (1922–1994). The DWR notes that the results of those model studies "represent the best available assessment of the delivery capability of the SWP." In addition, the DWR is continuing to update its studies and analysis of water supplies. EBMUD would incorporate this information from DWR in its update of its current UWMP 2005 (required every five years per the California Water Code), and information from the UWMP can be incorporated into Water Supply Assessments (WSAs) and Water Verifications prepared for certain development projects in accordance with Cal. Water Code Section 10910, et. seq. and Cal. Government Code Section 66473.7, et. seq. (See Section IV.M, *Utilities and Service Systems*, in this EIR for discussion of the WSA and verifications for the Proposed Project.)

- *Hydrology* – As discussed above, climate change could potentially affect the following: the amount of snowfall, rainfall and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise and coastal flooding; coastal erosion; and the potential for salt water intrusion. Sea level rise can be a product of global warming through two main processes -- expansion of sea water as the oceans warm and melting of ice over land. A rise in sea levels could result in coastal flooding and erosion and could also jeopardize California's water supply. In particular, saltwater intrusion would threaten the quality and reliability of the state's major fresh water supply that is pumped from the southern portion of the Sacramento/San Joaquin River Delta. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.
- *Agriculture* – California has a $30 billion agricultural industry that produces half the country's fruits and vegetables. The California Climate Change Center (CCCC) notes that higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase, crop-yield could be threatened by a less reliable water supply, and greater ozone pollution could render plants more susceptible to pest and disease outbreaks. In addition,

temperature increases could change the time of year that certain crops, such as wine grapes, bloom or ripen, and thus affect their quality (CCCC, 2006).

- *Ecosystems and Wildlife* – Increases in global temperatures and the potential resulting changes in weather patterns could have ecological effects on a global and local scale. In 2004, the Pew Center on Global Climate Change released a report examining the possible impacts of climate change on ecosystems and wildlife (Parmesan and Galbraith, 2004). The report outlines four major ways in which it is thought that climate change could affect plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes such as carbon cycling and storage.

Regulatory Context for GHG Emissions and Climate Change

Global climate change is addressed through the efforts of various federal, State, regional, and local government agencies as well as national and international scientific and governmental conventions and programs. These agencies work jointly, as well as individually, to understand and regulate the effects of greenhouse gas emissions and resulting climate change through legislation, regulations, planning, policy-making, education, and a variety of programs. The agencies, conventions and programs focused on global climate change are discussed below.

International and Federal

Kyoto Protocol

The United States participates in the United Nations Framework Convention on Climate Change (UNFCCC) (signed on March 21, 1994). The Kyoto Protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. It has been estimated that if the commitments outlined in the Kyoto Protocol are met, global GHG emissions could be reduced by an estimated 5 percent from 1990 levels during the first commitment period of 2008–2012. It should be noted that although the United States is a signatory to the Kyoto Protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments.

Copenhagen Summit

The 2009 United Nations Climate Change Conference, i.e., Copenhagen Summit, was held in Denmark in December 2009. The conference included the 15th Conference of the Parties (COP 15) to the United Nations Framework Convention on Climate Change and the 5th Meeting of the Parties (COP/MOP 5) to the Kyoto Protocol. A framework for climate change mitigation beyond 2012 was to be agreed there. The Copenhagen Accord was drafted by the US, China, India, Brazil and South Africa on December 18, and judged a "meaningful agreement" by the United States government. It was "taken note of", but not "adopted", in a debate of all the participating countries the next day, and it was not passed unanimously. The document recognized that climate change is one of the greatest challenges of the present day and that actions should be taken to keep any temperature increases to below 2°C. The document is not legally binding and does not contain any legally binding commitments for reducing CO2 emissions.

Climate Change Technology Program

The United States has opted for a voluntary and incentive-based approach toward emissions reductions in lieu of the Kyoto Protocol's mandatory framework. The Climate Change Technology Program (CCTP) is a multi-agency research and development coordination effort (which is led by the Secretaries of Energy and Commerce) that is charged with carrying out the President's National Climate Change Technology Initiative (CCTP, 2006).

U.S. Environmental Protection Agency (US EPA)

To date, the US EPA has not regulated GHGs under the Clean Air Act (discussed above) based on its assertion in *Massachusetts et. al. v. Environmental Protection Agency (EPA) et al.*(U.S. Supreme Court, 2007) that the "Clean Air Act does not authorize it to issue mandatory regulations to address global climate change and that it would be unwise to regulate GHG emissions because a causal link between GHGs and the increase in global surface air temperatures has not been unequivocally established," However, in the same case, (*Massachusetts v. EPA*) the U.S. Supreme Court held that the US EPA can, and should, consider regulating motor-vehicle GHG emissions.

State of California

Assembly Bill (AB) 1493 and Amended "Pavley" Regulations

On July 1, 2002, the California Assembly passed Assembly Bill (AB) 1493 (signed into law on July 22, 2002), requiring the CARB to "adopt regulations that achieve the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." The regulations were to be adopted by January 1, 2005, and apply to 2009 and later model-year vehicles. In September 2004, CARB responded by adopting "CO_2-equivalent fleet average emission" standards. The standards will be phased in from 2009 to 2016, reducing emissions by 22 percent in the "near term" (2009–2012) and 30 percent in the "mid term" (2013–2016), as compared to 2002 fleets.

Executive Order (EO) S-3-05

On June 1, 2005, Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05, establishing statewide GHG emission reduction targets. This EO provides that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and by 2050, emissions shall be reduced to 80 percent below 1990 levels. The Secretary of the California Environmental Protection Agency (CalEPA) is charged with coordinating oversight of efforts to meet these targets and formed the Climate Action Team (CAT) to carry out the EO. Several of the programs developed by the CAT to meet the emission targets are relevant to residential construction and are outlined in a March 2006 report (Cal EPA, 2006). These include prohibition of idling of certain classes of construction vehicles, provision of recycling facilities within residential buildings and communities, compliance with the Energy Commission's building and appliance energy efficiency standards, compliance with California's Green Buildings and Solar initiatives, and implementation of water-saving technologies and features.

California Assembly Bill 32 (AB 32)

On August 31, 2006, the California Assembly passed Bill 32 (AB 32) (signed into law on September 27, 2006), the California Global Warming Solutions Act of 2006. AB 32 commits California to reduce GHG emissions to 1990 levels by 2020 and establishes a multi-year regulatory process under the jurisdiction of the CARB to establish regulations to achieve these goals. The regulations shall require monitoring and annual reporting of GHG emissions from selected sectors or categories of emitters of GHGs. By January 1, 2008, CARB was required to adopt a statewide GHG emissions limit equivalent to the statewide GHG emissions levels in 1990, which must be achieved by 2020. By January 1, 2011, CARB is required to adopt rules and regulations, which shall become operative January 1, 2012, to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

On April 20, 2007, CARB published *Proposed Early Actions to Mitigate Climate Change in California* (Cal EPA, 2007). There are no early action measures specific to residential development included in the list of 36 measures identified for CARB to pursue during calendar years 2007, 2008, and 2009. Also, this publication indicated that the issue of GHG emissions in CEQA and General Plans was being deferred for later action, so the publication did not discuss any early action measures generally related to CEQA or to land use decisions. As noted in that report, "AB 32 requires that all GHG reduction measures adopted and implemented by the Air Resources Board be technologically feasible and cost effective (Cal EPA, 2007)." The law permits the use of market-based compliance mechanisms to achieve those reductions and also requires that GHG measures have neither negative impacts on conventional pollutant controls nor any disproportionate socioeconomic effects (among other criteria).

On December 11, 2008, CARB adopted its *Climate Change Scoping Plan* (Scoping Plan), which functions as a roadmap of CARB's plans to achieve GHG reductions in California required by AB 32 through subsequently enacted regulations. The Scoping Plan contains the main strategies California will implement to reduce CO_2e emissions by 174 million metric tons (MMT), or approximately 30 percent, from the state's projected 2020 emissions level of 596 MMT of CO_2e under a business-as-usual scenario. The Scoping Plan also breaks down the amount of GHG emissions reductions CARB recommends for each emissions sector of the state's GHG inventory. While CARB has identified a GHG reduction target of 15 percent for local governments themselves, it has not yet determined what amount of GHG emissions reductions it recommends from local government land use decisions. However, the Scoping Plan does state that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. CARB further acknowledges that decisions on how land is used will have large effects on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The measures approved by CARB will be developed over the next two years and be in place by 2012.

The Scoping Plan also includes recommended measures that were developed to reduce greenhouse gas emissions from key sources and activities while improving public health, promoting a cleaner environment, preserving our natural resources, and ensuring that the impacts of the reductions are equitable and do not disproportionately impact low-income and minority communities. These measures, shown below in **Table IV.B-8** by sector, also put the state on a path to meet the long-term 2050 goal of reducing California's greenhouse gas emissions to 80 percent below 1990 levels.

TABLE IV.B-8
LIST OF RECOMMENDED ACTIONS BY SECTOR

Measure No.	Measure Description	GHG Reductions (Annual Million Metric Tons CO_2e)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15
T-3[a]	Regional Transportation-Related Greenhouse Gas Targets	5
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures. • Ship Electrification at Ports • System-Wide Efficiency Improvements	3.5
T-7	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure – Aerodynamic Efficiency (Discrete Early Action)	0.93
T-8	Medium- and Heavy-Duty Vehicle Hybridization	0.5
T-9	High Speed Rail	1
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (Net reductions include avoided transmission line loss)	6.7
E-3	Renewables Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) • Target of 3000 MW Total Installation by 2020	2.1
CR-1	Energy Efficiency (800 Million Therms Reduced Consumptions) • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs	4.3
CR-2	Solar Water Heating (AB 1470 goal)	0.1
Green Buildings		
GB-1	Green Buildings	26
Water		
W-1	Water Use Efficiency	1.4†
W-2	Water Recycling	0.3†
W-3	Water System Energy Efficiency	2.0†
W-4	Reuse Urban Runoff	0.2†
W-5	Increase Renewable Energy Production	0.9†
W-6	Public Goods Charge (Water)	TBD†
Industry		
I-1	Energy Efficiency and Co-Benefits Audits for Large Industrial Sources	TBD
I-2	Oil and Gas Extraction GHG Emission Reduction	0.2
I-3	GHG Leak Reduction from Oil and Gas Transmission	0.9
I-4	Refinery Flare Recovery Process Improvements	0.3
I-5	Removal of Methane Exemption from Existing Refinery Regulations	0.01

a This is not the SB 375 regional target. CARB will establish regional targets for each MPO region following the input of the regional targets advisory committee and a consultation process with MPO's and other stakeholders per SB 375
† GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target

California Senate Bill 1368 (SB 1368)

On August 31, 2006, the California Senate passed SB 1368 (signed into law on September 29, 2006), which required the Public Utilities Commission (PUC) to develop and adopt a "greenhouse gases emission performance standard" by February 1, 2007, for the private electric utilities under its regulation. The PUC adopted an interim standard on January 25, 2007, but formally requested a delay until September 30, 2007, for the local publicly-owned electric utilities under its regulation. These standards apply to all long-term financial commitments entered into by electric utilities. The California Energy Commission (CEC) adopted a consistent standard in August, 2007. (NRDC, 2007)

California Senate Bill 97 (SB 97)

Governor Schwarzenegger signed SB 97 (Chapter 185, Statutes 2007) into law on August 24, 2007. The legislation provides partial guidance on how greenhouse gases should be addressed in certain CEQA documents.

SB 97 requires the Governor's Office of Planning and Research (OPR) to prepare CEQA Guidelines for the mitigation of GHG emissions, including, but not limited to, effects associated with transportation or energy consumption. The Resources Agency was required to certify and adopt the guidelines by January 1, 2010, and the relevant amendments became effective June, 2010, as discussed below. OPR and the Resources Agency are required to periodically review the guidelines to incorporate new information or criteria adopted by CARB pursuant to the Global Warming Solutions Act, scheduled for 2012.On June 19, 2008, OPR published a technical advisory on CEQA and climate change. The advisory provides OPR's perspective on the emerging role of CEQA in addressing climate change and greenhouse gas emissions, while recognizing that approaches and methodologies for calculating greenhouse gas emissions and addressing environmental impacts through CEQA review are rapidly evolving. The advisory recognizes that OPR will develop, and the Resources Agency will adopt, amendments to the CEQA Guidelines pursuant to SB 97. In the interim, the technical advisory "offers informal guidance regarding the steps lead agencies should take to address climate change in their CEQA documents."

The technical advisory points out that neither CEQA nor the CEQA Guidelines prescribe thresholds of significance or particular methodologies for performing an impact analysis. The advisory states, "This is left to lead agency judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable." OPR recommends that "the global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions." Until such a standard is established, OPR advises that each lead agency should develop its own approach to performing an analysis for projects that generate greenhouse gas emissions.

OPR sets out the following process for evaluating greenhouse gas emissions. First, agencies should determine whether greenhouse gas emissions may be generated by a proposed project, and if so, quantify or estimate the emissions by type or source. Calculation, modeling, or estimation of greenhouse gas emissions should include the emissions associated with vehicular traffic, energy consumption, water usage, and construction activities.

Lead agencies should then assess whether the emissions are “cumulatively considerable” even though a project’s greenhouse gas emissions may be individually limited. OPR states, “Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment.” Individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice.

Finally, if the lead agency determines emissions are a cumulatively considerable contribution to a significant cumulative impact, the lead agency must investigate and implement ways to mitigate the emissions. OPR states, “Mitigation measures will vary with the type of project being contemplated, but may include alternative project designs or locations that conserve energy and water, measures that reduce vehicle miles traveled (VMT) by fossil-fueled vehicles, measures that contribute to established regional or programmatic mitigation strategies, and measures that sequester carbon to offset the emissions from the project.” OPR concludes that, “A lead agency is not responsible for wholly eliminating all GHG emissions from a project; the CEQA standard is to mitigate to a level that is “less than significant.” The technical advisory includes a list of mitigation measures that can be applied on a project-by-project basis.

In January 2008, the California Air Pollution Control Officers Association (CAPCOA) issued a “white paper” on evaluating and addressing GHGs under CEQA. This resource guide was prepared to support local governments as they develop their programs and policies around climate change issues. The paper is not a guidance document. It is not intended to dictate or direct how any agency chooses to address GHG emissions. Rather, it is intended to provide a common platform of information about key elements of CEQA as they pertain to GHG, including an analysis of different approaches to setting significance thresholds.

The paper notes that for a variety of reasons local agencies may decide not to have a CEQA threshold. Local agencies may also decide to assess projects on a case-by-case basis when the projects come forward. The paper also discusses a range of GHG emission thresholds that could be used. The range of thresholds discussed includes a GHG threshold of zero and several non-zero thresholds. Non-zero thresholds include percentage reductions for new projects that would allow the state to meet its goals for GHG emissions reductions by 2020 and perhaps 2050. These would be determined by a comparison of new emissions versus business as usual emissions and the reductions required would be approximately 30 percent to achieve 2020 goals and 90 percent (effectively immediately) to achieve the more aggressive 2050 goals. These goals could be varied to apply differently to new projects, by economic sector, or by region in the state.

Other non-zero thresholds discussed in the paper include:

- 900 metric tons/year CO_2e (a market capture approach);
- 10,000 metric tons/year CO_2e (potential CARB mandatory reporting level with Cap and Trade);

- 25,000 metric tons/year CO_2e (the CARB mandatory reporting level for the statewide emissions inventory);
- 40,000 to 50,000 metric tons/year CO_2e (regulated emissions inventory capture – using percentages equivalent to those used in air districts for criteria air pollutants),
- Projects of statewide importance (9,000 metric tons/year CO_2e for residential, 13,000 metric tons/year CO_2e for office project, and 41,000 metric tons/year CO_2e for retail projects); and
- Unit-based thresholds and efficiency-based thresholds that were not quantified in the report.

In January 2009, OPR released preliminary proposed amendments to the CEQA Guidelines regarding GHG emissions. No significance threshold is included in the draft and the guidelines afford the customary deference provided to lead agencies in their analysis and methodologies. The introductory preface to the amendments recommends that CARB set state-wide thresholds of significance. OPR emphasized the necessity of having a consistent threshold available to analyze projects, and the analyses should be performed based on the best available information. The revisions would include a new section specifically addressing the significance of GHG emissions that would build upon OPR's 2008 technical advisory. Like the advisory, the proposed Guidelines section calls for quantification of GHG emissions. The proposed section states that the significance of GHG impacts should include consideration of the extent to which the project would result in the following: help or hinder compliance with AB 32 goals; increase energy use, especially energy use generated by fossil fuel combustion; improve energy efficiency; and result in emissions that would exceed any applicable significance threshold. In April 2009, OPR forwarded the draft revisions to the California Natural Resources Agency for review and proposed adoption. On July 3, 2009, the California Natural Resources Agency began the formal rulemaking process for adopting the CEQA Guidelines. The Secretary for Natural Resources adopted Amendments to the CEQA Guidelines addressing greenhouse gas emissions on December 30, 2009. The Amendments became effective on March 18, 2010, with a 120-day grace period.

The second part of SB 97 codifies safe harbor for highways and flood control projects. It provides that the failure of a CEQA document for a project funded by Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or the Disaster Preparedness and Flood Prevention Bond Act of 2006 to adequately analyze the effects of GHG emission otherwise required to be reduced pursuant to the regulations adopted under the Global Warming Solutions Act (which are not slated for adoption until January 1, 2012), does not create a cause of action for a violation of CEQA. This portion of SB 97 had a sunset date of January 1, 2010.

The bill does not address the obligation to analyze GHGs in projects not protected by the safe harbor provision. One possible interpretation is that there is no duty until the guidelines are adopted, because CEQA Guidelines Section 15007, Subdivision (b), provides that guideline amendments apply prospectively only.

California Senate Bill 375 (SB 375)

Governor Schwarzenegger signed SB 375 into law in September 2008 (Chapter 728, Statutes of 2008). The legislation aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires metropolitan planning organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) that will prescribe land use allocation in the MPO's regional transportation plan. CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects will not be eligible for funding programmed after January 1, 2012.

California Urban Water Management Act

The California Urban Water Management Planning Act requires various water purveyors throughout the State of California (such as EBMUD) to prepare UWMPs, which assess the purveyor's water supplies and demands over a 20-year horizon (California Water Code, Section 10631 *et seq*.). As required by that statute, UWMPs are updated by the purveyors every five years. As discussed above, this is relevant to global climate change which may affect future water supplies in California, as conditions may become drier or wetter, affecting reservoir inflows and storage and increased river flows.[14]

Bay Area Air Quality Management District (BAAQMD)

BAAQMD is responsible for improving air quality within the San Francisco Bay Area Basin. BAAQMD adopted new thresholds of significance (BAAQMD Thresholds) on June 2, 2010, to assist lead agencies in determining when potential air quality impacts would be considered significant under CEQA. BAAQMD also released new CEQA Guidelines (CEQA Guidelines) in June 2010 which advise lead agencies on how to evaluate potential air quality impacts with the adopted new thresholds of significance. The analysis herein uses the thresholds from the BAAQMD Thresholds and the CEQA Guidelines to determine the Proposed Project's significance with respect to GHG emissions.

City of Oakland

City of Oakland General Plan

Oakland Energy and Climate Action Plan. An Oakland Energy and Climate Action Plan (ECAP) is being developed to identify, evaluate and recommend prioritized actions to reduce energy consumption and GHG emissions in Oakland. The ECAP will identify energy and climate goals, clarify policy direction, and identify priority actions for reducing energy use and GHG emissions. On July 7, 2009, the Oakland City Council directed staff to develop the draft Oakland ECAP using a GHG reduction target equivalent to 36 percent below 2005 GHG emissions by

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14 Brekke, 2004, op. cit.

2020 (City of Oakland, Resolution No. 82129 C.M.S., 2009). Since the City issued a draft ECAP for public review in April 2010, but it has not established this ECAP at this time, it is unknown if the Project would conflict with policies and actions that may be included. However, the Project does not appear to conflict with the current City Sustainability Programs or General Plan policies regarding GHG reductions.

Land Use and Transportation Element (LUTE). The LUTE (which includes the Pedestrian Master Plan and Bicycle Master Plan) of the Oakland General Plan contains the following policies that address issues related to GHG emissions and climate change:

- Transit-oriented development should be encouraged at existing or proposed transit nodes, defined by the convergence of two or more modes of public transit such as BART, bus, shuttle service, light rail or electric trolley, ferry, and inter-city or commuter rail. *(Policy T.2.1)*
- Transit-oriented developments should be pedestrian-oriented, encourage night and day time use, provide the neighborhood with needed goods and services, contain a mix of land uses, and be designed to be compatible with the character of surrounding neighborhoods. *(Policy T.2.2)*
- The City should include bikeways and pedestrian ways in the planning of new, reconstructed, or realigned streets, wherever possible. *(Policy T3.5)*
- The City should encourage and promote use of public transit in Oakland by expediting the movement of and access to transit vehicles on designated “transit streets” as shown on the Transportation Plan. *(Policy T3.6)*
- Through cooperation with other agencies, the City should create incentives to encourage travelers to use alternative transportation options. *(Policy T4.2)*
- In order to facilitate the construction of needed housing units, infill development that is consistent with the General Plan should take place throughout the City of Oakland. *(Policy N3.2)*
- The City should prepare, adopt, and implement a Bicycle and Pedestrian Master Plan as a part of the Transportation Element of [the] General Plan. *(Policy T4.5)*

Open Space, Conservation and Recreation Element (OSCAR). The OSCAR Element includes policies that address GHG reduction and global climate change. Listed below are the following types of OCASR policies: policies that encourage the provision of open space, which increases vegetation area (trees, grass, landscaping, etc.) to effect cooler climate, reduce excessive solar gain, and absorb CO_2; policies that encourage stormwater management, which relates to the maintenance of floodplains and infrastructure to accommodate potential increased storms and flooding; and policies that encourage energy efficiency and use of alternative energy sources, which directly address reducing GHG emissions.

- Conserve existing City and Regional Parks characterized by steep slopes, large groundwater recharge areas, native plant and animal communities, extreme fire hazards, or similar conditions. *(Policy OS-1.1)*

- Manage Oakland's urban parks to protect and enhance their open space character while accommodating a wide range of outdoor recreational activities. *(Policy OS-2.1)*
- Employ a broad range of strategies, compatible with the Alameda Countywide Clean Water Program. *(Policy CO-5.3)*
- *See Policy CO-12.1, above, under OSCAR policies that address general air quality.*
- Expand existing transportation systems management and transportation demand management strategies which reduce congestion, vehicle idling, and travel in single passenger autos. *(Policy CO-12.3)*
- *See Policy CO-12.4, above, under OSCAR policies that address general air quality.*
- Require new industry to use best available control technology to remove pollutants, including filtering, washing, or electrostatic treatment of emissions. *(Policy CO-12.5)*
- Support public information campaigns, energy audits, the use of energy-saving appliances and vehicles, and other efforts which help Oakland residents, businesses, and City operations become more energy efficient. *(Policy CO-13.2)*
- Encourage the use of energy-efficient construction and building materials. Encourage site plans for new development which maximize energy efficiency. *(Policy CO-13.3)*
- Accommodate the development and use of alternative energy resources, including solar energy and technologies which convert waste or industrial byproducts to energy, provided that such activities are compatible with surrounding land uses and regional air and water quality requirements. *(Policy CO-13.4)*

Historic Preservation Element (HPE). A key HPE policy relevant to climate change encourages the reuse of existing building (and building materials) resources, which could reduce landfill material (a source of methane, a GHG), avoid the incineration of materials (which produces CO_2 as a by-product), avoid the need to transport materials to disposal sites (which produces GHG emissions), and eliminate the need for materials to be replaced by new product (which often requires the use of fossil fuels to obtain raw and manufacture new material) (US EPA 2006a).

Safety Element. Safety Element policies that address wildfire hazards related to climate change in that increased temperatures could increase fire risk in areas that become drier due to climate change (US EPA, 2010b). Also, wildfire results in the loss of vegetation; carbon is stored in vegetation, and when the vegetation burns, the carbon returns to the atmosphere (NASA, 2004). The occurrence of wildfire also emits particulate matters into the atmosphere. Safety Element policies also address storm-induced flooding hazards related to the potential to accommodate potential increase in storms and flooding as a result of climate change. Pertinent safety Element policies including the following:

- Prioritize the reduction of the wildfire hazard, with an emphasis on prevention. *(Policy FI-3)*
- Enforce and update local ordinances and comply with regional orders that would reduce the risk of storm-induced flooding. *(Policy FL-1)*

- Continue or strengthen city programs that seek to minimize the storm-induced flooding hazard. *(Policy FL-2)*

Other City of Oakland Programs and Policies. The City of Oakland has supported and adopted a number of programs and policies designed to reduce GHG emissions and continue Oakland's progress toward becoming a model sustainable city. Other programs and policies of relevance to new large commercial office development include:

- *Sustainable Oakland Program* – Oakland's sustainability efforts are coordinated through the Sustainable Oakland program, a product of the Oakland Sustainability Community Development Initiative (SDI) created in 1998 (Ordinance 74678 C.M.S.).

- *Green Building* – The City of Oakland has implemented Green Building principles in City buildings through the following programs: Civic Green Building Ordinance (Ordinance No. 12658 C.M.S., 2005), requiring, for certain large civic projects, techniques that minimize the environmental and health impacts of the built environment through energy, water and material efficiencies and improved indoor air quality, while also reducing the waste associated with construction, maintenance and remodeling over the life of the building; Green Building Guidelines (Resolution No. 79871, 2006) which provides guidelines to Alameda County residents and developers regarding construction and remodeling; and Green Building Education Incentives for private developers.

- *Downtown Housing* – The 10K Downtown Housing Initiative has a goal of attracting 10,000 new residents to downtown Oakland by encouraging the development of 6,000 market-rate housing units. This effort is consistent with Smart Growth principles.

- *Waste Reduction and Recycling* – The City of Oakland has implemented a residential recycling program increasing collection of yard trimmings and food waste. This program has increased total yard trimming collections by 46 percent compared to 2004, and recycling tonnage by 37 percent. The City also adopted Construction and Demolition Recycling, for which the City passed a resolution in July 2000 (Ordinance 12253. OMC Chapter 15.34), requiring certain nonresidential or apartment house projects to recycle 100 percent of all Asphalt & Concrete (A/C) materials and 65 percent of all other materials.

- *Polystyrene Foam Ban Ordinance* - In June 2006 the Oakland City Council passed the Green Food Service Ware Ordinance (Ordinance 14727, effective as of January 1, 2007), which prohibits the use of polystyrene foam disposable food service ware and requires, when cost neutral, the use of biodegradable or compostable disposable food service ware by food vendors and City facilities.

- *Zero Waste Resolution* – In March 2006 the Oakland City Council adopted a Zero Waste Goal by 2020 Resolution (Resolution 79774 C.M.S.), and commissioned the creation of a Zero Waste Strategic Plan to achieve the goal.

- *Stormwater Management* – On February 19, 2003, the Regional Water Quality Control Board, San Francisco Bay Region, issued a municipal stormwater permit under the National Pollutant Discharge Elimination System (NPDES) permit program to the Alameda Countywide Clean Water Program (ACCWP). The purpose of the permit is to reduce the discharge of pollutants in stormwater to the maximum extent practicable and to effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses. The City of Oakland, as a member of the ACCWP, is a co-permittee under the ACCWP's permit and is, therefore, subject to the permit requirements.

- *Provision C.3 of the NPDES permit* is the section of the permit containing stormwater pollution management requirements for new development and redevelopment projects. Among other things, Provision C.3 requires that certain new development and redevelopment projects incorporate post-construction stormwater pollution management measures, including stormwater treatment measures, stormwater site design measures, and source control measures, to reduce stormwater pollution after the construction of the project. These requirements are in addition to standard stormwater-related best management practices (BMPs) required during construction.

- *Community Gardens and Farmer's Markets* – Community Garden locations include Arroyo Viejo, Bella Vista, Bushrod, Golden Gate, Lakeside Horticultural Center, Marston Campbell, Temescal, and Verdese Carter. Weekly Farmer's Markets locations include the Jack London Square, Old Oakland, Grand Lake, Mandela, and Temescal districts. Both efforts promote and facilitate the principal of growing and purchasing locally, which effects reductions in truck and vehicle use and GHG emissions.

Impacts and Mitigation Measures for GHG Emissions

Significance Thresholds for GHG Emissions and Climate Change

The project would have a significant impact on the environment if it would:

1. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment, specifically:

   Project-Level Impacts[15]

   a. For a project involving a stationary source[16], produce total emissions of more than 10,000 metric tons of CO_2e annually.

   b. For a project involving a land use development[17], produce total emissions of more than 1,100 metric tons of CO_2e annually **AND** more than 4.6 metric tons of CO_2e per service population[18] annually.[19]

2. Conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing greenhouse gas emissions.

15 The project's expected greenhouse gas emissions during construction should be annualized over a period of 40 years and added to the expected emissions during operation for comparison to the threshold. A 40-year period is used because 40 years is considered the average life expectancy of a building before it is remodeled with considerations for increased energy efficiency. The thresholds are based on the BAAQMD thresholds. The BAAQMD thresholds were originally developed for project operation impacts only. Therefore, combining both the construction emissions and operation emissions for comparison to the threshold represents a conservative analysis of potential greenhouse gas impacts.

16 Stationary sources are projects that require a BAAQMD permit to operate.

17 Land use developments are projects that do not require a BAAQMD permit to operate.

18 The service population includes both the residents and the employees of a proposed project.

19 A project's impact would be considered significant if the emissions exceed BOTH the 1,100 metric tons threshold and the 4.6 metric tons threshold. Accordingly, the impact would be considered less than significant if a project's emissions are below EITHER of these thresholds.

Approach to CEQA Analysis of GHG Emissions and Climate Change Impacts in this EIR

This EIR does discuss, for consideration by decision makers, estimated GHG emissions of the Proposed Project, Project-related activities that could contribute to the generation of increased GHG emissions, the Project design features that would avoid or minimize those emissions, and the approaches to further reduce those emissions.

Quantitative and Qualitative Approach

The approach employed in this EIR is to use both a quantitative and a qualitative approach. The quantitative approach is used to answer the first threshold: Will the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment. The quantifiable threshold discussed above are used to determine if this threshold is met. .

If a project does not exceed the quantifiable thresholds in the first threshold, the qualitative approach addresses the second threshold: Will the project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs. Theoretically, if a project implements reduction strategies identified in AB 32, the Governor's Executive Order S-3-05, or other strategies to help toward reducing GHGs to the level proposed by the governor and targeted by the City of Oakland, it could reasonably follow that the project would not conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs. Alternatively, a project could reduce a potential cumulative contribution to GHG emissions through energy efficiency features, density and locale (e.g., compact development near transit and activity nodes of work or shopping) and by contributing to available mitigation programs, such as reforestation, tree planting, or carbon trading.

However, the analysis in Oakland EIRs consider that, because the quantifiable thresholds established in the BAAQMD Guidelines was formulated based on AB 32 reduction strategies, a project cannot exceed the numeric threshold without also conflicting with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. Therefore, if a project does not meet the threshold #1 (numeric) and therefore results in a significant cumulative impact because it would also result in a significant cumulative impact under the threshold #2 (plan, policy or regulation consistency), even though the project may incorporate measures and have features that would reduce its contribution to cumulative GHG emissions.

Net Change in Emissions and Local/Global Context

The methodology applied here assumes that all emission sources with the Project would be new sources that would combine with existing conditions. For this assessment, it is not possible to predict whether emission sources associated with the Project would move from outside the air basin (and thus generate "new" emissions within the air basin), or whether they are sources that already exist and are merely relocated within the air basin. Because the effects of GHGs are global, if the project merely shifts the location of the GHG-emitting activities (locations of residences and businesses and where people drive), there would not be a net new increase of emissions. It also can not be determined until buildout of the project whether occupants of the proposed development will have shorter commute distances, require fewer vehicle trips, walk, bike, or use public transit more often, instead of driving, or use overall less energy by virtue of the Project's characteristics or proximity to workers' housing. If these types of changes occur, overall vehicle miles traveled could be reduced and it could be argued that the Project would result in a potential net reduction in GHG emissions, locally and globally.

GHG Effects on Flooding and Sea-level Rise

Since the Project Site is not located in an area that would be subject to coastal or other flooding resulting from climate change, the potential effects of climate change (e.g., effects of flooding on the Project Site due to sea level rise) on the Proposed Project are not discussed in this EIR. The Project is located approximately 1.25 miles from the nearest coastal shoreline (along the Oakland Estuary) and approximately 1.0 mile from the nearest area considered vulnerable to sea level rise of approximately 55 inches at the end of this century (BCDC, 2009)

Impact AIR-9: Construction and operation of the Proposed Project would result in a cumulatively considerable increase in GHG emissions. (Potentially Significant)

Construction and operation of the Proposed Project would generate GHG emissions, with the majority of energy consumption (and associated generation of GHG emissions) occurring during operation. Typically more than 80 percent of the total energy consumption takes place during the use of buildings and less than 20 percent is consumed during construction (UNEP, 2007). Overall, the following activities associated with the Proposed Project (as well as any similar land use development) could contribute to the generation of GHG emissions:

- *Motor Vehicle Use* – Transportation associated with the Proposed Project would result in GHG emissions from the combustion of fossil fuels in daily automobile and truck trips. It is likely that these transportation emissions are comparatively lower that other development options on the site given the dense, transit-oriented nature of Downtown Oakland. Also, as discussed previously, the Project is designed to reduce auto trips.

- *Gas, Electric and Water Use* – Natural gas use results in the emissions of two GHGs: methane (the major component of natural gas) and carbon dioxide from the combustion of natural gas. Methane is released prior to initiation of combustion of the natural gas (as before a flame on a stove is sparked), and from the small amount of methane that is uncombusted in a natural gas flame. Electricity use can result in GHG production if the electricity is generated by combusting fossil fuel. California's water conveyance system is energy intensive: Preliminary estimates indicate that total energy used to pump and treat this water exceeds 15,000 GWh per year, or at least 6.5 percent of the total electricity used in the State per year (CEC, 2010).

- *Removal of Vegetation* – The net removal of vegetation for construction results in a loss of the carbon sequestration in plants. However, planting of additional vegetation would result in additional carbon sequestration and lower the carbon footprint of the project. (See City Standard Conditions of Approval regarding *Landscape Requirements and Tree Replacement*, below).)

- _Construction Activities_ – Construction equipment typically uses fossil-based fuels to operate. The combustion of fossil-based fuels creates GHGs such as carbon dioxide, methane and nitrous oxide. Furthermore, methane is emitted during the fueling of heavy equipment.

While the Proposed Project and all developments of similar land uses would generate GHG emissions from the activities described above, the City of Oakland's ongoing implementation of its Sustainability Community Development Initiative (which includes an array of programs and measures, discussed below, under *Regulatory Context for GHG Emissions and Climate Change*) will collectively reduce the levels of GHG emissions and contributions to global climate change attributable to activities throughout Oakland.

GHG Emission Inventory for the Proposed Project

Emissions included in the BAAQMD Guidelines, and therefore included in the baseline GHG emissions inventory for the Project, if applicable, are described below (and quantified in Tables IV.B-10 and IV.B-11):

- _Area Source Emissions._ These are direct emissions from sources that include natural gas combustion for heating, cooking, fireplaces, or boilers, as well as emissions from landscape maintenance equipment.

- _Transportation Emissions_. These are direct emissions from mobile sources including automobiles, trucks, motorcycles, and busses.

- _Operational Electricity Consumption._ These are indirect emissions emitted off-site via non-renewable, non-nuclear electricity generators as a result of increased electrical demand.

- _Solid Waste Disposal Emissions_. These are indirect emissions associated with waste generation. A large percentage of Project waste would be diverted from landfills by waste reduction, recycling, and composting. Oakland currently diverts a large portion of its waste and has goals to even further reduce the amount of waste sent to a landfill. The remainder of the waste not diverted would be disposed of at a landfill. Landfills emit anthropogenic methane from the anaerobic breakdown of material.

- _Operational Fugitive (Direct) Emissions_. These direct emissions are most commonly associated with a inadvertent emissions to the atmosphere due to leakage or inherent imperfections in a gas transport or collection system. Direct fugitive GHG emissions that may reasonably be expected to be generated by a commercial building like the Project would consist of GHG refrigerants emitted from leaks or other imperfections in refrigeration or air cooling equipment.

- _Operational Water Emissions (embedded energy)._ These indirect emissions are associated with the electricity used to convey water, due to increased water demand from the Project.

- _Operational Wastewater (non-biogenic)._ These are indirect emissions from wastewater treatment associated with the electricity use in wastewater treatment (and not the biogenic CO_2 process emissions) (BAAQMD, 2010b).

Emission sources not included in the BAAQMD Guidelines or relevant to the Project are not included in the baseline GHG emissions inventory and are discussed in greater detail in Appendix I. These include emissions generated from permitted stationary source equipment, vegetation sequestration change, fugitive refrigeration emissions, life cycle emissions, agricultural emissions; and off road equipment emissions.

Project Design Features, City Standard Conditions of Approval, Regulatory Requirements, and General Plan Policies and Local Programs that Reduce GHG Emissions of the Project

There are many ways for a project to reduce its GHG emissions through its design, construction and operations. Local conditions of approval, policies, programs and regulatory requirements that apply to a project also combine to reduce project GHG emissions. Each of these components is considered part of the Proposed Project and is also included in the estimate of the Project's baseline GHG emissions inventory as follows:

Project Design Features

- *CALGreen – Energy Performance Standard.* One of the objectives of the Project (presented in Chapter 3, Project Description) is to meet contemporary energy and design objectives by ensuring that the new towers meetmandatory CALGreen performance standards. CALGreen is a newly enacted building code requirement pursuant to Title 24 of the CCR, which is effective January 2011 and will apply to construction of the Proposed Project. CALGreen will require that every new building constructed in California reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills and install low pollutant-emitting materials. It also requires separate water meters for nonresidential buildings' indoor and outdoor water use, with a requirement for moisture-sensing irrigation systems for larger landscape projects and mandatory inspections of energy systems (e.g., heat furnace, air conditioner and mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies. The effects of these energy and water saving features are incorporated into the baseline emission inventory for the Proposed Project. The GHG Reduction Plan for the Project also provides the opportunity for the Project to exceed mandatory CALGreen performance standards where feasible.

City Standard Conditions of Approval

The following SCAs are required as part of a Proposed Project and adopted as conditions of approval to help reduce GHG emissions of the Project:

- *SCA TRANS-1 – Parking and Transportation Demand Management Plan*. SCA TRANS-1 requires the Project applicant to submit for review and approval by the City of Oakland Planning and Zoning Division a Transportation Demand Management (TDM) Plan containing strategies to reduce on-site parking demand and single occupancy vehicle (SOV) travel. Although a TDM Plan for the Project has not yet been prepared, generally the TDM Plan could reduce SOV trips for a large office project located near transit by about 10 to 20 percent. Calculations of GHG reductions attributable to the TDM Plan preliminarily (and conservatively) assume a 10 percent reduction in Project trip generation. The GHG Reduction Plan provides emissions estimates for the project both with and without the preliminary 10 percent projected TDM trip reduction. Once the TDM Plan is completed and approved (prior to certification of the EIR), the appropriate refinement to the Project trip generation and resulting GHG emissions will be calculated and reported in the EIR prior to certification.

- *SCA UTIL-1 – Waste Reduction and Recycling*. SCA UTIL-1 requires the Project applicant to submit a Construction & Demolition Waste Reduction and Recycling Plan (WRRP) and an Operational Diversion Plan (ODP) for review and approval by the Oakland Public Works Agency. Chapter 15.34 of the Oakland Municipal Code outlines requirements for reducing waste and optimizing construction and demolition (C&D) recycling. Affected projects include all new construction and all demolition. This SCA essentially addresses reduction in construction–related emissions, which the City combines with the Project's operational emissions to assess against the significance thresholds for operational emissions, even though construction emissions are not a component of BAAQMD's Guidelines. Therefore, this SCA will contribute to reducing total emissions of the Project.

- *Landscape Requirements and Tree Replacement.* SCAs address landscape requirements for frontages of commercial buildings and replacement of trees removed as part of a project. Projects are required to install one tree for every 25 feet of street frontage in cases sidewalks have adequate width. Additionally SCAs generally require the replacement of native trees removed as part of a project. Together, these SCAs that maintain and increase landscaping and trees effect cooler climate, reduce excessive solar gain, and absorb CO_2e emissions over the minimum 3.5 years to construct Phase 2 of the Project, for a total of, but have no impact on the emissions inventory of the Proposed Project.

- *SCA GHG-1- GHG Reduction Plan.* SCA GHG-1 applies to certain projects that produce total GHG emissions that exceed the BAAQMD CEQA Thresholds, including commercial office buildings employing 1,000 persons or containing more than 250,000 square feet of total floor area, such as the Proposed Project. SCA GHG-1 requires the Project applicant to prepare a GHG Reduction Plan to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the BAAQMD CEQA Thresholds. The GHG Reduction Plan will include a comprehensive set of quantified GHG emissions reduction measures in addition to energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements. SCA GHG-1 is presented in the detailed Project GHG emissions impact analysis further below and will reduced the GHG emissions of the Project.

General Plan Policies and City Programs

Each of the following policies and programs were previously presented in *Regulatory Context for GHG Emissions and Climate Change*, in this Section.

- *Oakland General Plan LUTE*. The LUTE is aimed at promoting use of public transit, bicycles and pedestrian travel. Any reduction of transportation-related GHG emissions are captured in the trip reduction associated with the TDM Plan.

- *Oakland General Plan Open Space, Conservation and Recreation (OSCAR) Element*. The OSCAR contains policies that (a) encourage the provision of open space, which increases vegetation area (trees, grass, landscaping, etc.) to effect cooler climate, reduce excessive solar gain, and absorb CO_2; (b) encourage stormwater management, which relates to the maintenance of floodplains and infrastructure to accommodate potential increased storms and flooding; and (c) encourage energy efficiency and use of alternative energy sources. Policies that address vegetation area have no impact on the emissions inventory as vegetative sequestration is not a component of BAAQMD's Guidelines Other policies regarding energy efficiency encourage and support energy efficiency but are not requirements under any implementation mechanism via the General Plan. They have resulted, however, in the implementation of the City of Oakland sustainability program discussed below.

- *City of Oakland Sustainability Programs*. The City has proactively adopted a number of sustainability programs in an effort to reduce the City's impact on climate change. Oakland's sustainability efforts are managed by the Oakland Sustainability Community Development Initiative and there are two main categories that relate to reducing GHG emissions from a development project: renewable energy and green building.

  Renewable Energy. With regard to renewable energy, the City's Sustainability Program has set a priority of promoting renewable energy with a particular emphasis on solar generation. The Program's aggressive renewable energy goals include the following: 50 percent of city facilities entire electricity use from renewable sources by 2017; and 100 percent of the city's entire electricity use from renewable sources by 2030. The City has some control over renewable energy percentages for buildings it operates by contracting its energy needs directly with the local utility. However, private building operators generally receive a standard energy mix from PG&E, and would not be required to contract for a higher percentage of renewables under this program as it only targets City facilities. PG&E has requested a 33 percent renewable energy mix goal for 2020 from the CPUC (compared to a 12 percent mix in 2007).

  Green Building. With regard to green building strategies, the City of Oakland has implemented green building principles in City buildings through the following programs: Civic Green Building Ordinance (Ordinance No. 12658 C.M.S., 2005), requiring, for certain large civic projects, techniques that minimize the environmental and health impacts of the built environment through energy, water and material efficiencies and improved indoor air quality, while also reducing the waste associated with construction, maintenance and remodeling over the life of the building; Green Building Guidelines (Resolution No. 79871, 2006) which provides guidelines to Alameda County residents and developers regarding construction and remodeling; and Green Building Education Incentives for private developers. Green building requirements for private developers are anticipated for adoption in the fall of 2010, however, the baseline emissions inventory for the Proposed Project assumes implementation of mandatory CALGreen standards as a Project design feature, as discussed above.

Regulatory Requirements

- *AB 1493 and Amended "Pavley" Regulations*. AB 1493 required the California Air Resources Board (CARB) to develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State. The CARB has adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments, approved by CARB on September 24, 2009, are part of California's commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. The model used to estimate the

Proposed Project's GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of Pavley standards.

- *Low Carbon Fuel Standards (LCFS).* On April 23, 2009 CARB approved the regulation to implement the LCFS. The LCFS will reduce GHG emissions from the transportation sector in California by about 16 million metric tons (MMT) in 2020. The model used to estimate the Proposed Project's GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of LCFS.

Other Project characteristics that reduce GHG emissions and support the Project's alignment with AB 32 GHG reduction goals include proposed pedestrian improvements. The Project proposed extensive streetscape improvements, including new and increased sidewalk, curb, and gutter; right-of-way landscaping; streetlights; street furniture; wayfinding signage; and/or art. These features, as outlined in the City's Pedestrian Master Plan adopted in November 2002, are identified as design amenities that develop a pedestrian-oriented environment that facilitate walking and transit use. These features would help reduce transportation-related GHG emissions by encouraging additional pedestrian trips. Also, the Project's combination of office and commercial/retail uses has the potential to reduce greenhouse gas emissions related to transportation for both the employees and the patrons of each of these uses. Multiple amenities and services an employee or patron might use would be located in this single development, which would reduce vehicle-miles-traveled.

Construction-generated GHG Emissions

The construction-generated GHG emissions of the Project are shown in **Table IV.B-9**, which summarizes the emissions estimates from the principal GHGs (CO_2, CH_4 and N_2O) in metric tons of CO_2e, by construction year and Project phase. An estimated total 2,081 MT CO_2e emissions from Project construction equipment and vehicles would be emitted over the minimum 3.5 years to construct Phase 1 of the Project, and an estimated total 2,461 MT CO_2e emissions over the minimum 3.5 years to construct Phase 2 of the Project, for a total of approximately 4,542 MT CO_2e emissions over the minimum total construction period of seven years through Buildout. Approximately 46 percent of the total construction GHG emissions is associated with Phase 1 construction, with approximately 54 percent associated with Phase 2 construction.

TABLE IV.B-9
CONSTRUCTION-GENERATED GHG EMISSIONS OF THE PROPOSED PROJECT

	Annual CO_2e Emissions (metric tons per year)			
Construction Year	**CO_2**	**CH_4**	**N_2O**	**Total CO_2e**
Phase 1				
2012	244	0.29	1.94	246
2013	733	0.88	5.82	740
2014	750	0.90	5.96	757
2015 (Phase 1)	335	0.40	2.66	338
Total Phase 1				**2,081**
Phase Construction Emissions per Year (annualized over 40 years)				52
Phase 2				
2015 (Phase 2)	112	0.13	0.89	113
2016	953	1.14	7.57	962
2017	948	1.14	7.53	957
2018 (	426	0.51	3.39	430
Total Phase 2				**2,461**
Total Construction Emissions – Project Buildout				**4,542**
Total Construction Emissions per Year (annualized over 40 years)				**114**
Total Construction Emissions per Year (annualized over approximately 7 years to construct the Project)				649

SOURCE: ESA, 2010

Construction emissions are annualized because the proposed operational GHG emissions thresholds are analyzed in terms of metric tons “per year.” Assuming a 40-year development life of the Project until it is demolished or remodeled for energy efficiency (which is the common standard currently used in practice), total construction emissions represent approximately 114 MT CO_2e annually, over 40 years. Annualized over the 3.5-year construction period for Phase 1, the one-time construction–related contribution to GHG emissions is approximately 52 MT CO_2e per year, and over the seven-year construction period of the Project Buildout the one-time construction-related contribution is approximately 649 MT CO_2e per year.

As previously discussed, the BAAQMD Guidelines do not include a specific threshold or methodology for assessing construction-related GHG emissions for CEQA analysis. The City’s methodology adds the 40-year annualized construction-related GHG emissions to the Project’s total operational-related emissions, to assess construction-related GHG emissions against the BAAQMD thresholds and Project’s ability to meet AB 32 GHG reduction goals, as discussed below.

The Project includes characteristics that specifically contribute it being consistent with AB 32 GHG reduction goals during construction. The analysis of construction emissions only considers improvements in construction equipment exhaust emissions through manufacturer requirements and turnover. In addition to considering the CO_2e emission from construction activities, the Project would incorporate dust control measures recommended by BAAQMD (Oakland SCA AIR-1, Construction-Related Air Pollution Controls (Dust and Equipment Emissions [Dust Control]), and measures related to construction exhaust emissions (Oakland SCA AIR-2, Construction Emissions). Further, the SCAs that apply to the Project align with BAAQMD regulations that relate to portable equipment (e.g., concrete batch plants, and gasoline- or diesel-powered engines used for power generation, pumps, compressors, pile drivers, and cranes), architectural coatings, and paving materials. Equipment used during project construction would be subject to the requirements of BAAQMD Regulation 2 (Permits), Rule 1 (General Requirements) with respect to portable equipment unless exempt under Rule 2-1-105 (Exemption, Registered Statewide Portable Equipment); BAAQMD Regulation 8 (Organic Compounds), Rule 3 (Architectural Coatings); and BAAQMD Regulation 8 (Organic Compounds), Rule 15 (Emulsified and Liquid Asphalts).

In summary, the annualized GHG emissions from construction of the Project would not conflict with the goals of AB 32.

Long-Term Operational GHG Emissions

As introduced above, long-term operational GHG emissions associated with the Project include indirect emissions from mobile sources (motor vehicle trips), emissions from natural gas combustion used in non-residential buildings, emissions from electricity use in non-residential buildings (grid electricity), emissions from water conveyance and waste water treatment and conveyance, and emissions from area sources. Emissions from each of these sources, in addition to the construction-related emissions discussed above, are reported in **Tables IV.B-10** and **IV.B-11**, below. Detailed descriptions and Project assumptions for each emissions source is included in the *Preliminary GHG Reduction Plan* for the Project, in Appendix Ito this EIR.

TABLE IV.B-10
UNADJUSTED OPERATIONAL GHG EMISSIONS INVENTORY FROM THE PROPOSED PROJECT

	Total Annual CO_2e Emissions (metric tons per year)	
	Phase 1 Total CO_2e	**Project Buildout[a] Total CO_2e**
Emission Source		
Motor vehicle trips (no TDM)	4,570	9,143
Natural gas	734	1,749
Grid Electricity	2,538	3,966
Water Conveyance	11	20
Wastewater Treatment & Conveyance	12	22
Solid Waste	280	758
Area Source (landscape maintenance)	0.24	0.24
Total Unadjusted Operational Project GHG Emissions without Construction Emissions	**8,145**	**15,658**
Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9)	**52**	**114**
Total Unadjusted Operational Project GHG Emissions with Construction Emissions	**8,197**	**15,772**
Total Unadjusted Operational Project GHG Emissions by Service Population	**5.7**[b]	**4.8**[b]

a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components
b Total emissions divided by service population of 1,423 net new employees for the Project at Phase 1, and 3,233 net new employees for the Project at Buildout.

SOURCE: ESA, 2010

TABLE IV.B-11
BASELINE OPERATIONAL GHG EMISSIONS INVENTORY FROM THE PROPOSED PROJECT

	Annual CO_2e Emissions (metric tons per year)	
	Phase 1 Total CO_2e	**Project Buildout[a] Total CO_2e**
Emission Source		
Motor vehicle trips without TDM / with TDM[a]	4,190 / 3,771	8,359 / 7,515
Natural gas	682	1,632
Grid Electricity	1,995	3,099
Water Conveyance	8	15
Wastewater Treatment & Conveyance	13	24
Solid Waste	170	462
Area Source (landscape maintenance)	0.24	0.24
Total Baseline Operational Project GHG Emissions without TDM / with TDM, without Construction Emissions	**7,058 / 6,639**	**13,591 / 12,747**
Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9)	**52**	**114**
Total Baseline Operational Project GHG Emissions without TDM / with TDM, with Construction Emissions	**7,110 / 6,691**	**13,705 / 12,861**
BAAQMD Threshold of Significance	1,100	1,100
Exceeds Threshold?	*Yes*	*Yes*
Total Operational Project GHG Emissions by Service Population without TDM / with TDM	**5.0 / 4.7**[c]	**4.2 / 3.9**[d]
BAAQMD Threshold of Significance	4.6	4.6
Exceeds Threshold?	*Yes*	*No*
Impact Determination	**Significant**	**Less than Significant**[e]

a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components
b Assumes preliminary 10 percent TDM reduction of vehicle trips.
c Total emissions divided by service population of 1,423 net new employees for Phase I of the Project.
d Total emissions divided by service population of 3,233 net new employees for the Project at Buildout.
e For projects that meet the City's definition of a "very large project," , the City requires the Project applicant to prepare a GHG Reduction Plan as a Standard Condition of Approval, even though no CEQA impact is identified.

SOURCE: ESA, 2010

Unadjusted Operational GHG Emissions

"Unadjusted Operational GHG Emissions" of the Project do not factor in the Project's design features, applicable City SCAs (including TDM), and regulatory requirements that are considered part of the Project and that reduced the Project's GHG emissions; it is essentially a "business as usual" approach. Unadjusted emissions do, however, assume the same Project assumptions and inputs used to estimate the Project's baseline emissions, below. The unadjusted emissions are considered to demonstrate the emissions reductions that are attributable to measures incorporated as part of the Project. As shown in **Table IV.B-10**, the total unadjusted annual GHG emissions generated by the Project is approximately 8,197 MT CO_2e per year at Phase 1 and 15,772 MT CO_2e per year at Project Buildout.

Total Baseline Operational GHG Emissions

"Baseline Operational GHG Emissions" of the Project factor in all the emissions reduction components that are part of the Project: the Project design features, applicable City SCAs (including TDM, but excluding SCA GHG-1), and regulatory requirements. Although a TDM Plan for the Project (required by SCA TRANS-1) has not yet been prepared, generally, TDM could reduce SOV trips for a large office project near located near transit by about 10 to 20percent. Baseline emissions are reported with and without a preliminary (and conservative) 10 percent TDM trip reduction assumption.

As shown in **Table IV.B-11**, the total annual baseline GHG emissions generated by the Project at Phase 1, *not assuming the preliminary 10 percent TDM reduction,* is approximately 7,110 MT CO_2e per year, which is approximately 5.0 MT CO_2e annually, based on a total service population of 1,423 net new employees. Emissions at Phase 1, *assuming the preliminary 10 percent TDM reduction,* is approximately 6,691 MT CO_2e per year, and approximately 4.7 MT CO_2e per year per capita of service population.

As further shown in Table IV.B-11, the total annual baseline GHG emissions generated by the Project at Buildout, *not assuming the preliminary 10 percent TDM reduction* is approximately 13,705 MT CO_2e per year, which is approximately 4.2 MT CO_2e based on a total service population of 3,233 net new employees. Emissions at Buildout, *assuming the preliminary 10 percent TDM reduction,* is approximately 12,861 MT CO_2e per year, and approximately 3.9 MT CO_2e per year per capita of service population.

Comparison of Unadjusted and Baseline Emissions

The difference in the baseline and unadjusted GHG emissions of the Project generally demonstrate the extent of emissions reduction that is attributable to measures incorporated with the Project.

At Phase 1, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (7,110 MT CO_2e shown in Table IV.B-11), is approximately 1,087 MT CO_2e per year less than the Project's estimated unadjusted Phase 1 emissions (8,197 MT CO_2e shown in IV.B-10). This is a reduction of approximately 13 percent. The most substantial reductions are associated with motor vehicle emissions (approximately 380 MT CO_2e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 543 MT CO_2e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards, as discussed in the assumptions, above).

At Buildout, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (13,705 MT CO_2e shown in Table IV.B-11), is approximately 2,067 MT CO_2e per year less than the Project's estimated unadjusted emissions (15,772 MT CO_2e shown in IV.B-10). This is a reduction of approximately 13 percent (as with Phase 1). Again, the most substantial reductions are associated with motor vehicle emissions (approximately 784 MT CO_2e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 867 MT CO_2e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards).

Impacts of Baseline Operational GHG Emissions

Based on the project-level significance thresholds, the Project would have a significant impact on the environment if it would produce total emissions of more than 1,100 metric tons of CO_2e annually *and* more than 4.6 metric tons of CO_2e per service population annually, or conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing greenhouse gas emissions.

Impact at Phase 1

For Phase 1, as shown in Table IV. B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 7,110 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold. Also, the Project's 5.0 MT CO_2e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 6,691 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold, and the 4.7 MT CO_2e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Therefore, the Project would have a significant cumulative GHG impact in Phase 1 because its emissions would exceed both the 1,100 MT CO_2e per year threshold *and* the 4.6 MT CO_2e per year service population threshold.

Impact at Total Buildout

At Buildout, as shown in Table IV.B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 13,705 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold. However, the Project's 4.2 MT CO_2e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 12,861 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold, but the 3.9 MT CO_2e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Therefore, at Buildout, the Project would not have a significant cumulative GHG impact because it would not exceed the 4.6 MT CO_2e per year service population threshold, even though it would exceed the 1,100 MT CO_2e per year threshold.

GHG Reduction Plan Mitigation Measure and Standard Conditions of Approval (SCAs)

The City addresses significant cumulative GHG emissions CEQA impacts through a "GHG Reduction Plan Mitigation Measure" that requires the applicant to prepare and implement a project-specific GHG Reduction Plan. The GHG Plan would identify a set of emissions reduction measures targeted at reducing the Project's GHG emissions to below either of the two numeric significant thresholds (1,100 MT CO_2e per year **OR** 4.6 MT CO_2e per year), which would thereby reduce the CEQA impact to less than significant.

The City has also identified a "GHG Reduction Plan Standard Condition of Approval," SCA GHG-1, to identify a set of emissions reduction measures targeted at reducing the Project's GHG emissions to below *both* of the two numeric significant thresholds (1,100 MT CO_2e per year **AND** 4.6 MT CO_2e per year), even though a CEQA impact may not exist. SCA GHG-1 is identical to the GHG Reduction Plan Mitigation Measure, as shown below (Mitigation Measure AIR-2, below. The SCA GHG-1 would apply to "very large projects" that: (a) involve a land use development (i.e., a project that does not require a permit from the Bay Area Air Quality Management District to operate); (b) produce total greenhouse gas (GHG) emissions of more than 1,100 metric tons of CO2e annually **or** more than 4.6 metric tons of CO2e per service population annually (with "service population" defined as the total number of employees and residents of the project); *and* (c) is either a:

- Residential development of more than 500 units;
- Shopping center or business establishment employing more than 1,000 persons or containing more than 500,000 square feet of total floor area;
- Commercial office building employing 1,000 persons or containing more than 250,000 square feet of total floor area;
- Hotel or motel containing more than 500 rooms;
- Industrial, manufacturing, or processing plant, or industrial park employing more than 1,000 persons, occupying more than 40 acres of land, or encompassing more than 650,000 square feet of total floor area; or
- Any combination of smaller versions of the above that when combined result in equivalent annual CO_2e emissions as the above.

Like all Oakland SCAs, the GHG Reduction Plan SCA GHG-1 would be incorporated as a condition of approval to the project.

Phase 1

The following Mitigation Measure AIR-3, GHG Reduction Plan, is identified to address the Phase 1 GHG Emissions impact, and preparation and implementation of the GHG Reduction Plan would be specifically targeted at reducing the Project's GHG Emissions at Phase 1 to below the 4.6 MT CO_2e per year service population threshold – a reduction of at least 0.5 MT CO_2e per year (to reduced 5.0 to 4.5 MT CO_2e).

> **Mitigation Measure AIR-3, GHG Reduction Plan:** The project applicant shall retain a qualified air quality consultant to develop a GHG Reduction Plan for City review and approval. The applicant shall implement the approved GHG Reduction Plan.
>
> The goal of the GHG Reduction Plan shall be to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the Bay Area Quality Management District's (BAAQMD's) CEQA Thresholds of Significance (1,100 metric tons of CO2e per year and 4.6 metric tons of CO2e per year per service population) to help achieve the City's goal of reducing GHG emissions. The GHG Reduction Plan shall include, at a minimum,

(a) a detailed GHG emissions inventory for the project under a "business-as-usual" scenario with no consideration of project design features, or other energy efficiencies; (b) an "adjusted" baseline GHG emissions inventory for the project, taking into consideration energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements); and (c) a comprehensive set of quantified additional GHG reduction measures available to further reduce GHG emissions beyond the adjusted GHG emissions. If the project is to be constructed in phases, the GHG Reduction Plan shall provide GHG emission scenarios by phase.

Potential additional GHG reduction measures to be considered include, but are not be limited to, measures recommended in BAAQMD's latest CEQA Air Quality Guidelines, the California Air Resources Board Scoping Plan (December 2008, as may be revised), the California Air Pollution Control Officers Association (CAPCOA) CEQA and Climate Change Guidance Document (January 2008, as may be revised), the California Attorney General's website, and Reference Guides on Leadership in Energy and Environmental Design (LEED) published by the U.S. Green Building Council.

The proposed additional GHG reduction measures must be reviewed and approved by the City. The types of allowable GHG reduction measures include the following (listed in order of City preference): (1) physical design features; (2) operational features; and (3) the payment of fees to fund GHG-reducing programs (i.e., the purchase of "carbon credits"). For proposed reduction measures involving the purchase of carbon credits, the City will give preference to proposed payments to the City to offset the costs associated with implementation of GHG reduction strategies identified in the draft City's Energy and Climate Action Plan (ECAP).

The allowable locations of the GHG reduction measures include the following (listed in order of City preference): (1) the project site; (2) off-site within the City of Oakland; (3) off-site within the San Francisco Bay Area Air Basin; and (3) off-site within the State of California.

For physical GHG reduction measures to be incorporated into the design of the project, the measures shall be included on the drawings submitted for construction-related permits. For operational GHG reduction measures to be incorporated into the project, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of project completion (or at the completion of the project phase for phased projects).

For physical GHG reduction measures to be incorporated into off-site projects, the measures shall be included on drawings and submitted to the City for review and approval and then installed prior to completion of the subject project (or prior to completion of the project phase for phased projects). For operational GHG reduction measures to be incorporated into off-site projects, the measures shall be implemented on an indefinite and ongoing basis beginning at the time of completion of the subject project (or at the completion of the project phase for phased projects).

For GHG reduction measures involving the purchase of carbon credits (either to fund GHG-reducing activities identified in the draft ECAP or to fund non-ECAP GHG-reducing activities), evidence of the payment/purchase shall be submitted to the City for review and approval prior to completion of the subject project (or prior to completion of the project phase for phased projects).

Because the Project meets the City's definition of "very large project" for a commercial office building[20] the Project would also be subject to the City's SCA GHG-1, GHG Reduction Plan, for which the target would be to further reduce the Project's Phase 1 GHG emissions to below the 1,100 MT CO_2e per year threshold (after implementation of the mitigation measure to reduce the Phase I GHG emissions to below the 4.6 MT CO_2e per year). SCA GHG-1 is identical to Mitigation Measure AIR-3.

This cumulative GHG emissions impact identified for Phase 1 would be less than significant. Although the actual emissions reduction would depend on the combination and extent of the additional measures employed, it is reasonable that potential additional measures identified in **Table IV.B-12**, *Additional GHG Reduction Measures Identified for Potential Implementation by the Proposed Project,* and in the preliminary GHG Reduction Plan in Appendix I to this EIR (in addition to TDM reductions from SCA TRANS-1), could reduce the cumulative baseline GHG emissions associated with Phase 1 of the Project by at least 0.5 MT CO_2e per year to a less-than-significant level.

Significance after Implementation of Mitigation Measure: Less than Significant

Project Buildout

The Proposed Project would not result in a significant cumulative GHG impact at Buildout, therefore no mitigation measure is required. However, SCA GHG-1, GHG Reduction Plan, would apply to the Project, and would be specifically targeted at reducing the Project's GHG Emissions at Buildout to below the 1,100 MT CO_2e per year threshold – a reduction of at least 12,604 MT CO_2e per year (to reduced 13,705 to 1,099 MT CO_2e). SCA GHG-1 is identical to Mitigation Measure AIR-3. Other City SCAs that will be adopted as conditions of approval for the Project include TRANS-1, *Parking and Transportation Demand Managemen*t; SCA UTIL-1, *Waste Reduction and Recycling*; and *Landscape Requirements and Tree Replacement* SCAs.

Mitigation: None required.

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[20] Commercial office building employing 1,000 persons or containing more than 250,000 square feet of total floor area.

TABLE IV.B-12
ADDITIONAL GHG REDUCTION MEASURES IDENTIFIED FOR POTENTIAL IMPLEMENTATION BY THE PROPOSED PROJECT

Mitigation Measure	Description	CO_2e Emissions Reduction Estimate Range
CAPCOA MM T-9	Paid Parking[a]	1 percent – 30 percent
CAPCOA MM T-18	Reduced/No Parking Fee for EVs/CNG Vehicles	Low
CAPCOA MM T-19	TMA Membership[a]	1 percent – 28 percent
CAPCOA MM D-14	Enhanced Recycling	Low
CAPCOA MM D-15	LEED Certification[b]	Moderate
CAPCOA MM D-16	Retro-Commissioning	8 percent – 10 percent
CAPCOA MM D-17	Drought-tolerant Landscaping	Low
CAPCOA MM E-1	High-Efficiency Pumps	Low
CAPCOA MM E-4	Energy Star Roof	0.5 percent – 1 percent
CAPCOA MM E-5	On-Site Renewable Energy System	1 percent – 3 percent
CAPCOA MM E-9	Low energy Cooling	1 percent – 10 percent
CAPCOA MM E-11	Charging Facilities	Low
CAPCOA MM E-15	Electric Yard Equipment Compatibility	Low
CAPCOA MM E-17	Green Building Materials	Low
CAPCOA MM E-18	Shading Mechanisms for windows, patio and walkway overhangs	Low
CAPCOA MM E-20	Programmable Thermostats	Low
CAPCOA MM S-1	Emissions Reduction Education	Low
CAPCOA MM M-2	Offset Purchase	Up to 100 percent
BAAQMD MM 6	Daily Parking Charge [a,c]	0 percent - 25 percent
BAAQMD MM 7	Parking Cash-out. California law requires certain employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space [a]	0 percent – 12.5 percent
BAAQMD MM 8	Free Transit Passes [a]	25 percent of transit service reduction
BAAQMD MM 16	Car sharing services provided [a]	1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together
BAAQMD MM 17	Information Provided on Transportation Alternatives [a]	1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together
BAAQMD MM 18	Dedicated Employee Transportation Coordinator [a]	
BAAQMD MM 19	Carpool Matching Program [a]	
BAAQMD MM 20	Preferential Carpool/Vanpool Parking [a]	
BAAQMD MM 24	Electrically powered landscape equipment and electrical outlets	Equivalent to URBEMIS estimated emissions
BAAQMD MM 43	Increase Roof/Ceiling Insulation	None Given
BAAQMD MM 45	Install rainwater collection systems in commercial buildings	None Given
BAAQMD MM 47	Restrict the use of water for cleaning outdoor surfaces/prohibit systems that apply water to non-vegetated surfaces	None Given
BAAQMD MM 48	Implement water-sensitive Urban Design Practices in New Construction	None Given
BAAQMD MM 51	Require the Provision of storage areas for recyclables and green waste in new construction	None Given

a To be estimated with SCA TRANS-1, which requires preparation of a TDM incorporating a variety of measures aimed at reducing SOV trips generated by the Project.
b While LEED certification is not being proposed for the Project, Voluntary Tier CALGreen standards may be identified.
c Addressed In CAPCOA Measure T-9.

SOURCE: ESA, 2010

Impact AIR-10: The Proposed Project would conflict with any applicable plan, policy or regulation of an appropriate regulatory agency adopted for the purpose of reducing greenhouse gas emissions (Potentially Significant)

As discussed in Impact AIR-2, the Project incorporates several characteristics, such as its transit-oriented location and building and site design features, and will comply with several BAAQMD and other strategies and regulatory requirement that would reduce the Project's contribution to cumulative GHG emissions generated during construction and operation of the Project.

An Oakland Energy and Climate Action Plan (ECAP) is being developed to identify, evaluate and recommend prioritized actions to reduce energy consumption and GHG emissions in Oakland. The ECAP will identify energy and climate goals, clarify policy direction, and identify priority actions for reducing energy use and GHG emissions. On July 7, 2009, the Oakland City Council directed staff to develop the draft Oakland ECAP using a GHG reduction target equivalent to 36 percent below 2005 GHG emissions by 2020 (City of Oakland, Resolution No. 82129 C.M.S., 2009). Since the City issued a draft ECAP for public review in April 2010, but it has not adopted this ECAP at this time, it is unknown if the Project would conflict with policies and actions that may be included. However, the Project does not appear to conflict with the current City Sustainability Programs or General Plan policies regarding GHG reductions.

The Project's GHG emissions generated during construction and operation would be minimized by virtue of the building characteristics and site design features that the Project proposes. In addition, the Project is subject to all the regulatory requirements including the City's Standard Conditions of Approval, which would reduce GHG emissions of the Project. These include conditions to address adherence to best management construction practices and equipment use (see SCA AIR-1 and AIR-2) and to minimize post construction stormwater runoff that could affect the ability to accommodate potentially increased storms and flooding within existing floodplains and infrastructure systems. Overall, the Project would entail implementing reduction strategies identified in AB 32, the Governor's Executive Order S-3-05, and other strategies to help reduce GHGs to the level proposed by the governor and targeted by the City of Oakland.

Mitigation Measure AIR-4: Implement Mitigation Measure AIR-3.

Significance after Implementation of Mitigation Measure: Less than Significant

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C. Biological Resources

This section identifies the existing biological resources at the Project Site and within the Project Study Area; identifies the federal, state, and local regulations pertaining to biological resources within the region; and describes project impacts on those biological resources as well as SCAs and/or mitigation measures to reduce project-related potentially significant impacts. Information used in the preparation of this section was obtained from existing documents pertaining to plant and wildlife species found in the Study Area, the California Natural Diversity Database (CDFG, 2010), California Native Plant Society (CNPS) Electronic Inventory (CNPS, 2010), U.S. Fish and Wildlife Service (USFWS) database (USFWS, 2010), and standard biological literature.

Setting

Regional Setting

The Project Site is located in California's Bay -Delta Bioregion[1]. This bioregion consists of a variety of natural communities that range from the open waters of the Bay and Delta to salt and brackish marshes to chaparral and oak woodlands. The temperate climate is Mediterranean in nature, with relatively mild, generally wet winters and warm, dry summers. The high diversity of vegetation and wildlife found in Alameda County, which reflects that of the region as a whole, is a result of soils, topographic, and micro-climate diversity that combine to promote relatively high levels of endemism.[2] This, in combination with the rapid pace of development in the region, has resulted in a relatively high degree of endangerment for local flora and fauna. The Project Site is located on the western shores of Lake Merritt, approximately one-half mile inland from the Oakland Estuary and in the central portion of the San Francisco Estuary, which is designated as a Western Hemisphere Shorebird Reserve Network of international importance. More than one million shorebirds use regional wetlands each winter, between 300,000 and 900,000 shorebirds pass through San Francisco Bay during spring and fall migration periods, more than 50% of the diving ducks in the Pacific Flyway winter in the shallow wetlands of the bay, and several species breed in regional wetlands during the summer (Goals Project, 1999). More than 90% of historic wetlands in San Francisco Bay have been lost or altered and 94% of tidal marshes have been destroyed in the central San Francisco Bay Region (Goals Project, 1999). San Francisco Bay's remaining tidal wetlands are home to several special-status bird species, including the California clapper rail (*Rallus longirostris obsoletus*), black rail (*Laterallus jamaicensis*), salt-marsh common yellowthroat (*Geothlypis trichas*), and Alameda song sparrow (*Melospiza melodia pusillula*).

1 A bioregion is an area defined by a combination of ecological, geographic and social criteria, that consists of a system of related, interconnected ecosystems. The Bay-Delta bioregion is considered the immediate watershed of the Bay Area and the Delta, not including the major rivers that flow into the Delta. Bounded on the north by northern edge of Sonoma and Napa counties and the Delta and extending east to the edge of the valley floor. Bounded on the south by the southern edge of San Joaquin County, the eastern edge of the Diablo Range, and the southern edge of Santa Clara and San Mateo counties.

2 *Endemism* refers to the degree to which organisms or taxa are restricted to a geographical region or locality and are thus individually characterized as endemic to that area.

Project Setting

Project Site

The Project Site is located on the eastern edge of downtown Oakland, a city with a population of over 400,000. Land uses in the Project Study Area[3] consist of a mix of commercial and office buildings, as well as urban parks. The Project Site is part of the already fully developed Kaiser Center and is currently occupied by low-rise commercial buildings and the mature landscaping of the roof garden on top of commercial space and a parking garage. The site is surrounded by high-traffic city streets, with Lakeside Park and Lake Merritt directly to the east. While the construction of the buildings proposed under the Project will result in the destruction of the westernmost portion of the existing roof garden, this area of the garden will be relocated to the south end of the existing garden and east of the Project's proposed South Tower (see Figure III-3). The Project will result in a net gain in roof garden area of approximately 4,500 square feet.

Study Area

Historically, the Study Area consisted of a mosaic of a fully tidal estuary with mudflats and salt marshes that transitioned into brackish marsh and riparian habitat along Glen Echo Creek and the other freshwater drainages (Pleasant Valley, Bushy Dell, Indian Gulch, and Park Boulevard Creeks) that emptied into a narrow arm of San Francisco Bay running between the mainland and what was then a peninsula but has since become the island of Alameda (SFEI, 1998). Uplands in the vicinity would originally have been a mosaic of coastal prairie and coastal scrub, with scattered oaks and occasional willow groves along stream courses. Sewage from the several early settlements along its shores was discharged into the estuary. Lake Merritt was created when a dam was built in 1868 and the Lake became the nation's first wildlife refuge in 1870. The wetlands surrounding the Lake were gradually reclaimed as houses were built in their place but by 1915 some of these houses were demolished as Lakeside Park was created. Between 1925 and 1956 five islands were constructed of dredged silt to provide habitat for nesting and roosting waterfowl. Fresh water is provided to the islands and a barrier protects the islands from recreational boaters. The uplands of surrounding Lakeside Park are dominated by large areas of maintained turfgrass and have been planted with numerous trees, including native coast live oak (*Quercus agrifolia*), California buckeye (*Aesculus californica*), and coast redwood (*Sequoia sempervirens*), and many non-native species including Italian stone pine (*Pinus pinea*) and deodar cedar (*Cedrus deodara*).

Habitat Types Within the Study Area

Descriptions of the various habitat types occurring within the Study Area are presented below.

[3] The Project Site includes the western portion of the Kaiser Center; the larger Study Area includes the Project Site as well as Lakeside Park and Lake Merritt to the east of the Project Site because of the proposed Project's potential to impact biological resources there.

Urban

The Project Site is fully developed and occurs in a highly urbanized context. Lakeside Park and the open waters of Lake Merritt lie to the east across busy Lakeside Drive from the Kaiser Center, but all other directions are dominated by urban land uses. Urban, developed areas, dominated by roads, structures, concrete, and asphalt, provide little wildlife habitat and essentially no habitat for plants other than opportunistic weedy species adapted to harsh conditions or the horticultural plants used in landscaped areas (see discussion below). Wildlife species utilizing urban areas must be able to tolerate the presence of humans and their activities and are typically generalists, capable of utilizing the limited food sources available, such as garbage and horticultural plants and their fruit. Urban wildlife species in the Oakland area include common raven (*Corvus corax*), northern mockingbird (*Mimus polyglottos*), raccoon (*Procyon lotor*), Norway rat (*Rattus norvegicus*), and Virginia opossum (*Didelphis virginiana*). Several exceptions to the generalist rule are red-tailed hawks (*Buteo jamaicensis*), which prey on rodents and birds often found in urban parks, and Cooper's hawks (*Accipiter cooperi*) and peregrine falcons (*Falco peregrinus anatum*), which prey almost exclusively on small to medium sized birds. Peregrine falcons have been observed roosting on the Kaiser Center building and another tall building within two blocks of the Project Site over a number of years, as well as preying on local birds, including pigeons (*Columba livia*), European starlings (*Sturnus vulgaris*), and Brewer's blackbirds (*Euphagus cyanocephalus*) (Nevill, 2007a, 2007b, 2008; Scalf, 2008). However, although this species is known to use tall buildings and bridges in highly urbanized areas for nesting, there is only one known peregrine nesting site in Oakland, on the Fruitvale Bridge (Nevill, 2010).

Landscaped

Habitat provided by landscaped areas occurs within the Project Site, on the Kaiser Center roof garden, and in Lakeside Park within the greater Study Area. Street trees within the Study Area also provide some marginal foraging, roosting and, potentially, nesting habitat for common urban adapted birds. The Kaiser Center roof gardens were originally planted over 30 years ago and now contain mature trees and shrubs capable of providing nesting habitat for birds. Tree species include southern magnolia (*Magnolia grandiflora*), olive (*Olea europea*), cork oak (*Quercus suber*), Japanese maple (*Acer palmatum*), strawberrry tree (*Arbutus unedo*). These trees are maintained at heights of generally less than 20 feet and with open canopies and thus provide relatively marginal nesting habitat. Mature shrubs in the roof gardens include English laurel (*Prunus laurocerasus*), hydrangea (*Hydrangea macrophylla*), rhododendron and azalea (*Rhododendron* spp.), and camellia (*Camellia japonica*) and many of these have dense enough foliage to provide good cover for nesting birds.

Landscaped areas and planted trees can typically provide cover, foraging, and nesting habitat for a variety of bird species, especially those that are tolerant of disturbance and human presence. Birds commonly found in such areas include the non-native English sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), dark-eyed junco (*Junco hyemalis*), western scrub jay (*Aphelocoma californica*), and Anna's hummingbird (*Calypte anna*). The latter two species were observed at the roof garden.

Bird Use of Lake Merritt and Lakeside Park

Lake Merritt and surrounding Lakeside Park provide habitat for a diversity of bird species. Black-crowned night herons (*Nycticorax nycticorax*) and egrets (*Egretta thula*, *Ardea alba*) nest on the protected islands. A large colony of Canada geese (*Branta canadensis*) forage in the turfgrass and also utilize the island habitat. Numerous water birds forage in the open waters of the lake and species such as eared and pied-billed grebes (*Podiceps nigricollis, Podilymbus podiceps*) are common. Brown pelicans (*Pelecanus occidentalis californicus*), double-crested cormorants (*Phalacrocorax auritus*) and numerous duck species, including bufflehead (*Bucephala albeola*) and scaup (*Aythya marila, A. affinis*) also frequent the aquatic habitat provided by the Lake. Trees in Lakeside Park have been documented as supporting nesting Cooper's hawks and red-tailed hawk also likely nest in trees there. Undoubtedly many common passerine birds nest there as well.

Wetlands and Aquatic Habitat

There are no wetlands or other aquatic habitats on the Project Site. While there is a series of three linked pools in the roof garden, these are maintained with chemicals that would preclude the presence of aquatic invertebrates and the rooftop location precludes colonization by aquatic vertebrates from adjacent habitat. Within the area of potential Project impact, the banks of Lake Merritt are confined with concrete retaining walls and therefore provide no substrate for wetland vegetation.

Lake Merritt is affected by twice daily tidal flows and receives water from 60 storm drain outfalls around the lake. Salinity of the waters varies throughout the year according to the volume of freshwater input but the Lake is basically brackish. The open waters of Lake Merritt within the Study Area also support primarily marine fish species common to the San Francisco Estuary (Pham, 2001). The species composition within the Study Area is expected to vary by season and regularly changing physical conditions created by variation in freshwater flow from the creeks and other freshwater sources into the Lake. Fish commonly found within the Bay include such diverse species as northern anchovy (*Engraulis mordax*), striped bass (*Morone saxatilis*), threadfin shad (*Dorosoma petenense*), and yellowfin goby (*Acanthogobius flavimanus*). Fish species actually documented as occurring within the Glen Echo Creek watershed, which includes Lake Merritt, are goldfish (*Carassius auratus*), western mosquitofish (*Gambusia affinis*), and three-spine stickleback (*Gasterosteus aculeatus*) (Leidy, 2007). Leidy also notes the potential for Chinook salmon (*Oncorhynchus tshawytscha*) in the watershed but presence is apparently not confirmed.

The benthic invertebrate community of Lake Merritt is expected to be composed of various annelids, mysid shrimp, copepods, amphipods, shrimp, crabs and other macroinvertebrates, similar to those that occur in San Francisco Bay. All of these organisms provide important food sources for the fish and bird species that use Lake Merritt.

Sensitive Natural Communities

Sensitive natural communities are designated as such by various resource agencies, such as CDFG, or in local policies and regulations and are generally considered to have important functions or values for wildlife or humans and/or are recognized as declining in extent or distribution and are considered threatened enough to warrant some sort of protection. For example, many local agencies in California consider protection of oak woodlands important and federal, state, and most local agencies also consider wetlands and riparian habitat as sensitive communities. The CNDDB tracks communities it believes to be of conservation concern and these communities are typically considered sensitive for the purposes of CEQA analysis. The CNDDB lists three sensitive natural communities as occurring in the vicinity of the Study Area: northern coastal salt marsh, northern maritime chaparral, and serpentine bunchgrass grasslands. However, although riparian habitat and tidal salt marsh were historically present within the Study Area, none of these communities currently occur within the Project Site or within the Study Area.

Jurisdictional Waters and Wetlands

There are no potentially jurisdictional waters or wetlands on the Project Site. However, within the Study Area the open waters of Lake Merritt would be considered 'other waters' of the U.S and thus a jurisdictional feature. The Proposed Project is not expected to result in any direct impacts on Lake Merritt.

Special-status Species

A number of species known to occur in the Project Site vicinity are protected pursuant to federal and/or State of California endangered species laws, or have been designated Species of Special Concern by CDFG. In addition, Section 15380(b) of the California Environmental Quality Act (CEQA) Guidelines provides a definition of rare, endangered, or threatened species that are not included in any listing.[4] Species recognized under these terms are collectively referred to as "special-status species." For the purposes of this EIR, special-status species include:

- Plant and wildlife species listed as rare, threatened or endangered under the federal or state endangered species acts;
- Species that are candidates for listing under either federal or state law;
- Species formerly designated by the USFWS as Species of Concern or designated by CDFG as Species of Special Concern;
- Species protected by the federal Migratory Bird Treaty Act (16 U.S.C. 703-711); and/or
- Species such as candidate species that may be considered rare or endangered pursuant to Section 15380(b) of the CEQA Guidelines.

Appendix D provides comprehensive lists of the special-status species that have been documented from, or have potential to occur in suitable habitat within, the Study Area. These lists include occurrences documented by the CNDDB (CDFG, 2010), the CNPS Electronic Inventory (CNPS,

[4] For example, vascular plants listed as rare or endangered or as List 1 or 2 by the California Native Plant Society (CNPS) are considered subject to Section 15380(b).

2008), and the USFWS database (USFWS, 2010). Based on review of the biological literature of the region, information presented in previous environmental documentation, and an evaluation of the habitat conditions of the Proposed Project Site, many of these species were eliminated from further evaluation because (1) the Study Area does not and/or never has provided suitable habitat for the species, or (2) the known range for a particular species is outside of the Study Area.

The remaining special-status species presented in **Table IV.C-1** include those that are documented as occurring within the Study Area or for which potential habitat (i.e., general habitat types) occurs within the Study Area. Species for which generally suitable habitat occurs but that were nonetheless determined to have low potential to occur in the Study Area are also listed in Table IV.C-1. This table also provides the rationale for each potential-to-occur determination. Species observed or with a moderate to high potential to occur in the Study Area are discussed in further detail below.

Special-Status Animals

Thirteen special-status wildlife species were identified in Table IV.C-1 as having potential for occurrence within the Project Study Area. Please refer to Table IV.C-1 for a summary of each species' habitat preferences and the rationale for our determinations with regard to potential for occurrence within the Study Area. None of these species is expected to occur within the Project area, with the exception of several raptors, which may prey on birds using the Kaiser roof garden.

Of the special-status plants and animals presented in Table IV.C-1, only the following nine species, which have been observed or determined to have a moderate to high potential to occur within the Study Area, were fully considered in the impact analysis:

- Peregrine falcon
- California brown pelican
- Cooper's hawk
- Red-shouldered hawk
- Red-tailed hawk
- Double-crested cormorant
- Pallid bat
- Silver-haired bat
- Hoary bat

These species are described in further detail below.

Birds

Peregrine falcon (*Falco peregrinus anatum*). The peregrine falcon is known throughout California and is a year-around resident along the Pacific coast. The peregrine is a specialist, preying primarily on mid-sized birds, such as pigeons and doves, in flight. Occasionally these birds will take insects and bats. Although typical nesting sites for the species are tall cliffs, preferably over or near water, peregrines are also known to use urban sites (Peeters, 2005), including the Bay Bridge and tall buildings in San Francisco and San Jose.

TABLE IV.C-1
SPECIAL-STATUS SPECIES CONSIDERED

Common Name *Scientific Name*	**Listing Status USFWS/CDFG/ CNPS**	**General Habitat**	**Potential for Occurrence in Project Study Area**
Species Listed and Proposed for Listing			
Birds			
Peregrine falcon *Falco peregrinus anatum*	Delisted/Delisted/ Fully Protected	Nests on ledges on cliffs, bridges, and tall buildings. In SF Bay area the species is known to nest on the Bay Bridge and buildings in San Francisco and San Jose.	**High.** This species is documented as foraging at Lake Merrit (CNDDB, 2010), as well as roosting and foraging in the Kaiser Center. Tthere is one known nesting site for this species in Oakland.
California brown pelican *Pelecanus occidentalis californicus*	FE/CE	Nests on islands, seeks cover on islands, mudflats, beaches, wharves.	**High.** Documented as occurring on Lake Merritt within the Study Area, but no suitable nesting habitat is present. Would not occur within the Project area.
Fish			
Tidewater goby *Eucyclogobius newberryi*	FE/CSC	Shallow waters of bays and estuaries.	**Low.** Reported as present in Lake Merritt in the late 1990's (CNNDB, 2008). However, thought to be extirpated since then due to poor water quality (City of Oakland, 2006).
Central California coast steelhead *Oncorhynchus mykiss*	FT/CSC	Spawns and rears in coastal streams between the Russian River and Aptos Creek, as well as drainages tributary to San Francisco Bay, where gravelly substrate and shaded riparian habitat occurs.	**Low.** Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Sacramento winter-run Chinook salmon *Oncorhynchus tshawytscha*	FE/CE	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	**Low.** Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Central Valley spring-run Chinook salmon *Oncorhynchus tshawytscha*	FT/CT	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	**Low.** Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Additional Special-Status Species			
Invertebrates			
Mimic tryonia (=California brackishwater snail) *Tryonia imitator*	FSC/--	Inhabits permanently submerged areas in coastal lagoons, estuaries, and salt marshes, from Sonoma County south to San Diego County.	**Low.** Historical collection from vicinity of Lake Merritt. However species is thought likely to be extirpated as a result of habitat degradation (CNDDB, 2010).
Fish			
Central Valley fall/late fall-run Chinook salmon *Oncorhynchus tshawytscha*	FSC/CSC	Spawns and rears in Sacramento River and tributaries where gravelly substrate and shaded riparian habitat occurs.	**Low.** Migrates through San Francisco Estuary. Individuals may occasionally stray into Lake Merritt. However, no suitable breeding habitat remains in the area.
Birds			
Cooper's hawk *Accipiter cooperii*	--/CSC	Commonly nests in conifers and riparian woodland but also known to nest in large trees in urban areas throughout the East Bay, especially near riparian corridors.	**High.** Documented as nesting in Lakeside Park within the Project Study Area (CNDDB, 2010). May forage within the Project area but not expected to nest there.

TABLE IV.C-1 (CONTINUED)
SPECIAL-STATUS SPECIES CONSIDERED

Common Name *Scientific Name*	**Listing Status USFWS/CDFG/ CNPS**	**General Habitat**	**Potential for Occurrence in Project Study Area**
Birds (Continued)			
Red-shouldered hawk *Buteo lineatus*	--/3503	Commonly nests in riparian corridors but becoming increasingly common in urban areas throughout the East Bay, nesting in large trees.	**High.** Fairly common locally in urban areas. May nest at Lakeside Park. May forage occasionally at Kaiser Center but not expected to nest there.
Red-tailed hawk *Buteo jamaicensis*	--/3503	Nests in large oaks and conifers. The Bay Area's most common urban raptor.	**High.** Known to occur in downtown Oakland. May nest at Lakeside Park. May forage occasionally at Kaiser Center but not expected to nest there.
Northern harrier *Circus cyaneus*	--/CSC	Nests on ground primarily in emergent vegetation, wet meadows, or near rivers and lakes, but may nest in grasslands away from water.	**Low.** May occasionally forage within the Study Area but no suitable nesting habitat is present. Not expected to occur within Project area.
Double-crested cormorant *Phalacrocorax auritus*	--/CSC	Nests along coast on isolated islands or in trees along lake margins.	**High.** Known to forage and roost at Lake Merritt but not known to nest in Study Area. Not expected to occur within Project area.
Mammals			
Pallid bat *Antrozous pallidus*	FSC/CSC	Occurs in various habitats including grasslands, scrubs, woodlands, mixed conifer forests, but it is most common in open, dry habitats with rocky areas for roosting. Day roosts include hollow trees, buildings, caves, crevices, and mines.	**Moderate.** Marginally suitable roosting habitat occurs within Lakeside Park, with foraging habitat available over Lake Merritt and open turf areas. May forage within Project area but not expected to roost or breed there.
Silver-haired bat *Lasionycteris noctivagans*	FSC/--	Roost almost exclusively in trees – in natural hollows and bird excavated cavities or under loose bark of large diameter snags.	**Moderate to High.** Suitable roosting habitat is present in trees within the Study Area. Foraging habitat also present over Lake Merritt and adjacent turfgrass areas. May forage within Project area but not expected to roost or breed there.
Hoary bat *Lasiurus cinereus*	--/CSC	Prefers open habitats or habitat mosaics, with trees for cover and open areas or habitat edges for feeding. Prefers to roost in dense foliage of medium to large trees.	**Moderate to High.** Suitable roosting habitat is present in trees within the Study Area. Foraging habitat also present over Lake Merritt and adjacent turfgrass areas. May forage within Project area but not expected to roost or breed there.

STATUS CODES:

FEDERAL: (U.S. Fish and Wildlife Service)
FE = Listed as Endangered (in danger of extinction) by the Federal Government.
FT = Listed as Threatened (likely to become Endangered within the foreseeable future) by the Federal Government.
FP = Proposed for Listing as Endangered or Threatened.
FC = Candidate to become a *proposed* species.
FSC = former Federal Species of Concern. Species so designated as such were listed by the Sacramento FWS office until 2006 but Sacramento FS no longer maintains this list. These species are still considered to be at-risk by other federal and state agencies, as well as various organizations with recognized expertise such as the Audubon Society.

STATE: (California Department of Fish and Game)
CE = Listed as Endangered by the State of California
CT = Listed as Threatened by the State of California
CSC = California Species of Special Concern
3503.5=Protection for nesting species of Falconiformes (hawks) and Strigiformes (owls)

SOURCES: CDFG, 2010; USFWS, 2010

Only one peregrine nesting site is documented in Oakland, on the Fruitvale Bridge (Nevill, 2010), and the species is known to use the Kaiser Center outside of breeding season. Juvenile peregrines have been observed perched or roosting on the nearby Kaiser Permanente building as recently as May 2008 (Nevill, 2008 and 2007a) and a breeding pair that used to nest on the Bay Bridge was observed multiple times at the Kaiser Center in the post-breeding season (Scalf, 2008). More recently, peregrines have also been observed using Oakland City Hall and the California State Building in downtown Oakland (Lowe, 2010), as well as in Emeryville (Nevill,2008). The open skies over Lakeside Park, combined with adjacent tall buildings for perching and roosting and the abundance of birds using habitat at the Lake provide excellent foraging habitat for peregrine falcons.

Brown pelican (*Pelecanus occidentalis*). The brown pelican is a regular summer and fall migrant to San Francisco Bay and, in some years, these birds can be found in the Bay year-round. However, these birds are colonial breeders that favor rocky islands along the southern California coast to Mexico and, historically, only rarely north as far as Point Lobos (Cogswell, 1977). Brown pelicans are often seen foraging in deep water and channel habitat or perched on pilings or docks and have been observed foraging and roosting at Lake Merritt.

Cooper's hawk *(Accipiter cooperi)***.** Cooper's hawk ranges over most of North America and may be seen throughout California, most commonly as a winter migrant. Nesting pairs have declined throughout the lower-elevation, more populated parts of the state. Cooper's hawk forages in open woodlands and wooded margins and nests in tall trees, often in riparian areas (Ehrlich et al., 1988; Sibley, 2001). This species may forage at Kaiser Center roof garden as well as Lakeside Park; coast live oak and conifers provide suitable nesting habitat for Cooper's hawk at Lakeside Park and the species is documented as breeding there (CNDDB, 2010).

Red-tailed hawk (*Buteo jamaicensis*). Red-tailed hawks are commonly found in woodlands and open country with scattered trees. These large hawks feed primarily on small mammals, but will also prey on other small vertebrates, such as snakes and lizards, as well as on small birds and invertebrates. Red-tailed hawks nest in a variety of trees in urban, woodland, and agricultural habitats. Large coast live oaks as well as taller non-native trees such as conifers, may be used by red-tailed hawks for nesting in woodlands within Lakeside Park.

Red-shouldered hawk (*Buteo lineatus*). Red-shouldered hawks are relatively common in both rural and urban situations and can be found in residential neighborhoods and along riparian corridors or other waterbodies. These hawks hunt primarily for mammals, reptiles, and amphibians (Sibley, 2000). Large conifers provide potential nesting habitat for this species within the Project Study Area, primarily in Lakeside Park.

Double-crested cormorant (*Phalacrocorax auritus*). The double-crested cormorant is the only one of the three cormorants occurring in California that occurs on freshwater and is the most common cormorant in San Francisco Bay. The species feeds on a variety of fish and some. crustaceans. These birds are colonial breeders, building stick nests or platforms in trees inland and using rocky ledges along the coast (Cogswell, 1977). Double-crested cormorants are known to nest locally on the Richmond San Rafael Bridge, at Lake Merced in San Francisco.

Mammals

Special status bat species. The Project Study Area provides potential foraging and roosting habitat for three special-status bat species. **Pallid bat** (*Antrozous pallidus*) ranges throughout western North America, from British Columbia to Mexico and east to Texas. This species is most abundant in arid lands, including deserts and canyonlands, shrub-steppe grasslands, and higher elevation coniferous forests and is therefore only likely to occur within the Study Area on a transient basis during spring and summer migrations. Pallid bats may roost alone or in groups in trees in cavities or under bark and structures such as bridges and buildings. Pallid bats forage over open areas and are opportunistic feeders on a wide variety of insects, foraging both on surfaces and in the air. Prey includes beetles, centipedes, crickets, moths, and rarely, lizards, and small rodents (WBWG, 2005a). **Silver-haired bat** (*Lasionycteris noctivagans)* occurs throughout most of North America and is primarily associated with conifer and mixed conifer/hardwood forests. This species would most likely be found in the Study Area during winter and seasonal migrations. Silver-haried bats roost almost exclusively in cavities and under the bark of tree, although they are sometimes found in structures as well. Moths are apparently the primary prey for this species, although they have been documented as feeding on a wide variety of insects. Seasonal records suggest considerable north to south migration, with animals moving to warmer, more southern climates in the winter (WBWG, 2005b). The **hoary bat** (*Lasiurus cinereus*) is the most widespread of all North American bats. This species ranges from Canada to South America and is primarily associated with forested habitats. Hoary bats are solitary and roost primarily in foliage of both coniferous and deciduous trees, often at the edge of a clearing. The species is highly migratory but neither wintering sites nor migratory routes are well documented. Hoary bats reportedly have a strong preference for moths, but are also known to eat beetles, flies, grasshoppers, termites, dragonflies, and wasps (WBWG, 2005c). These three bat species may utilize trees for roosting in Lakeside Park and forage over the park's turfgrass and the Lake itself during migratory periods but are not expected to breed and reproduce there.

Special-Status Plants

No special-status plant species are expected to occur on the Proposed Project Site or within the larger Study Area. Although a number of special-status plant species are identified in Appendix D as occurring within the Project vicinity there are no intact native communities remaining within the Study Area. In addition, distribution of a number of these species is restricted to specific habitat types or soils that are not, and/or never were, present within the Study Area, such as vernal pools or serpentine soils. Many plant species presented in Appendix D are considered by CNPS (2008) to be extirpated from the Project vicinity due to a long-standing history of disturbance within the Study Area.

Regulatory Setting

This subsection briefly describes federal, state, and local regulations, permits, and policies pertaining to biological resources and wetlands as they apply to the Proposed Project.

Special-Status Species

Federal Endangered Species Act

The USFWS, which has jurisdiction over plants, wildlife, and most freshwater fish, and the National Marine Fisheries Service (NMFS), which has jurisdiction over anadromous fish, marine fish, and mammals, oversee implementation of the Federal Endangered Species Act (FESA). Section 7 of the FESA mandates that all federal agencies consult with the USFWS and NMFS to ensure that federal agency actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. A federal agency is required to consult with USFWS and NMFS if it determines a "may affect" situation will occur in association with the Proposed Project. The FESA prohibits the "take"[5] of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

Under Section 9 of the FESA, the take prohibition applies only to wildlife and fish species. However, Section 9 does prohibit the removal, possession, damage, or destruction of any endangered plant from federal land. Section 9 also prohibits acts to remove, cut, dig up, damage, or destroy an endangered plant species in non-federal areas in knowing violation of any state law or in the course of criminal trespass. Candidate species and species that are proposed or under petition for listing receive no protection under Section 9 of the FESA.

Section 10 of the FESA requires the issuance of an "incidental take" permit before any public or private action may be taken that would potentially harm, harass, injure, kill, capture, collect, or otherwise hurt (i.e., take) any individual of an endangered or threatened species. To offset the take of individuals that may occur incidental to implementation of a project, the permit requires preparation and implementation of a habitat conservation plan that provides for the overall preservation of the affected species through specific mitigation measures.

Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and egg.

Federal Essential Fish Habitat

The Sustainable Fisheries Act of 1996 (Public Law 104-297), amended the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to establish new requirements for Essential Fish Habitat (EFH) descriptions in federal Fisheries Management

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5 "Take," as defined in Section 9 of the FESA, is broadly defined to include intentional or accidental "harassment" or "harm" to wildlife. "Harass" is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act that actually kills or injures wildlife. This may include significant habitat modification or degradation that actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

Plans (FMPs) and to require federal agencies to consult with the NMFS on activities that may adversely affect EFH. The Magnuson-Stevens Act requires all fishery management councils to amend their FMPs to describe and identify EFH for each managed fishery. The act also requires consultation for all federal agency actions that may adversely affect EFH (i.e., direct versus indirect effects); it does not distinguish between actions in EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside of EFH, such as upstream and upslope activities that may have an adverse effect on EFH. Therefore, EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of the activity's location. Under section 305(b)(4) of the Magnuson-Stevens Act, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. However, state agencies and private parties are not required to consult with NMFS unless state or private actions require a federal permit or receive federal funding. Although the concept of EFH is similar to that of critical habitat under the FESA, measures recommended to protect EFH by NMFS are advisory, not proscriptive.

California Endangered Species Act

Under the California Endangered Species Act (CESA), CDFG has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code Section 2070). CDFG also maintains a list of "candidate species," which are species formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. In addition, CDFG maintains lists of "species of special concern," which serve as "watch lists." Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present on the Project Site and determine whether the proposed project could have a potentially significant impact on such species. In addition, CDFG encourages informal consultation on any proposed project that may affect a candidate species.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed CDFG to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this state." The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The California Endangered Species Act (CESA) expanded upon the original NPPA and enhanced legal protection for plants. The CESA established threatened and endangered species categories, and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

California Fish and Game Code

Under Section 3503 of the California Fish and Game Code, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.3 of the California Fish and Game Code prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs.

The California Fish and Game Code (Sections 3511-birds, 4700-mammals, 5050-reptiles and amphibians, and 5515-fish) also allows the designation of a species as Fully Protected. This designation provides a greater level of protection than is afforded by the CESA, since it means the designated species cannot be taken at any time.

Sensitive Natural Communities

Sensitive natural communities are identified as such by CDFG's Natural Heritage Division and include those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The CNDDB tracks 135 such natural communities in the same way that it tracks occurrences of special-status species: information is maintained on each site's location, extent, habitat quality, level of disturbance, and current protection measures. CDFG is mandated to seek the long-term perpetuation of the areas in which these communities occur. While there is no statewide law that requires protection of all special-status natural communities, CEQA requires consideration of a project's potential impacts on biological resources of statewide or regional significance.

Jurisdictional Waters (Including Wetlands)

Definitions

Waters of the United States

The term "waters of the United States," as defined in the Code of Federal Regulations (33 CFR § 328.3[a]; 40 CFR § 230.3[s]), refers to:

1. All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
2. All interstate waters including interstate wetlands;
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce including any such waters:
   - which are or could be used by interstate or foreign travelers for recreational or other purposes; or
   - from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
   - which are used or could be used for industrial purposes by industries in interstate commerce.
4. All impoundments of waters otherwise defined as waters of the United States under the definition;

5. Tributaries of waters identified in paragraphs (1) through (4);
6. Territorial seas; and
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (1) through (6).
8. Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA (33 CFR 328.3[a][8]).

Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance of wetlands has increased due to their value as recharge areas and filters for water supplies and to their widespread filling and destruction to enable urban and agricultural development. Examples of wetlands may include freshwater marsh, seasonal wetlands, and vernal pool complexes that are adjacent to waters of the U.S. In a jurisdictional sense, there are two commonly used wetland definitions, one adopted by the USEPA and U.S. Army Corps of Engineers (Corps) and a separate definition, originally developed by USFWS, which has been adopted by agencies in the State of California that have regulatory authority over wetlands. Both definitions are presented below.

Federal Wetland Definition

Under federal law, wetlands are a subset of "waters of the United States" and receive protection under Section 404 of the Clean Water Act (CWA). Wetlands are defined as those areas that are inundated or saturated by surface or ground water at a frequency and duration that are sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetland determination under the federal wetland definition adopted by the Corps requires the presence of three factors: (1) wetland hydrology; (2) plants adapted to wet conditions; and (3) soils that are routinely wet or flooded [33 C.F.R. § 328.3(b)]. In January 2001, the Supreme Court of the United States ruled that certain isolated wetlands do not fall under the jurisdiction of the CWA (*Solid Waste Agency of Northwestern Cook County v. United States Army Corps of Engineers et al.*).

California Wetland Definition

The CDFG and the California Coastal Commission (CCC) have adopted the USFWS (Cowardin, 1979) definition of wetlands. While the federal definition of wetlands requires three wetland identification parameters to be met, the Cowardin definition can be satisfied under some circumstances with the presence of only one parameter. Thus, identification of wetlands by State agencies may include areas that are permanently or periodically inundated or saturated and without wetland vegetation or soils, such as rocky shores, or areas that presume wetland hydrology based on the presence of at least one of the following: a) a seasonal or perennial dominance by hydrophytes[6] *or* b) the presence of hydric[7] soils. CDFG does not normally assert

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6 A *hydrophyte* is, literally, a water loving plant, i.e., one that is adapted to growing in conditions where the soil lacks oxygen, at least periodically during the year, due to saturation with water.

7 A *hydric* soil is one that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part of the soil profile.

jurisdiction over wetlands unless they are subject to Streambed Alteration Agreements (CDFG Code Sections 1600–1616) or they support state-listed endangered species.

Other Waters of the U.S.

"Other waters of the U.S." refers to additional features that are regulated by the CWA but are not wetlands (33 CFR 328.4). To be considered jurisdictional, these features must exhibit a defined bed and bank and an ordinary high water mark. The term ordinary high water mark refers to a line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other means appropriate to the characteristics of the surrounding areas. Examples of other waters of the U.S. include rivers, creeks, ponds, and lakes.

U.S. Army Corps of Engineers and U.S. Environmental Protection Agency Regulations

The Corps and the USEPA regulate the discharge of dredged or fill material into waters of the United States, including wetlands, under Section 404 of the CWA. Projects that would result in the placement of dredged or fill material into waters of the United States require a Section 404 permit from the Corps. Some classes of fill activities may be authorized under General or Nationwide permits if specific conditions are met. Nationwide permits do not authorize activities that are likely to jeopardize the existence of a threatened or endangered species (listed or proposed for listing under the FESA). In addition to conditions outlined under each Nationwide Permit, project-specific conditions may be required by the Corps as part of the Section 404 permitting process. When a project's activities do not meet the conditions for a Nationwide Permit, an Individual Permit may be issued.

Section 401 of the CWA requires an applicant for a Corps permit to obtain state certification that the activity associated with the permit will comply with applicable state effluent limitations and water quality standards. In California, water quality certification, or a waiver, must be obtained from the Regional Water Quality Control Board (RWQCB) for both Individual and Nationwide Permits.

The Corps also regulates activities in navigable waters under Section 10 of the Rivers and Harbors Act. The construction of structures, such as tidegates, bridges, or piers, or work that could interfere with navigation, including dredging or stream channelization, may require a Section 10 permit, in addition to a Section 404 permit if the activity involves the discharge of fill.

Finally, the federal government also supports a policy of minimizing "the destruction, loss, or degradation of wetlands." Executive Order 11990 (May 24, 1977) requires that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

In recent years several Supreme Court cases have challenged the scope and extent of the Corps' jurisdiction over waters of the United States and have led to several reinterpretations of that authority. The most recent of these decisions are the case of *Solid Waste Agency of Northern Cook County* (SWANCC) *v. the Army Corps of Engineers* (January 9, 2001) and *Rapanos v. United States* (June, 2006). The SWANCC decision found that jurisdiction over non-navigable, isolated, intrastate waters could not be based solely on the use of such waters by migratory birds. The reasoning behind the SWANCC decision could be extended to suggest that waters need a demonstrable connection with a 'navigable water' to be protected under the CWA. The introduction of the term isolated has led to the consideration of the relative connectivity between waters and wetlands as a jurisdictionally relevant factor. The more recent Rapanos case further questioned the definition of "waters of the United States" and the scope of federal regulatory jurisdiction over such waters but resulted in a split decision which did not provide definitive answers but expanded on the concept that a 'significant nexus' with traditional navigable waters was needed for certain waters to be considered jurisdictional.

On June 5, 2007 the USEPA and the Corps released guidance on CWA jurisdiction in response to the Rapanos Supreme Court decisions, which can be used to support a finding of CWA coverage for a particular water body when either a) there is a significant nexus between the stream or wetland in question and navigable waters in the traditional sense; or b) a relatively permanent water body is hydrologically connected to traditional navigable waters and/or a wetland has a surface connection with that water. According to this guidance the Corps and the USEPA will take jurisdiction over the following waters: 1) Traditional navigable waters, which are defined as all waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; 2) Wetlands adjacent to traditional navigable waters; including adjacent wetlands that do not have a continuous surface connection to traditional navigable waters; 3) Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and 4) Wetlands adjacent to non-navigable tributaries as defined above; that have a continuous surface connection to such tributaries (e.g. they are not separated by uplands, a berm, dike, or similar feature).

The USEPA and the Corps decide jurisdiction over the following waters based on a fact-specific analysis to determine if there is a significant nexus, as defined below, to a traditional navigable water: a) Non-navigable tributaries that are not relatively permanent; b) Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and c) wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary.

The USEPA and the Corps *generally* do not assert jurisdiction over: 1) swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow) or 2) ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water.

The USEPA and the Corps have defined the significant nexus standard as follows:

1. A significant nexus analysis assesses the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters;
2. Significant nexus analysis includes consideration of hydrologic and ecologic factors including: a) volume, duration, and frequency of flow, including consideration of certain physical characteristics of the tributary; b) proximity to a traditional navigable water; c) size of the watershed; d) average annual rainfall; e) average annual winter snow pack; f) potential of tributaries to carry pollutants and flood waters to traditional navigable waters; g) provision of aquatic habitat that supports a traditional navigable water; h) potential of wetlands to trap and filter pollutants or store flood waters; and i) maintenance of water quality in traditional navigable waters.

State Policies and Regulations

State regulation of activities in waters and wetlands resides primarily with CDFG and the State Water Resources Control Board (SWRCB). In addition, the CCC has review authority for wetland permits within its planning jurisdiction. CDFG provides comment on Corps permit actions under the Fish and Wildlife Coordination Act. CDFG is also authorized under the California Fish and Game Code, Sections 1600-1616, to enter into a Streambed Alteration Agreement with applicants and to develop mitigation measures when a proposed project would obstruct the flow or alter the bed, channel, or bank of a river or stream in which there is a fish or wildlife resource, including intermittent and ephemeral streams. The SWRCB, acting through the nine RWQCBs, must certify that a Corps permit action meets state water quality objectives (Section 401, Clean Water Act).

Bay Conservation and Development Commission (BCDC) Regulations

The Bay Conservation and Development Commission (BCDC) is authorized by the McAteer - Petris Act to analyze, plan, and regulate San Francisco Bay and its shoreline. BCDC implements the San Francisco Bay Plan and regulates filling and dredging in the bay, its sloughs and marshes, and certain creeks and their tributaries. BCDC jurisdiction includes the waters of San Francisco Bay as well as a shoreline band that extends inland 100 feet from the high tide line. Any fill, excavation of material, or substantial change in use within BCDC jurisdiction requires a permit from BCDC.

Other Plans and Policies

City of Oakland General Plan

The OSCAR Element of the City of Oakland General Plan was adopted in 1996. OSCAR policies pertaining to natural resources with potential relevance to implementation of the Proposed Project include the following:

> Policy CO-6.1: Protect Oakland's remaining natural creek segments by retaining creek vegetation, maintaining creek setbacks, and controlling bank erosion. Design future flood control projects to preserve the natural character of creeks and incorporate provisions for public access, including trails, where feasible. Strongly discourage projects which bury creeks or divert them into concrete channels.

> Policy CO-7.1: Protect native plant communities, especially oak woodlands, redwood forests, native perennial grasslands, and riparian woodlands, from the potential adverse impacts of development. Manage development in a way which prevents or mitigates adverse impacts to these communities.

> Policy CO-7.4: Discourage the removal of large trees on already developed sites unless removal is required for biological, public safety, or public works reasons.

> Policy CO-8.1: Work with federal, state, and regional agencies on an ongoing basis to determine mitigation measures for development which could potentially impact wetlands. Strongly discourage development with unmitigatable adverse impacts.

> Policy CO-9.1: Protect rare, endangered, and threatened species by conserving and enhancing their habitat and requiring mitigation of potential adverse impacts when development occurs within habitat areas.

> Policy CO-11.1: Protect wildlife from the hazards of urbanization, including loss of habitat and predation by domestic animals.

> Policy CO-11.2: Protect and enhance migratory corridors for wildlife. Where such corridors are privately owned, require new development to retain native habitat or take other measures which help sustain local wildlife population and migratory patterns.

The following policy is from the Land Use and Transportation Element:

> Policy W3.3: Native plant communities, wildlife habitats, and sensitive habitats should be protected and enhanced.

City of Oakland Tree Ordinance

> City of Oakland Tree Preservation and Removal Ordinance (Oakland Municipal Code (OMC) Chapter 12.36) prohibits removal of protected trees under certain circumstances. Factors to be considered in determining significance include:

> The number, type, size, location and condition of (a) the protected trees to be removed and/or impacted by construction and (b) the protected trees to remain, with special consideration given to native trees.[8]

Protected trees include the following:

> *Quercus agrifolia* (California or coast live oak) measuring four inches diameter at breast height (dbh) or larger, and any other tree measuring nine inches dbh or larger except *Eucalyptus* and *Pinus radiata* (Monterey pine); provided, however, that Monterey pine trees on City property and in development-related situations where more than five Monterey pine trees per acre are proposed to be removed are considered to be Protected trees.

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

The SCAs relevant to the biological resources that could be significantly impacted by the Proposed Project are listed below. If the Project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to biological resources. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA BIO-1 Tree Removal During Breeding Season**

  Prior to issuance of a tree removal permit. To the extent feasible, removal of any tree and/or other vegetation suitable for nesting of raptors shall not occur during the breeding season of March 15 and August 15. If tree removal must occur during the breeding season, all sites shall be surveyed by a qualified biologist to verify the presence or absence of nesting raptors or other birds. Pre-removal surveys shall be conducted within 15 days prior to start of work from March 15 through May 31, and within 30 days prior to the start of work from June 1 through August 15. The pre-removal surveys shall be submitted to the Planning and Zoning Division and the Tree Services Division of the Public Works Agency. If the survey indicates the potential presences of nesting raptors or other birds, the biologist shall determine an appropriately sized buffer around the nest in which no work will be allowed until the young have successfully fledged. The size of the nest buffer will be determined by the biologist in consultation with the CDFG, and will be based to a large extent on the nesting species and its sensitivity to disturbance. In general, buffer sizes of 200 feet for raptors and 50 feet for other birds should suffice to prevent disturbance to birds nesting in the urban environment, but these buffers may be increased or decreased, as appropriate, depending on the bird species and the level of disturbance anticipated near the nest.

- **SCA BIO-2 Tree Removal Permit**

  Prior to issuance of a demolition, grading, or building permit. Prior to removal of any protected trees, per the Protected Tree Ordinance, located on the Project Site or in the public right-of-way adjacent to the Project, the Project applicant must secure a tree removal permit from the Tree Division of the Public Works Agency, and abide by the conditions of that permit.

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8 Oakland Planning Code section 17.158.280E2 states that "Development related" tree removal permits are exempt from CEQA if no single tree to be removed has a dbh of 36 inches or greater **and** the cumulative trunk area of all trees to be removed does not exceed 0.1 percent of the total lot area.

- **SCA BIO-3 Tree Replacement Plantings**

  Prior to issuance of a final inspection of the building permit. Replacement plantings shall be required for erosion control, groundwater replenishment, visual screening and wildlife habitat, and in order to prevent excessive loss of shade, in accordance with the following criteria:

  1. No tree replacement shall be required for the removal of nonnative species, for the removal of trees which is required for the benefit of remaining trees, or where insufficient planting area exists for a mature tree of the species being considered.
  2. Replacement tree species shall consist of Sequoia sempervirens (Coast Redwood), Quercus agrifolia (Coast Live Oak), Arbutus menziesii (Madrone), Aesculus californica (California Buckeye) or Umbellularia californica (California Bay Laurel) or other tree species acceptable to the Tree Services Division.Replacement trees shall be at least of twenty-four (24) inch box size, unless a smaller size is recommended by the arborist, except that three fifteen (15) gallon size trees may be substituted for each twenty-four (24) inch box size tree where appropriate.
  3. Minimum planting areas must be available on site as follows:
     - For Sequoia sempervirens, three hundred fifteen square feet per tree;
     - For all other species listed in #2 above, seven hundred (700) square feet per tree.
  4. In the event that replacement trees are required but cannot be planted due to site constraints, an in lieu fee as determined by the master fee schedule of the city may be substituted for required replacement plantings, with all such revenues applied toward tree planting in city parks, streets and medians. Plantings shall be installed prior to the issuance of a final inspection of the building permit, subject to seasonal constraints, and shall be maintained by the Project applicant until established. The Tree Reviewer of the Tree Division of the Public Works Agency may require a landscape plan showing the replacement planting and the method of irrigation. Any replacement planting which fails to become established within one year of planting shall be replanted at the Project applicant's expense.

- **SCA BIO-4 Tree Protection During Construction.**

  Prior to issuance of a demolition, grading, or building permit. Adequate protection shall be provided during the construction period for any trees which are to remain standing, including the following, plus any recommendations of an arborist:

  1. Before the start of any clearing, excavation, construction or other work on the site, every protected tree deemed to be potentially endangered by said site work shall be securely fenced off at a distance from the base of the tree to be determined by the City Tree Reviewer. Such fences shall remain in place for duration of all such work. All trees to be removed shall be clearly marked. A scheme shall be established for the removal and disposal of logs, brush, earth and other debris which will avoid injury to any protected tree.
  2. Where proposed development or other site work is to encroach upon the protected perimeter of any protected tree, special measures shall be incorporated to allow the roots to breathe and obtain water and nutrients. Any excavation, cutting, filing, or compaction of the existing ground surface within the protected perimeter shall be minimized. No change in existing ground level shall occur within a distance to be determined by the City Tree Reviewer from the base of any protected tree at any

time. No burning or use of equipment with an open flame shall occur near or within the protected perimeter of any protected tree.

3. No storage or dumping of oil, gas, chemicals, or other substances that may be harmful to trees shall occur within the distance to be determined by the Tree Reviewer from the base of any protected trees, or any other location on the site from which such substances might enter the protected perimeter. No heavy construction equipment or construction materials shall be operated or stored within a distance from the base of any protected trees to be determined by the tree reviewer. Wires, ropes, or other devices shall not be attached to any protected tree, except as needed for support of the tree. No sign, other than a tag showing the botanical classification, shall be attached to any protected tree.
4. Periodically during construction, the leaves of protected trees shall be thoroughly sprayed with water to prevent buildup of dust and other pollution that would inhibit leaf transpiration.
5. If any damage to a protected tree should occur during or as a result of work on the site, the Project applicant shall immediately notify the Public Works Agency of such damage. If, in the professional opinion of the Tree Reviewer, such tree cannot be preserved in a healthy state, the Tree Reviewer shall require replacement of any tree removed with another tree or trees on the same site deemed adequate by the Tree Reviewer to compensate for the loss of the tree that is removed.
6. All debris created as a result of any tree removal work shall be removed by the Project applicant from the property within two weeks of debris creation, and such debris shall be properly disposed of by the Project applicant in accordance with all applicable laws, ordinances, and regulations.

- **SCA BIO-5: Bird Collision Reduction**

  These development standards apply to ALL new construction, including telecommunication towers, which include large uninterrupted expanses of glass that account for more than 40 percent of any one side of the building's exterior AND at least one of the following:

  - The project is located immediately adjacent to a substantial water body (i.e., Oakland Estuary, San Francisco Bay, Lake Merritt or other substantial lake, reservoir, or wetland; OR
  - The project is located immediately adjacent to a substantial recreation area or park (i.e., Region-Serving Park, Resource Conservation Areas, Community Parks, Neighborhood Parks, and Linear Parks and Special Use Parks over 1 acre in size), which contain substantial vegetation; OR
  - The project includes a substantial vegetated or greenroof (roofs with growing medium and plants taking the place of asphalt, tile, gravel, or shingles, but excluding container gardens):

  Concurrent with submittal of planning applications or a building permit, whichever occurs first, and ongoing. The Project applicant, or his or her successor shall submit plans to the Planning and Zoning Division, for review and approval, indicating how they intend to reduce potential bird collisions to the maximum feasible extent. The applicant shall implement the approved plan, including all mandatory measures, as well as applicable and specific project Best Management Practice (BMP) strategies to reduce bird strike impacts to the maximum feasible extent.

a. Mandatory measures include **all** of the following:

1. Comply with federal aviation safety regulations for large buildings by installing minimum intensity white strobe lighting with three second flash instead of blinking red or rotating lights.
2. Minimize the number of and co-locate rooftop-antennas and other rooftop structures.
3. Monopole structures or antennas shall not include guy wires.
4. Avoid the use of mirrors in landscape design.
5. Avoid placement of bird-friendly attractants (i.e. landscaped areas, vegetated roofs, water features) near glass.

b. Additional BMP strategies to consider include the following:

i. Make clear or reflective glass visible to birds using visual noise techniques. Examples include:
   1. Use of opaque or transparent glass in window panes instead of reflective glass.
   2. Uniformly cover the outside clear glass surface with patterns (e.g., dots, decals, images, abstract patterns). Patterns must be separated by a minimum 10 centimeters (cm).
   3. Apply striping on glass surface. If the striping is less than 2 cm wide it must be applied vertically at a maximum of 10 cm apart (or 1 cm wide strips at 5 cm distance)
   4. Install paned glass with fenestration patterns with vertical and horizontal mullions of 10 cm or less.
   5. Place decorative grilles or louvers with spacing of 10 cm or less.
   6. Apply one-way transparent film laminates to outside glass surface to make the window appear opaque on the outside.
   7. Install internal screens through non-reflective glass (as close to the glass as possible) for birds to perceive windows as solid objects.
   8. Install windows which have the screen on the outside of the glass.
   9. Use UV-reflective glass. Most birds can see ultraviolet light, which is invisible to humans.
   10. If it is not possible to apply glass treatments to the entire building, the treatment should be applied to windows at the top of the surrounding tree canopy or the anticipated height of the surrounding vegetation at maturity.

ii. Mute reflections in glass. Examples include:
   1. Angle glass panes toward ground or sky so that the reflection is not in a direct line-of-sight (minimum angle of 20 degrees with optimum angle of 40 degrees).
   2. Awnings, overhangs, and sunshades provide birds a visual indication of a barrier and may reduce image reflections on glass, but do not entirely eliminate reflections.

iii. Reduce Light Pollution. Examples include:
   1. Turn off all unnecessary interior lights from 11 p.m. to sunrise.
   2. Install motion-sensitive lighting in lobbies, work stations, walkways, and corridors, or any area visible from the exterior and retrofitting operation systems that automatically turn lights off during after-work hours.
   3. Reduce perimeter lighting whenever possible.

iv. Institute a building operation and management manual that promotes bird safety. Example text in the manual includes:
   1. Donation of discovered dead bird specimens to authorized bird conservation organization or museums to aid in species identification and to benefit scientific study, as per all federal, state and local laws.
   2. Production of educational materials on bird-safe practices for the building occupants
   3. Asking employees to turn off task lighting at their work stations and draw office blinds or curtains at end of work day.

4. Schedule nightly maintenance during the day or to conclude before 11 p.m., if possible.

In addition, other standard conditions would also serve to reduce impacts to biological resources, including:

- SCA AES-1 Lighting Plan (Section IV.A *Aesthetics, Shadow and Wind*)
- SCA AIR-1 Dust Control (Section IV.B *Air Quality and Greenhouse Gases*)
- SCA GEO-1 Erosion and Sedimentation Control Plan (Section IV.E *Geology, Soils and Geohazards*)
- SCA HYD-1 Stormwater Pollution Prevention Plan (Section IV.G *Hydrology and Water Quality*)
- SCA HYD-2 Post Construction Stormwater Pollution Plan (Section IV.G *Hydrology and Water Quality*)
- SCA HYD-3 Maintenance Agreement for Stormwater Treatment Measures (Section IV.G *Hydrology and Water Quality*)

Impacts and Mitigation Measures

Significance Criteria

The Proposed Project would have a significant impact to biological resources if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service;

3. Have a substantial adverse effect on federally protected wetlands (as defined by Section 404 of the Clean Water Act) or state protected wetlands, through direct removal, filling, hydrological interruption, or other means;

4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

5. Fundamentally conflict with any applicable habitat conservation plan or natural community conservation plan;

6. Fundamentally conflict with the City of Oakland Tree Protection Ordinance (Oakland Municipal Code (OMC) Chapter 12.36) by removal of protected trees under certain circumstances. Factors to be considered in determining significance include:

7. The number, type, size, location and condition of (a) the protected trees to be removed and/or impacted by construction and (b) the protected trees to remain, with special consideration given to native trees.[9]

8. Protected trees include the following:

   Quercus agrifolia (California or coast live oak) measuring four inches diameter at breast height (dbh) or larger, and any other tree measuring nine inches dbh or larger except eucalyptus and pinus radiata (Monterey pine); provided, however, that Monterey pine trees on City property and in development-related situations where more than five Monterey pine trees per acre are proposed to be removed are considered to be Protected trees.

9. Fundamentally conflict with the City of Oakland Creek Protection Ordinance (OMC Chapter 13.16) intended to protect biological resources. Although there are no specific, numeric/quantitative criteria to assess impacts, factors to be considered in determining significance include whether there is substantial degradation of riparian and aquatic habitat through: (a) discharging a substantial amount of pollutants into a creek; (b) significantly modifying the natural flow of the water; (c) depositing substantial amounts of new material into a creek or causing substantial bank erosion or instability; or (d) adversely impacting the riparian corridor by significantly altering vegetation or wildlife habitat.

Impact Assessment Methodology

Potential impacts resulting from implementation of the Proposed Project elements were evaluated based on field reconnaissance surveys performed by qualified ESA biologists and a review of the following sources:

- Existing resource information and aerial photographs of the Project Site and surrounding area that included downtown Oakland[10], Lakeside Park and Lake Merritt (“Study Area”);
- Data presented in the CNDDB (CDFG, 2010), CNPS *Electronic Inventory of Rare and Endangered Vascular Plants of California* (CNPS, 2010), and USFWS (2010) for the Oakland West and Oakland East USGS 7.5 minute topographic quadrangles, which include the Project Site and vicinity;
- Standard biological references (e.g., Holland, 1986; Hickman, 1993; Zeiner et al., 1990; Sawyer, Keeler-Wolf, 1995; Sibley, 2001);
- Surveys and environmental documents including specific information on species or habitats found in the Study Area (e.g. Leidy, 2008);
- Other available literature regarding the natural resources of the area.

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[9] Oakland Planning Code section 17.158.280E2 states that “Development related” tree removal permits are exempt from CEQA if no single tree to be removed has a dbh of 36 inches or greater **and** the cumulative trunk area of all trees to be removed does not exceed 0.1 percent of the total lot area.

[10] Downtown Oakland for purposes of the biological resources “study area” is defined as the area from West Grand Avenue on the north to I-880 on the south, and I-980 on the west to the east shore of Lake Merritt on the east.

Once site surveys were completed and all sources reviewed, a list was prepared of special-status species that were observed or had the potential to occur in the Study Area, due to the presence of the basic habitat types that they inhabit. Species were designated as follows:

- Low Potential for occurrence if: (1) their known current distribution or range is outside of the Study Area, (2) only limited or marginally suitable habitat is present within the Study Area, (3) their specific habitat requirements (e.g., serpentine grasslands, as opposed to grasslands occurring on other soils) are not present, or (4) they are presumed, based on the best scientific information available, to be extirpated from the Study Area or region.

- Moderate Potential for occurrence if there is low to moderate quality suitable habitat within the Study Area or immediately adjacent areas, even though the species was not observed during biological surveys.

- High Potential for occurrence if (1) moderate to high quality habitat is present within the Study Area, and (2) the Study Area is within the known range of the species.

- Observed if the species were recently observed within the Study Area by ESA biologists or other sources.

Project Impacts and Mitigation Measures

Due to the presence of existing development and immediate adjacency to busy city streets, as well as the long-standing history of urban development in the area, the Proposed Project footprint does not contain significant biological resources that would require elaborate analysis or mitigation, or that could significantly influence Project design. Although adjacent Lake Merritt and Lakeside Park support a well-known bird refuge and both wintering and breeding habitat for migratory birds, the Proposed Project is not expected to have direct impacts on these biological resources. Typically, analyses for projects located in such highly urbanized areas have focused primarily on ensuring landscape trees are removed without disturbing nesting birds (which would potentially violate the Migratory Bird Treaty Act or California Fish and Game Code), as well as focusing on adherence to local tree preservation ordinances such as those found in the City of Oakland's Municipal Code. The current analysis also considers the potential indirect impacts of a new source of shadows on Lake Merritt, Lakeside Park, and the wildlife inhabiting those areas.

Impact BIO-1: The Proposed Project would not adversely affect special-status species. (Less than Significant)

Special-status plants

Special-status plants do not occur on the Project Site or within the Study Area. Therefore, neither construction nor Project operations are expected to result in adverse impacts on special-status plants.

Special-status wildlife

Peregrine falcons have been documented as using the Kaiser Center and other nearby tall buildings during the post-breeding season for purposes such as perching, roosting, and foraging and therefore has continued potential to occur within the Project Site. Both adults and juveniles have been observed in the immediate Project vicinity over a period spanning at least 15 years. There is also potential for other special-status raptors, such as red-tailed hawk and Cooper's hawk, to roost in trees and forage in the Kaiser Center roof garden. However, none of these species is expected to nest within the Kaiser Center and other special-status animals are not expected to occur on the Project Site due to current uses and lack of habitat. Several special-status species are known to use habitat within the Study Area, i.e., Lakeside Park and Lake Merritt, including brown pelican, double-crested cormorant, and numerous species of migratory waterfowl, as Lake Merritt is a stopover in the Pacific Flyway migration corridor. Several special-status bats may use trees in Lakeside Park for roosting and to forage for insects over open turfgrass and Lake Merritt. However, as noted in the *Setting* section, none of these species are expected to use the marginal habitat provided by the Kaiser roof garden or street trees with the Project footprint. The Project is therefore not expected to have direct impacts on individual special-status species. A further discussion of direct and indirect impacts on wildlife is discussed later in this section.

Mitigation: None required.

Impact BIO-2: The Proposed Project would not adversely affect sensitive natural communities. (Less than Significant)

There are no sensitive communities within the Proposed Project Site or within the Project Study Area. The original mosaic of tidal wetlands, native grasslands, and riparian corridors that historically occupied the Study Area have been altered over the past 150 years to the point that no natural communities remain. Therefore, the Proposed Project will have no impact on sensitive communities.

Mitigation: None required.

Impact BIO-3: The Proposed Project would not adversely affect wetlands. (Less than Significant)

No direct impacts on wetlands and other waters are expected because there are no jurisdictional waters located on the Project Site. The Proposed Project is not expected to increase stormwater runoff as the site is already fully developed. However, potential increases in transmittal of oil, diesel fuel, transmission fluids, and other toxic materials from construction of the Proposed Project via runoff from the impermeable surfaces of the site, could result in significant adverse impacts to aquatic habitat and organisms that use it within the Study Area. Incorporation of the City's SCAs relating to erosion control, stormwater management, and hazardous materials will address potential degradation of water quality that could result from Project construction. SCA GEO-1, SCA HAZ-10, SCA HYD-1, SCA HYD-2, and SCA HYD-3 are relevant and will minimize potential indirect impacts to water quality in Lake Merritt to less-than-significant levels.

Mitigation: None required.

Impact BIO-4: Project construction and operations have the potential to affect migratory and breeding birds, and wildlife, corridors, and nursery sites, through building collisions, increases in night lighting, increases in noise pollution due to Project construction, shading of existing habitat, and vegetation removal. (Less than Significant)

Migrating Birds

The San Francisco Estuary is designated as a Western Hemisphere Shorebird Reserve Network of international importance, because more than one million shorebirds use San Francisco Bay wetlands each winter, between 300,000 and 900,000 shorebirds pass through San Francisco Bay during spring and fall migration periods, more than 50% of the diving ducks in the Pacific Flyway winter in the shallow wetlands of the Bay, and several species breed in the wetlands during the summer (Goals Project, 1999). Lake Merritt is a major wintering site for ducks and other waterfowl, with numbers easily reaching the thousands during fall, winter, and early spring. Many landbirds also use migratory routes along the Pacific Flyway and Lake Merritt provides a stopover point for these species as well. Avian movement patterns in and around Lake Merritt have not been studied and it is unknown how most birds approach the area, although it would be most likely that they would approach from the south or the west, as these would be shortest routes to the open water of San Francisco Bay.

Breeding Birds

Although the Project Site does not appear to provide suitable nesting habitat for most birds, upland areas at Lakeside Park provides potential nesting habitat for a number of species, including raptors such as Cooper's hawk (CNDDB, 2010), red-tailed hawk, and red-shouldered hawk, as well as assorted passerine species. As noted in the Environmental Setting, the man-made islands near the northern central shore of Lake Merritt support breeding colonies of black-crowned night heron and two species of egrets. All of these birds, their nests, and their eggs are protected under the federal Migratory Bird Treaty Act, CDFG Code 3513, and CDFG Code 3503. In addition, all raptors (eagles, hawks, and owls), their nests, and eggs are protected under CDFG Code 3503.5.

Impacts of Building Collisions and Night Lighting on Migratory Birds

It is estimated that, in North America alone, millions of songbirds are killed due to collisions with buildings and other structures each year (Lochhead, 2008). Collisions are currently recognized as one of the leading causes of bird population declines worldwide (Brown et al., 2007). Daytime collisions occur most often when birds fail to recognize window glass as a barrier and many collisions are induced by artificial night lighting, particularly from large buildings, which can be especially problematic for migrating songbirds since many species are nocturnal migrants (Ogden, 1996). The tendency of birds to move towards lights at night when migrating, and their reluctance to leave the sphere of light influence for hours or days once encountered, has been well documented. It has been suggested that structures located at key points along migratory routes may present a greater hazard than those at other locations (Ogden, 1996). Other research suggests that fatal bird collisions increase as light emissions increase, that weather often plays an important part in increasing the risk of collisions, and that nights with heavy cloud cover and/or precipitation present the conditions most likely to result in high numbers of collisions (Ogden, 2002). Direct effects include death or injury as the birds collide with lighted structures and other birds that are attracted to the light, as well as collisions with glass during the daytime, while indirect effects include delayed arrival at breeding or wintering grounds, and reduced energy stores necessary for migration, winter survival, or subsequent reproduction (Gauthreaux and Belser, 2006). The type of light used may affect its influence on the birds, for example, studies have indicated that blinking lights or strobe lights affect birds significantly less than non-blinking lights (Gauthreaux and Belser, 2006).

Project Site Lighting. The Project Site and Study Area currently contain street lights and building lights and are located in an urban setting, surrounded by other light sources. Existing lighting sources already provide a significant source of illumination that affects nearby natural areas to some extent. SCA AES-1 would be incorporated as part of the Project which would minimize potential impacts resulting from Project related lighting to less-than-significant levels. SCA AES-1 would require outside lighting fixtures to be shielded sufficiently to prevent unnecessary glare onto adjacent properties, and exterior lighting to be designed with downward-pointing lights, side shields, and visors. Therefore, the Proposed Project is not expected to significantly increase the amount of light generated at ground-levels on the Project Site or within the Study Area.

However, the Project Site is adjacent to Lake Merritt, a migratory bird stopover attractive to both waterfowl and songbirds, and the Proposed Project entails the construction of two buildings that will be significantly taller than most of the existing or other proposed buildings in the downtown and Lake Merritt areas of Oakland. While specific avian flight routes in and out of Lake Merritt are not known, and there is no local data on bird kills due to building collisions, the Proposed Project has the potential to result in a significant new source of lighting at elevations where none currently exist, that may act as an attractant for nocturnal migrating birds, resulting in collisions and avian mortality. In addition, the proposed building heights fall within the range identified as posing a threat to migratory birds, particularly in areas prone to fog and in areas proximate to migratory stopover points (Brown et al., 2007). With a lack of local data it is not possible to determine the significance of this potential impact in relation to the Proposed Project. Therefore, no mitigation measures would be required under CEQA. However, a growing recognition of the severity of the impact on migratory birds suggests that, whenever feasible, measures to reduce the risk of avian collisions should be incorporated in the construction and operations of tall buildings, particularly when they are to be located in areas where the risk of collision may be heightened due to a number of risk factors, including location along a known migratory route, proximity to migratory stopover locations, proximity to open space and areas of natural habitat, and areas where low cloud ceilings are frequent (Brown et al., 2007).

SCA BIO-5 shall apply here because of the increase in building height and in the use of glass exteriors that would occur and result in adverse effect of potential bird strikes. Implementation of the SCA would reduce the impact to less than significant.

Impacts of Noise on Migrating and Breeding Birds

Noise pollution can have detrimental impacts on wildlife, and bird populations are particularly susceptible because they rely on acoustic signals for mating, predator evasion, and communication between adults and offspring, among other behaviors. Ellis (1981) describes studies that show “noticeably alarmed” responses in raptors to sounds within the 82 to 114 dBA range. At comparable levels (72-89 dBA), seabirds flushed off nests (Jehl and Cooper, 1980). Though these studies did not necessarily establish nest failure, the thresholds for a single stimulus event clearly had an effect on bird behavior and suggest that short-term loud noises may affect foraging and roosting birds, by temporarily disturbing these types of behaviors and, perhaps, deterring use of an area if such noises persisted over the long term. Reijnene and Foppen (1994) showed that male willow warblers (*Phylloscpus trochilus*) experience difficulties in mate attraction near highways as a result of noise pollution. This information also suggests that nesting disruption may occur if the noises persist over a longer period of time. More recent research has found certain types of unnatural noise to be disruptive to bird life at a much lower level. For example, Delaney et al. (1999) found that spotted owl flush rates in response to chain saws were apparent at levels above 46 dBA.

With regard to the effects of continuous noise on bird communities one source reports, “An increase of 10 dBA above background noise is probably acceptable in most situations” (Nicholoff, 2003). On the other hand, a 10 dBA increase in noise level is perceived by the human ear as a doubling in loudness, potentially causing an adverse response. Wildlife perception of noise appears to be generally more sensitive than that of humans; therefore, it is assumed for the purposes of this analysis that a 10 dBA increase in noise (a doubling of loudness) over the existing maximum levels should be considered to be material for birds, as well as other wild animals.

Within the Study Area, increasing noise pollution could potentially hinder mate attraction, disrupt reproductive success of breeding birds, and/or deter the general use of the Study Area by migratory birds for wintering, foraging, or roosting purposes.

Current Noise Levels at the Project Site and within the Study Area. Ambient noise levels in the Project Study Area are relatively high and are generated primarily by automobile and truck traffic on the surrounding City streets, including busy Lakeside Drive and 12th Street, as well as nearby Highway 880, and ongoing building construction throughout the downtown area. Short-term noise measurements taken in the Project vicinity resulted in average daytime noise levels ranging from 57 A-weighted decibels (dBA) to 70 dBA and maximum noise levels ranging from 66 to 84 dBA, depending on the location. Birds that are currently resident in the Study Area have habituated to the ambient noise levels. Birds that use the area seasonally either habituate to existing noise levels or are deterred from using the habitat there.

Noise Resulting from the Proposed Project. Noise exceeding ambient levels will be produced through Project construction activities. Because pile driving will occur at the Project Site, construction activities are expected to produce maximum daytime noise levels of approximately 78-105 dBA as measured at 50 feet from the source of the sound within the Project Site. When attenuated by distance[11], maximum construction generated noise levels could range from 72 to 99 dBA at a distance of 100 feet; from 66 to 93 dBA at 200 feet; from 60 to 87 dBA at a distance of 400 feet, 54 to 81 dBA at a distance of 800 feet, and 48 to 75 dBA from a distance of 1,600 feet.

The nearest potential raptor nesting habitat in Lakeside Park is approximately 1,300-1,400 feet from the Project Site and the heron and egret rookeries are located 3,000 feet and more distant. SCA NOI-1 Days/Hours of Construction, SCA NOI-2 Noise Control, and SCA NOI-5 Pile Driving and Other Extreme Noise Generators shall be incorporated as part of the Project in order to help minimize potential impacts resulting from Project related construction noise to less-than-significant levels. Therefore, any Project-related increases in ambient noise would be virtually indiscernible at such distances.

Through expected attenuation over distance alone, increases over existing noise levels due to Project-related construction and operation noise would be considered less-than-significant at 1,300 feet (i.e. less than a 10 decibel increase over ambient levels) and indiscernible at distances greater than 1,600 feet. Application of the abovementioned SCAs would serve to further attenuate construction noise. Current noise levels have not been shown to deter birds from using Lake Merritt and Lakeside Park for breeding, loafing and foraging purposes. Consequently, it is not expected that noise generated by construction of the Proposed Project would deter use of nearby habitat within the Study Area by birds. Therefore, no further mitigation is required.

Impacts of Shading from Proposed Buildings on Existing Habitat for Special-status Species

The Proposed Project includes construction of buildings significantly taller than existing structures within the Study Area. Increased building height would cause larger shaded areas in the terrestrial and aquatic environment within the Project Site (the Kaiser Center roof garden). Increased shading could reduce water temperatures in open water areas and potentially interfere with the health of existing vegetation over time. Were existing vegetation that supports breeding special-status birds to be adversely affected to such a degree that it could no longer perform this function, it would be considered a significant effect in this EIR. As discussed in Section IV.A *Aesthetics, Shadow and Wind*, shadow diagrams show that the Proposed Project would not create shade or shadow on Lake Merritt or Lakeside Park. Effects on vegetation are discussed below.

Plants have the ability to survive under various light and shade regimes. Quantifying effects of shade on any individual species is poorly understood due to the interaction of multiple factors in nature. For example, Callaway (1992) determined that shade was critical to the survival of blue oak (*Quercus douglasii*) seedlings, but that at least one other factor (acorn predation) was reduced by shade and protection from herbivores may have been as important as shade tolerance. In an urban situation, shading from buildings, except for that cast closest to the building, is dynamic—increasing and decreasing in length throughout the year, as well as changing in terms of its angle with respect to the building casting it. Due to the obvious complexity of the physical phenomenon

[11] Noise from a stationary source typically attenuates by 6dBA for each doubling of distance.

of moving shade, and the equal complexity of plant interaction, scientific studies of shade relevant to a CEQA process are limited.

San Clements (2003) studied the effects of shading by bridges on estuarine wetlands in an attempt to improve environmental analysis and quantify impacts. The SanClements study measured photosynthetically available light, soil nitrogen and attributes of plant vigor such as numbers of flowers and stems. Results only identified effects when the Height-to-Width ratio (HW) of the shadow source (e.g., building, bridge, etc.) was less than 0.5, and there was no measurable effect when the ratio was greater than 0.7. Thus the shade of a bridge 100 ft wide, by this standard, would have no effect on wetland vegetation if higher than 70 ft (0.7 HW). The study showed that at a certain distance from the source of the shadow, shade has no effect. Furthermore, SanClements' effects were limited to the area immediately under and adjacent to the bridges under study, i.e. the direct vertical projection of the shade at noon during the summer solstice. Extrapolating to the current Project, measurable effects would only be likely immediately adjacent to buildings because that is where shadow frequency and duration are the highest. Shadows cast by the new buildings on the rooftop garden would not only move throughout the day but throughout the year, such that no one spot would be in constant shade as a result of new construction. Therefore, no negative effects on vegetation and/or its ability to support breeding birds within the Study Area are expected as a result of the Proposed Project. The conclusion is therefore, that building shade cast on habitats, primarily on the rooftop garden, is a less-than-significant impact.

Impacts of Vegetation Removal on Breeding Birds

Project construction will require the removal of existing trees and shrubs in the Kaiser Center roof garden. While no evidence of nesting birds was found during ESA's 2008 survey, the possibility that common bird species may use vegetation here for nesting cannot be ruled out. With the exception of English sparrow and European starling, the nests, eggs, and nestlings of all birds are protected under the California Fish and Game Code. Therefore, their destruction would be considered a significant impact under the criteria set forth earlier in this EIR. SCA BIO-3 would be required as part of the Proposed Project which would minimize potential impacts resulting from Project related vegetation removal to less-than-significant levels.

SCA BIO-3 and SCA BIO-5, along with SCA AES-1, SCA NOI-1, SCA NOI-2, and SCA NOI-5 would be required as part of the Proposed Project and would serve to minimize potential impacts on migratory and breeding birds to less-than-significant levels.

Mitigation: None required.

Impact BIO-5: The Proposed Project would not adversely affect adopted Habitat Conservation Plans. (Less than Significant)

There are no adopted Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plans that apply to the Project Site or Study Area.

Mitigation: None required.

Impact BIO-6: The Proposed Project would not adversely affect biological resources governed by the City's Tree Preservation or Removal Ordinance. (Less than Significant)

The Applicant has prepared a map and table (Appendix D-4) indicating the size and species of existing protected trees slated for removal by construction activities on the Project Site and any right-of-way abutting the site. All the protected trees identified for removal have a dbh of greater than 9 inches and therefore qualify for protected status under City Ordinance, and are located on the rooftop garden. One of the trees is greater than 36 inches. As shown in the tree removal plan map, the Project Site has 68 protected trees, with 17 of those slated for removal.

Oakland's Tree Protection Ordinance (Oakland Municipal Code, Title 12, Chapter 12.36) requires a permit for removal of any protected tree (12.36.040). The removal of a protected tree would require that an appropriate replacement tree be planted on the Project Site for each tree removed (1:1 replacement).

SCA BIO-1, SCA BIO-2, SCA-BIO-3, and SCA BIO-4 would be required as part of the Proposed Project and would serve to minimize potential impacts on protected trees to less-than-significant levels.

Mitigation: None required.

Impact BIO-7: The Proposed Project would not adversely affect resources governed by the City's Creek Protection Ordinance. (Less than Significant)

Oakland's Creek Protection Ordinance (Oakland Municipal Code, Title 13, Chapter 13.16.120) requires a Creek Protection Permit for construction that will take place within close proximity to a creek, as defined in the Ordinance. Since no Project-related work will take place within 20 feet of the top of bank or within 100 feet of the centerline of any Creek, the Project will not require a City of Oakland Creek Protection Permit. Nevertheless, Projects exempt from the Creek Protection Permit requirement must comply with the remaining portions of the ordinance and must incorporate site design/landscape characteristics which maximize infiltration (where appropriate), provide retention or detention, slow runoff, and minimize impervious land coverage (i.e., use hydrologic source controls) to the maximum extent practicable. The Project is replacing existing buildings and not expected to increase impervious surface amounts over those already existing at the site. In fact, the Project will expand the roof garden, which may result in a net increase of permeable surface at the Project site. SCA GEO-1, SCA HAZ-1, SCA HYD-1, SCA HYD-2, and SCA HYD-3 would be applied to the Proposed Project and would serve to minimize potential impacts on water quality, which will ensure that the Project is in compliance with all aspects of the Creek Protection Ordinance.

Mitigation: None required.

Cumulative Impacts

Impact BIO-8: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in impacts on special-status species, wetlands, and other waters of the U.S. (Less than Significant)

This analysis evaluates whether the impacts of the Proposed Project, together with the impacts of cumulative development, would result in a cumulatively significant impact on special-status species, wetlands and other waters of the U.S., or other biological resources protected by federal, state, or local regulations or policies (based on the significance criteria and thresholds presented earlier). This analysis then considers whether the incremental contribution of the Proposed Project to this cumulative impact would be considerable. Both conditions must apply in order for a project's cumulative effects to rise to the level of significance.

Geographic Context

The geographic context for analysis of cumulative impacts to biological resources in this DEIR encompasses downtown Oakland, Lakeside Park, and Lake Merritt. This analysis considers, but is not limited to major projects in the aforementioned areas as identified in Table IV-1, List of Relevant Cumulative Projects from the City's Major Project List.

Impacts

The cumulative analysis considers the effect of the Proposed Project combined with past, present, pending and reasonably foreseeable projects in the defined geographic area. Past projects, i.e., the principal determinant of existing conditions in the downtown and Lakeside areas of Oakland, which are completely developed and where natural communities no longer exist—even where open space persists, have already caused adverse cumulative effects on biological resources. With the addition of current and other proposed projects, there is an existing cumulative impact *without* the Project, which could be considered to combine with the Proposed Project to increase the aggregate effect and be considered cumulatively significant.

However, relative to the CEQA baseline, the impacts of the proposed Project *do not* aggregate to breach the CEQA significance thresholds described elsewhere in the Draft EIR. The projects identified in Table IV-1 considered for the cumulative effect on biological resources would be the displacement of a few scattered pockets of wildlife. These outcomes are essentially similar to those anticipated for the Proposed Project and generally represent a less-than-significant re-shuffling of disturbance-tolerant plants and animals. With respect to the peregrine falcon, the Proposed Project could be viewed as having a beneficial impact in that it will provide two new, tall buildings with the potential to provide roosting habitat and, perhaps, nesting habitat for these birds.

Environmentally protective laws and regulations, have been applied with increasing rigor since the early 1970s and include the California Endangered Species Act, Federal Endangered Species Act, and the Clean Water Act, as described in the *Regulatory Setting* earlier in this EIR chapter. The Proposed Project and other future projects within the cumulative geographic context are and would be required to comply with local, state, and federal laws and policies and all applicable permitting requirements of the regulatory and oversight agencies intended to address potential impacts on biological resources, including wetlands, other waters of the U.S., and special-status species. Additionally, new projects would be required to demonstrate that they would not have significant effects on these biological resources, although it is possible that some projects may be approved even though they would have significant, unavoidable impacts on biological resources.

The current impact analysis has shown that the Kaiser Center Project has the potential for relatively minor impacts on biological resources and that these impacts can be minimized to less-than-significant levels through the application of the City of Oakland's SCAs BIO-1, BIO-2, BIO-3, BIO-4 and BIO-5. When considered with impacts of past, present, pending and reasonably foreseeable future projects within the geographic context for this analysis, the minor incremental contribution of the Proposed Project to an already existing cumulative impact is not cumulatively considerable. Therefore, the cumulative effect of the Proposed Project on biological resources would be less-than-significant.

Mitigation: None required.

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D. Cultural Resources

This section examines the potential impact of the Kaiser Center Project on cultural resources (archaeological, historic, and paleontological). Resources for this section include an Historic Resources Evaluation report on the Kaiser Center in February 2009 by an historic preservation consultant, Page & Turnbull (Page & Turnbull, 2009), an Archaeological Survey Report (ASR) prepared by ESA in August 2008 (Koenig, 2008); archival research conducted at the California Historical Resources Information System's Northwest Information Center (NWIC) on April 22, 2008 (file dated 2007); and consultation with the Oakland Cultural Heritage Survey. Potential impacts are discussed and evaluated, and appropriate mitigation measures are identified, as necessary.

Setting

Prehistoric Setting

The Project Site is located in downtown Oakland. The area is now mostly urbanized, although, prehistorically, it was a biologically rich alluvial plain and estuarine environment between the East Bay Hills and San Francisco Bay.

The natural marshland biotic communities along the edges of bays and channels were the principal source for subsistence and other activities during the prehistory of the San Francisco Bay region. Many of the original surveys of archaeological sites in the Bay region were conducted between 1906 and 1908 by Stanford (and, later, UC Berkeley) archaeologist N.C. Nelson. Such surveys yielded the initial documentation of nearly 425 "earth mounds and shell heaps" along the littoral zone of the Bay (Nelson, 1909). From these beginnings, the most notable sites in the Bay region were excavated scientifically, like the Emeryville shellmound (CA-ALA-309), the Ellis Landing Site (CA-CCO-295) in Richmond, and the Fernandez Site (CA-CCO-259) in Rodeo Valley (Morrato, 1984). These dense midden sites, such as CA-ALA-309, have been carbon 14 dated to be 2310 ± 220 years old, but other evidence from around the Bay suggests that human occupation in the region is of greater antiquity, or around 5000 B.C. (Davis & Treganza, 1959 as cited in Moratto, 1984).

As of 2000 B.C., the bayshore and marsh-adapted peoples began appearing in the archaeological record. The so-called Berkeley Pattern (2000 B.C. to A.D. 300) reflected a change in socioeconomic complexity and settlement patterns (Fredrickson, 1973). This artifact pattern was represented by minimally-shaped cobble mortar and cobble pestle, dart and atlatl, and bone industry. Given the size of these settlements, it is probable that the populations were denser and more sedentary, yet continued to exploit a diverse resource base from woodland to grassland and marshland, to bayshore resources throughout the San Francisco Bay Area (Bickel, 1978; King, 1974 as cited in Moratto, 1984). Many of the Berkeley traits diffused throughout the region and spread to the interior areas of central California during this time period.

Ethnographic Setting

Prior to Euroamerican contact, the Ohlone (also known by their linguistic group, Costanoan[1]) occupied the area that is currently Alameda County. Politically, the Costanoan were organized into groups called tribelets. A tribelet constituted a sovereign entity that held a defined territory and exercised control over its resources. It was also a unit of linguistic and ethnic differentiation. Oakland, and a large area of the East Bay, is located within the territory of a people that spoke Chochenyo, one of several Costanoan languages.

The Ohlone economy was based on fishing, gathering, and hunting, with the land and waters providing a diversity of resources including acorns, various seeds, salmon, deer, rabbits, insects, and quail. The acorn was the most important dietary staple of the Costanoan, and the acorns were ground to produce a meal that was leached to remove the bitter tannin. Technologically, the Costanoan crafted tule balsa, basketry, lithics (stone tools) such as mortars and metates (a mortar-like flat bowl used for grinding grain), and household utensils. The Costanoan, like many other Native American groups in the Bay Area, likely lived in conical tule thatch houses.

In 1770 the Costanoan-speaking people lived in approximately 50 separate and politically autonomous nations or tribelets. At this time, the number of Chochenyo speakers reached 2,000, substantially more than the typical size of a tribelet, which ranged from 40 to 200 members.

During the mission period, 1770–1835, the Costanoan people experienced cataclysmic changes in almost all areas of their life, particularly a massive decline in population due to introduced diseases and declining birth rate, resulting in large part from colonization by the Spanish missionaries. Following the secularization of the missions by the Mexican government in the 1830s, most Native Americans gradually left the missions to work as manual laborers on the ranchos that were established in the surrounding areas.

Historic Setting

The Project Site is within the Rancho San Antonio land grant that was granted to Luis Maria Peralta on August 3, 1820 for his service to the Spanish government. The 43,000-acre rancho included the present-day cities of Oakland, Berkeley, Alameda, and parts of San Leandro and Piedmont. Peralta's land grant was confirmed after Mexico's independence from Spain in 1822, and the title was honored when California entered the Union by treaty in 1848. Despite the title, by the middle of the 19th century, squatters had moved in to use portions of Peralta's undeveloped land. The Gold Rush and California statehood brought miners, businessmen, lumbermen and other speculators to the area in search of opportunities. Early settlers of that period include Edson Adams, Andrew Moon, and Horace Carpentier, who squatted on 480 acres of Vicente Peralta's (one of Luis Peralta's sons) land. Adams, Moon, and Carpentier subsequently hired Jules Kellsersberger, an Austrian-educated Swiss military engineer, to plot a new city—Oakland—which was incorporated in 1852.

[1] "Costanoan" is derived from the Spanish word Costanos meaning "coast people." No native name of the Costanoan people as a whole existed in prehistoric times as the Costanoan were neither a single ethnic group nor a political entity.

The city originally encompassed the area roughly bordered by the Oakland Estuary on the south, Market Street on the west, 14th Street on the north, and the Lake Merritt Channel on the east. Broadway served as the main street. The majority of the early city dwellers, numbering under one hundred, lived near the foot of Broadway in proximity to the estuary. From there, city development moved north along the street car lines of Broadway and Telegraph Avenue towards the Oakland Hills and ultimately towards East Oakland.

Lake Merritt was originally part of a tidal estuary formed by several creeks draining into the San Francisco Bay. The estuary, alternately known as San Antonio Creek or San Antonio Slough, was initially used as a depository for Oakland's sewer system. Sixty miles of brick and wood channels sent raw sewage from the new city to the estuary. A wooden box sewer line ran down 20th Street adjacent to the Project Site (Warring, 1886). The daily tidal flushing was deemed ideal for everyone in the new city except those who lived near the shore. One of those residents was Oakland mayor, Dr. Samuel Merritt, who wished to clean up the water and create a source of civic pride. In 1868 he proposed and funded the construction of a dam that would control the flow of water between the estuary and the bay. Two new sewer line projects were constructed to divert sewage to other locations. The new lake was called "Lake Peralta," "Merritt's Lake," and ultimately Lake Merritt. In order to protect the great number of migratory birds as well as stop noise and gunfire in the city, Dr Merritt also proposed to protect the lake as a wildlife refuge. In 1870, the California state legislature created the Lake Merritt Wildlife Refuge. No hunting was allowed and fishing could only be done with a hook.

After the damming and improvement of Lake Merritt, this area of Oakland was home to an affluent residential neighborhood along the lake, and later became the site of a mix of mid-rise multiple family residential, religious, and institutional buildings. The area included residential hotels such as the Lake Merritt Hotel (1927); civic and institutional buildings such as the College of the Holy Names (1868, demolished 1957) the Veterans Memorial Building (1926) at 200 Grand Avenue, and religious buildings such as St. Paul's Episcopal Church (1912) at 110–116 Montecito Avenue. After the construction of the Kaiser Center in 1960, Lakeside Drive developed as an area for skyscraper office buildings, though many institutional buildings remained in place. In addition to the Kaiser Center, the twenty-eight-story Ordway Building, also constructed by Kaiser (1970), the twenty-seven-story Lake Merritt Plaza (1985) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s are located on prominent intersections in the immediate area. The surrounding area is mixed residential, institutional, and religious with multiple-family dwellings, commercial buildings, and religious buildings. The building scale of the area includes low, mid- and high-rise historic and non-historic buildings of various styles and materials (Page and Turnbull, 2009).

Brief History of the Kaiser Center Project Site

The subject property was first developed when the Convent of the Sacred Heart was constructed in 1868. Father Michael King, the priest of the Church of the Immaculate Conception, purchased the five-acre campus in 1866 for $4,922. Though the site on Lake Merritt was considered "far out in the country, wild and brush-covered," King envisioned a large convent and novitiate that would not fit on the city blocks near the church. Two years later, the two-and-a-half-story convent was built in time for the arrival of the Sisters of the Holy Names. An addition to the convent was constructed later that year; it likely contained additional living quarters and classrooms. In 1873 a four-story multi-purpose building was built to house the sisters' growing school, and a chapel was constructed in 1885. An auditorium and music hall building was constructed in 1909 (Page and Turnbull, 2009).

By the mid-1950s, the Holy Names campus was considered close to downtown. Various commercial interests began to discuss the potential of purchasing the site, which covered a large parcel over a city block in area. On June 27, 1955, Kaiser Industries acquired the Holy Names site for a reported sum of $2,560,000. Kaiser had been headquartered in Oakland since 1921 and at the time of the acquisition the main office was located at 1924 Broadway. After the sale, the College of the Holy Names was relocated to a hillside site at Redwood Road and Mountain Boulevard. The Kaiser Center site was cleared beginning on June 24, 1957 (Page and Turnbull, 2009).

Henry J. Kaiser, the magnate of the Kaiser industrial empire, intended to consolidate the Kaiser offices located around Oakland (see discussion of Henry J. Kaiser, below). Welton Becket and Associates, a Los Angeles architecture firm that designed prominent office and hotel buildings, was hired as the project architect (see discussion below of Welton Becket). Henry Kaiser wanted the building to be an outstanding piece of architecture and a showcase in the use of Kaiser products.

Construction of the steel-frame, aluminum-and-glass-clad Kaiser Center began in May 1958 and was completed in late 1959. Final construction costs reached $46 million, and Henry Kaiser could boast of having the largest building west of Chicago, with 976,000 square feet of space. The first employees moved into the office tower on December 20, 1959, and the Center officially opened on September 27, 1960. The Center included a twenty-eight-story office tower, with three basement levels; a three story department store; and a five-level, 1,200-car parking garage with a 3.5-acre garden (Kaiser Center roof garden) on the roof of the parking garage. The Kaiser Center contained 80 percent Kaiser products or Kaiser raw materials, including 1,000 tons of anodized aluminum, 8,000 tons of steel, 60,000 cubic yards of concrete, 98,000 tons of aggregates and dolomite, and 250,000 yards of gypsum products from Kaiser Industries. Aluminum was used in exterior curtain walls and as sheets, strips, fluted panels, and artwork.

The plan for the roof garden, designed by the landscape firm Osmundson & Staley, was organized along a north-south axis running from the main garden entrance at the third floor of the 20th Street Mall across the reflecting pool to the central circular lawn and plaza. The reflecting pool, which a 1960 Oakland Tribune article described as the approximate shape of Lake Merritt, was designed to contain water circulated by perimeter jets (Page & Turnbull, 2009). Curving concrete walkways wound around the planting areas, which were mounded around the trees and in some lawn spaces. The roof garden atop the parking garage opened to the public on October 3, 1960 and received early recognition in 1962 when the American Society of Landscape Architects awarded the garden the Industrial Landscape Design award. The garden was documented by a variety of publications, including *Sunset* magazine, *Landscape Architecture*, and *Landscape*

Design and Construction (Page & Turnbull, 2009). Overall, the garden was highly regarded by landscape architects, and was the center piece of the Kaiser Center complex.

The Kaiser Center has had minimal modifications to the exterior since its original construction. The office building retains its original exterior finishes and materials. Most of the interior of the office spaces, however, have been renovated over the years by various tenants, and the lobby underwent a major renovation in the mid-1990s. Similarly, the interior of the mall buildings have been substantially altered due to tenant improvements, but the exterior of the buildings have undergone few substantial alterations which were typically limited to storefront alterations, changes in signage, and the installation of ornament above the entrances. Finally, the only additions to the roof garden appear to have been the bridge over the pool which was incorporated in the design in the 1970s. Many of the original hardscape design components of the garden remain intact including the low perimeter walls, aggregate paths, planters, benches, and an original water fountain. While many of the plant materials have been replaced over time, the replacement plantings have been consistent with the original design.

Brief History of Master Planning Efforts at the Kaiser Center Site

By 1967, the growth of the Kaiser industries created the need for additional office space. An office tower was planned to the north of the existing tower. The twenty-eight-story tower was called the Ordway Building after A. B. Ordway, the vice president of Kaiser Industries. Designed by Skidmore, Owings & Merrill, construction of the Ordway Building began in 1968 and was completed in 1970. Even before the Ordway Building opened, Kaiser Industries was preparing for a long-range plan for the expansion of the Kaiser Center. The 1971 plan recommended an $85 million expansion project including a third office tower on the Project Site, which was never completed. More master plans were developed for the Kaiser Center complex in 1982 and 1986, both of which envisioned an office campus in the form of additional office towers connected with pedestrian walkways, roof top gardens, and sky bridges. The 1986 plan, specifically, called for the addition of four major towers connected to the existing Kaiser Center with a large pedestrian plaza near the Ordway Building. None of these master plans were ever realized.

Brief History of Henry J. Kaiser

Henry J. Kaiser (1882–1967) oversaw an industrial empire which began with road-building in the 1920s and dam-building in the 1930s. In 1938, Kaiser launched a cement company to provide the raw materials for building dams; his first foray into manufacturing durable goods. Kaiser helped to completed Hoover Dam, and by the early 1940s, Kaiser was preparing to compete in magnesium, steel, aircraft, and shipping. In anticipation of World War II, Kaiser opened shipyards in Richmond, California and Portland, Oregon in 1940 and 1941. By the end of the war the Kaiser Shipyards were producing one Liberty ship per month. In 1945, the Kaiser Permanente Medical Care Program which was formerly offered to shipyard workers, opened enrollment to the general public. Kaiser Permanente became the country's first health maintenance organization (HMO). Kaiser coordinated the manufacture of automobiles and cargo planes, increased magnesium production, and launched a successful aluminum business. In 1954 Henry Kaiser moved to Hawaii, where he became involved in building hotels, beaches, a new city, a hospital, and a cement plant. Edgar F. Kaiser took over the management of the Kaiser empire when his father moved to Hawaii. Although Henry Kaiser died in 1967, Kaiser Companies continued to grow as a multi-national business with diversified interests ranging from aluminum and steel to engineering to television broadcasting to real estate development.

Brief History of Welton Becket and Associates

Led by well-known modernist architect Welton Becket (1902–1967) the firm of Welton Becket and Associates grew to be one of the largest architectural firms in the United States, with headquarters in Los Angeles and offices in San Francisco, New York, Houston, and Chicago. Welton Becket and Associates completed numerous high profile projects, mostly in and around Los Angeles, including such icons of mid-twentieth century Modernism as the Capitol Records Building (1954–1956) and the Cinerama Dome, the world's first concrete geodesic dome (1963–1964). The firm was also responsible for the Beverly Hilton Hotel (1955), Memorial Sports Arena (1959), Los Angeles International Airport Theme Building (1962, with Pereira & Luckman and Paul R. Williams), and the Federal Office Building in Los Angeles (1966, with Paul R. Williams and A.C. Martin & Associates). In 1987, Ellerbe Associates acquired Welton Becket Inc. to become Ellerbe Becket Inc. The firm continues today as Ellerbe-Becket.

Paleontological Setting

Paleontological resources are the fossilized remains of plants and animals, including vertebrates (animals with backbones), invertebrates (e.g., starfish, clams, ammonites, and coral marine), and fossils of microscopic plants and animals (microfossils). The age and abundance of fossils depend on the location, topographic setting, and particular geologic formation in which they are found. Fossil discoveries not only provide a historic record of past plant and animal life, but may assist geologists in dating rock formations. Often, fossil discoveries constrain the time period and the geographic range of flora or fauna.

On a regional scale, fossilized plants, animals and microorganisms are prevalent throughout the East Bay. Many of the hills in the east bay are made up of sedimentary bedrock that is known to contain a wide range of fossils, including radiolarians, mullusks, diatoms, foraminifers and non-marine vertebrates. In addition, even geologically young fluvial deposits have been known to contain fresh water mullusks and extinct late Pleistocene vertebrate fossils (Graymer, 2000).

The Proposed Project overlies geologic units that have low paleontological sensitivity. Beneath artificial fills lies deposits of mud and silt associated with the present-day bay estuary (Bay Mud). The Bay Mud overlies the Merrit Sand, which is composed of older deposits of wind-blown sand (Graymer, 2000). Deep excavations associated with building foundations and the 1.5 stories of underground parking are likely to disturb both the Bay Mud and the Merrit Sand. Generally, these types of geologic deposits do not preserve vertebrate fossils. While the Bay Mud may preserve a variety of marine invertebrate fossils (mullusks, clams, fomanifera, microorganisms, etc…), such fossils are likely to exists in other Bay Mud deposits all around the Bay Area and would not be considered significant or unique.

The University of California Museum of Paleontology maintains the world's largest database of fossil discoveries and collections, with thousands of records for the East Bay. A search of the database by both formation name and location revealed few invertebrate fossils and no vertebrate fossils in the formations underlying the site. Fourteen invertebrate fossils of quaternary age (within the last 10,000 years) were found in various locations in Oakland, three of which were found in or around Lake Merrit (UCMP, 2008). Whether or not these fossils were found within the specific geologic units underlying the site was not specified.

Regulatory Framework

National Register of Historic Places

The National Register is the nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.

To be listed on the National Register, a property must be shown to be "significant" at the local, state, or national level under one or more of the following criteria.

1. Criterion A (Event): That are associated with events that have made a significant contribution to the broad patterns of our history.
2. Criterion B (Person): That are associated with the lives of persons significant in our past.
3. Criterion C (Design/Construction): That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
4. Criterion D (Information Potential): That have yielded, or may be likely to yield, information important in prehistory or history.

Integrity: The property must also possess historic "integrity." Integrity is defined as "the ability of a property to convey its significance." The National Register criteria recognize seven qualities that define integrity: location, design, setting, materials, workmanship, feeling, and association.

- "Location" refers to the place where the historic property was constructed.
- "Design" is the combination of architectural elements that create the form, structure and style of the property.
- "Setting" is the physical environment surrounding a historic property.
- "Materials" are the original physical components that were combined during a particular period in time and in a particular pattern to form the historic property.
- "Workmanship" is the physical evidence of the building crafts and skills of a particular culture during a given period.

- "Feeling" is a property's expression of the aesthetic or historic sense of a particular period of time.
- "Association" is the direct link between an important historic event or person and a historic property.

Special considerations apply to moved or reconstructed properties, cemeteries, religious or commemorative properties, and properties achieving significance within the past 50 years. Properties listed in the National Register are automatically listed in the California Register.

California Register of Historical Resources

The California Register of Historical Resources (California Register) is an authoritative guide to the state's historical resources, and by which properties are considered significant for CEQA purposes. The California Register includes resources listed in or formally determined eligible for listing in the National Register of Historic Places (National Register; see discussion below), California State Landmarks, and Points of Historical Interest. The State Office of Historic Preservation (OHP) maintains a list of historical resources by county in their Directory of Properties in the Historic Property Data File. A building or structure identified on OHP's Directory with a rating of 1 or 2 (on or determined eligible for the National Register) is considered to be "listed" on the California Register.

Properties of local significance that have been designated under a local preservation ordinance (i.e., local landmarks), or that have been identified in a local historical resources inventory may also be eligible for listing in the California Register and are presumed to be significant resources for purposes of CEQA.

In order for a resource to meet the criteria for listing in the California Register, it must satisfy all of the following three provisions:

1. It meets one of the following four criteria of significance (PRC 5024.1(c) and CEQA Guidelines 15064.5):
    a. the resource "is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage".
    b. the resource "is associated with the lives of persons important in our past.
    c. the resource "embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values"; or
    d. the resource "has yielded, or may be likely to yield information important in prehistory or history" (this criterion applies primarily to archaeological sites).
2. The resource retains historic integrity ; and
3. It is fifty years old or older (except where it can be demonstrated that sufficient time has passed to understand the historical importance of the resource).

City of Oakland Historical Resources

In the City of Oakland, an historical resource under CEQA is a resource that meets any of the following criteria:

1. A resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources;
2. A resource included in Oakland's Local Register of historical resources (defined below), unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
3. A resource identified as significant (e.g., rated 1–5) in a historical resource survey recorded on Department of Parks and Recreation Form 523, unless the preponderance of evidence demonstrates that it is not historically or culturally significant;
4. Any object, building, structure, site, area, place, record, or manuscript which the Oakland City Council determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the determination is supported by substantial evidence in light of the whole record. Generally, a resource is considered "historically significant" if it meets the criteria for listing on the California Register of Historical Resources CEQA Guidelines section 15064.5; or
5. A resource that is determined by the City Council to be historically or culturally significant even though it does not meet the other four criteria listed here.

A "local register of historical resources" means a list of properties officially designated or recognized as historically significant by a local government pursuant to a local ordinance or resolution, unless the preponderance of evidence demonstrates otherwise.

In March 1994, the Oakland City Council adopted a Historic Preservation Element of the General Plan (amended July 21, 1998). The Historic Preservation Element sets out a graduated system of ratings and designations resulting from the Oakland Cultural Heritage Survey (OCHS) and Oakland Zoning Regulations. The Element provides the following policy related to identifying historical resources under CEQA:

> Policy 3.8. *Definition of "Local Register of Historical Resources" and Historic Preservation "Significant Effects" for Environmental Review Purposes*: For purposes of environmental review under the California Environmental Quality Act, the following properties will constitute the City of Oakland's Local Register of Historic Resources:
>
> 1. All Designated Historic Properties (Landmarks, Heritage Properties, Study List Properties, Preservation Districts, and S-7 and S-20 Preservation Combining Zone Properties); and
> 2. Those Potential Designated Historic Properties that have an existing rating of "A" or "B" or are located within an Area of Primary Importance.

The Local Register also includes properties within Areas of Primary Importance (API). An API is a district that appears eligible for the National Register of Historic Places.

The Oakland Cultural Heritage Survey uses a five-tier rating system for individual properties, ranging from "A" (highest importance) and "B" (major importance) to "E" (of no particular interest). This letter rating is termed the Individual Property Rating of a building and is based on the following criteria:

1. Visual Quality/Design: Evaluation of exterior design, interior design, materials and construction, style or type, supporting elements, feelings of association, and importance of designer.
2. History/Association: Association of person or organization, the importance of any event, association with patterns of history, and the age of the building.
3. Context: Continuity and familiarity of the building within the city, neighborhood, or district.
4. Integrity and Reversibility: Evaluation of the building's condition, its exterior and interior alterations, and any structural removals.

Properties with conditions or circumstances that could change substantially in the future are assigned both an "existing" and a "contingency" rating. The existing rating (UPPER CASE letter) describes the property under its present condition, while the contingency rating (lower case letter, if any), describes it under possible future circumstances.

All areas of the City that are not yet intensively surveyed by the OCHS have been evaluated through "windshield" surveys in 1985–1986 and 1996–1997. This Preliminary Citywide Historical and Architectural Inventory, known as the *Reconnaissance Survey*, employs the same A-B-C-D-E rating system as the OCHS, but is not as thorough and is intended to be confirmed or modified over time by the OCHS.

Local Plans and Policies

City of Oakland goals and policies that pertain to cultural resources (specifically for this Project) are provided primarily in the General Plan Historic Preservation Element (HPE) (1994) and the General Plan Land Use and Transportation Element (LUTE) (1998).

As discussed in detail in Section IV.H, *Land Use, Plans and Policies*, policies are discussed in the EIR solely for the benefit of the decision-makers who will, as a policy matter, consider and apply them for consistency prior to issuing discretionary permits for the Project. In doing so, the City must "balance" potentially competing General Plan policies.

The following HPE goals and policies are applicable to the Kaiser Center Project:

- HPE Historic Preservation Goal 2: To preserve, protect, enhance, perpetuate, use, and prevent the unnecessary destruction or impairment of properties or physical features of special character or special historic, cultural, educational, architectural or aesthetic interest or value. Such properties or physical features include buildings, building components, structures, objects, districts, sites, natural features related to human presence, and activities taking place on or within such properties or physical features.

- HPE Policy 3.1: *Avoid or Minimize Adverse Historic Preservation Impacts Related to Discretionary City Actions:* The City will make all reasonable efforts to avoid or minimize adverse effects on the Character-Defining Elements of existing or Potential Designated Historic Properties which could result from private or public projects requiring discretionary City actions.
- HPE Policy 3.5: *Historic Preservation and Discretionary Permit Approvals.* For additions or alterations to Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design matches or is compatible with, but not necessarily identical, to the property's existing or historical design; or (2) the proposed design comprehensively modifies and is at least equal in quality to the existing design and is compatible with the character of the neighborhood; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood.
- For any project involving complete demolition of Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design quality of the proposed project is at least equal to that of the original structure and is compatible with the character of the neighborhood; or (2) the public benefits of the proposed project outweigh the benefit of retaining the original structure; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood.
- HPE Policy 3.7: *Property Relocation Rather than Demolition*. As a condition of approval for all discretionary projects involving demolition of existing or Potential Designated Historic Properties, the City will normally require that reasonable efforts be made to relocate the properties to an acceptable site.
- HPE Policy 3.8: *Local Register of Historical Resources*. See discussion above.

The above policies from the Historic Preservation Element generally encourage, but do not mandate, the preservation of Oakland's historic resources, within the context of and consistent with other General Plan goals, objectives, and policies (as discussed in Section IV.H, *Land Use, Plans and Policies*, and other sections of this EIR). So, for example, the admonition in HPE Historic Preservation Goal 2 against "the unnecessary destruction" of historic buildings and HPE Policy 3.1's direction to employ "all reasonable efforts to avoid or minimize adverse effects" on historic resources are reviewed against the Proposed Project's provision of additional office space in Downtown Oakland.

A determination of consistency with the above policies by the Planning Commission and City Council must be predicated upon a finding that, as specified in HPE Policy 3.5, "(1) the design quality of the proposed project is at least equal to that of the original structure and is compatible with the character of the neighborhood; or (2) the public benefits of the proposed project outweigh the benefit of retaining the original structure; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood."

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

The City's SCAs relevant to the cultural resources that might be impacted by the Proposed Project are listed below. If the Project is approved by the City, all applicable SCAs will be adopted as conditions of approval and required of the Proposed Project to help ensure no significant impacts to cultural resources occur. Because the conditions of approval are incorporated as part of the Proposed Project they are not listed as mitigation measures.

- **SCA CUL-1 Archaeological Resources**

  Ongoing throughout demolition, grading, and/or construction.

  1. Pursuant to CEQA Guidelines section 15064.5 (f), "provisions for historical or unique archaeological resources accidentally discovered during construction" should be instituted. Therefore, in the event that any prehistoric or historic subsurface cultural resources are discovered during ground disturbing activities, all work within 50 feet of the resources shall be halted and the project applicant and/or lead agency shall consult with a qualified archaeologist or paleontologist to assess the significance of the find. If any find is determined to be significant, representatives of the project proponent and/or lead agency and the qualified archaeologist would meet to determine the appropriate avoidance measures or other appropriate measure, with the ultimate determination to be made by the City of Oakland. All significant cultural materials recovered shall be subject to scientific analysis, professional museum curation, and a report prepared by the qualified archaeologist according to current professional standards.
  2. In considering any suggested measure proposed by the consulting archaeologist in order to mitigate impacts to historical resources or unique archaeological resources, the project applicant shall determine whether avoidance is necessary and feasible in light of factors such as the nature of the find, project design, costs, and other considerations. If avoidance is unnecessary or infeasible, other appropriate measures (e.g., data recovery) shall be instituted. Work may proceed on other parts of the project site while measure for historical resources or unique archaeological resources is carried out.
  3. Should an archaeological artifact or feature be discovered on-site during project construction, all activities within a 50-foot radius of the find would be halted until the findings can be fully investigated by a qualified archaeologist to evaluate the find and assess the significance of the find according to the CEQA definition of a historical or unique archaeological resource. If the deposit is determined to be significant, the project applicant and the qualified archaeologist shall meet to determine the appropriate avoidance measures or other appropriate measure, subject to approval by the City of Oakland, which shall assure implementation of appropriate measure measures recommended by the archaeologist. Should archaeologically-significant materials be recovered, the qualified archaeologist would recommend appropriate analysis and treatment, and would prepare a report on the findings for submittal to the Northwest Information Center.

- **SCA CUL-2 Human Remains**

  Ongoing throughout demolition, grading, and/or construction. In the event that human skeletal remains are uncovered at the project site during construction or ground-breaking activities, all work shall immediately halt and the Alameda County Coroner shall be contacted to evaluate the remains, and following the procedures and protocols pursuant to

Section 15064.5 (e)(1) of the CEQA Guidelines. If the County Coroner determines that the remains are Native American, the City shall contact the California Native American Heritage Commission (NAHC), pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, and all excavation and site preparation activities shall cease within a 50-foot radius of the find until appropriate arrangements are made. If the agencies determine that avoidance is not feasible, then an alternative plan shall be prepared with specific steps and timeframe required to resume construction activities. Monitoring, data recovery, determination of significance and avoidance measures (if applicable) shall be completed expeditiously.

- **SCA CUL-3 Paleontological Resources**

  Ongoing throughout demolition, grading, and/or construction. In the event of an unanticipated discovery of a paleontological resource during construction, excavations within 50 feet of the find shall be temporarily halted or diverted until the discovery is examined by a qualified paleontologist (per Society of Vertebrate Paleontology standards (SVP 1995,1996)). The qualified paleontologist shall document the discovery as needed, evaluate the potential resource, and assess the significance of the find under the criteria set forth in Section 15064.5 of the CEQA Guidelines. The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction is allowed to resume at the location of the find. If the City determines that avoidance is not feasible, the paleontologist shall prepare an excavation plan for mitigating the effect of the project on the qualities that make the resource important, and such plan shall be implemented. The plan shall be submitted to the City for review and approval.

- **SCA CUL-4 Compliance with Policy 3.7 of the Historic Preservation Element (Property Relocation Rather than Demolition)**

  Prior to issuance of a demolition permit. The project applicant shall make a good faith effort to relocate the building to a site acceptable to the Planning and Zoning Division and the Oakland Cultural Heritage Survey. Good faith efforts include, at a minimum, the following:

  a. Advertising the availability of the building by: (1) posting of large visible signs (such as banners, at a minimum of 3’x 6’ size or larger) at the site; (2) placement of advertisements in Bay Area news media acceptable to the City ;and (3) contacting neighborhood associations and for-profit and not-for-profit housing and preservation organizations;

  b. Maintaining a log of all the good faith efforts and submitting that along with photos of the subject building showing the large signs (banners) to the Planning and Zoning Division;

  c. Maintaining the signs and advertising in place for a minimum of 90 days; and

  d. Making the building available at no or nominal cost (the amount to be reviewed by the Oakland Cultural Heritage Survey) until removal is necessary for construction of a replacement project, but in no case for less than a period of 90 days after such advertisement.

- **SCA CUL-5 (Same as SCA GEO-2) Vibrations Adjacent Historic Structures**

  Prior to issuance of a demolition, grading or building permit. The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage the Kaiser Center Tower building or other nearby historic resource and design means and methods of construction that shall be utilized to not exceed the thresholds. The engineer's analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

Study Results

Historical Resources (Buildings and Structures)

City of Oakland Historic Resources on the Project Site and Vicinity

Project Site

Kaiser Center was included in the OCHS *Reconnaissance Survey* of 1985–1986. At the time of the survey, the Kaiser Center was not yet 50 years of age; the typical threshold for eligibility as a City of Oakland Historic Resource. The Kaiser Center is listed in the OCHS with a status code of "A1+," which indicates that the property has an "A"-rating, defined as a property of "Highest Importance." "A"-rated buildings are labeled as buildings with, "exceptional historical or architectural value which are clearly eligible individually for the National Register of Historic Places." The building's "1"rating signifies that the property is located within the Lake Merritt District Area of Primary Importance (see discussion below), and the "+" rating indicates the property is a contributor to the Area of Primary Importance.

The Lake Merritt District was also surveyed as part of the OCHS *Reconnaissance Survey* in 1986. The District is considered an Area of Primary Importance (API), one that appears eligible for the National Register for "the governmental history and public uses of the lake, and for the landscape architecture of the lake and for the high architectural quality of many of the buildings on its shores to take advantage of views across lakes and parks." According to the OCHS Historic Resources Inventory form, "The boundaries of the Lake Merritt District include the lake itself, the parklands on its shores, and all buildings fronting on the lake which were constructed over 50 years ago and are not reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries." The Lake Merritt API has the rough boundaries of the Lake, Lakeside Park, and one parcel deep around the perimeter of the lake. The Kaiser Center was not over the 50-year threshold at the time of the 1986 survey, and therefore was not included as a contributor to the district. However, both Page & Turnbull and OCHS concur that the Kaiser Center would be considered a contributor to an updated district evaluation due to its historic and architectural significance (Page & Turnbull, 2009). For conservative purposes therefore, the Kaiser Center is considered a contributor to the Lake Merritt District API.

The Kaiser Center has never been formally designated a City of Oakland Landmark. However, in 2003, members of the City of Oakland's Landmarks Preservation Advisory Board particularly interested in Modern design began the process of pursuing a Landmark nomination for the Kaiser Center. While the process was never completed, it indicates that the Kaiser Center would be determined eligible for listing as a City of Oakland Landmark.

As a property with an existing OCHS rating of "A+1," a contributor to an updated Lake Merritt District API, and a likely candidate as a City of Oakland landmark, the Kaiser Center is an historical resource for CEQA purposes.

Project Vicinity

City of Oakland Landmarks in the Project vicinity include the Lake Merritt Necklace of Lights on Lake Shore Avenue (LM #97), the Lake Merritt Lakeside Park and Wildlife Refuge (LM# 39), the Municipal Boathouse at 1520 Lakeside Drive (LM#139), the Cameron-Stanford House at 1420 Lakeside Drive (LM#2), and the Don Lee-Cox Cadillac Showroom (currently the Whole Foods Market) at 213 Bay Place (LM# 131).

Other historic resources in the Project vicinity which are not designated landmarks but have high (A and B) ratings by OCHS, and are be considered preliminary designated historic properties (PDHPs), include the Beaux-Arts style Regillus Apartments & Garage (1921) at 200 Lakeside Drive, the Schilling House Garage (1909) at 244 Lakeside Drive, and Lakeside Drive Apartments & Garage (1924) located at 244 Lakeside Drive (see discussion of 244 Lakeside Drive Building Group Area of Primary Importance [API], and Lake Merritt API, below). These properties are also included in the California Register and are contributors to the National Register-eligible Lake Merritt Historic District. In addition to these buildings, the August Schilling Gardens are located behind 244 Lakeside Drive, and Snow Park is located at 19th Street between Alice and Harrison Streets. The historic Schilling Gardens are the last remaining portion of landscaped gardens originally planted behind spice magnate August Schilling's Victorian mansion (now demolished). Snow Park was the site of the Snow Museum, established in 1922 when big game hunter Henry A. Snow donated his collection of pelts and animal eggs to the City of Oakland. The Schilling Gardens and Snow Park are also contributors to the National Register-eligible Lake Merritt Historic District.

According to the OCHS, the project site is located within the Lake Merritt Historic District, an Area of Primary Importance (API) which includes Lake Merritt, Lakeside Park, and all the parcels immediately adjacent thereto. The project site is located across 20th Street from the 244 Lakeside Drive Building Group API which includes the 244 Lakeside Drive Apartments, the Schilling garage, and the Schilling Garden. These API's are described below.

Lake Merritt API. According to the OCHS, the Lake Merritt API includes "Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries." As of 1986, when the API was established, the API included approximately 85 buildings, structures, objects, and cultural landscapes. Additional structures have since surpassed 50 years of age and/or may have gained historical significance in their own right and may now also be considered contributors.

244 Lakeside Drive Building Group API. The 244 Lakeside Drive Building Group API was defined in 1984 as part of the OCHS, and includes three contributors: the 244 Lakeside Drive . Apartments, the Schilling Garage and the Schilling Garden. The 244 Lakeside Drive Building

Group API lies entirely within the larger Lake Merritt API, and its contributors are also contributors to the Lake Merritt API.

California Register Historical Resources on the Project Site and Vicinity

Project Site

The Kaiser Center is not listed in the California Register, nor does it have an existing California Register rating. Although the Center was completed in 1960 and is less than 50 years old as of 2009, Page & Turnbull determined that the property currently meets the criteria for listing in the California Register and demonstrated that sufficient time has passed to understand the historical importance of the resource. The following is an excerpt from the historical resources evaluation describing how the Kaiser Center meets each of the California Register criteria, including an assessment of physical integrity.

Criterion 1 (Events). The Kaiser Center appears to be eligible under Criterion 1 (Events) as a complex that reflects "events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States." In this case, the event is the influence of the Kaiser Industries on the history of California and the West Coast. As the only remaining headquarters building of Kaiser Industries, the multinational corporation that influenced the World War II war effort, infrastructure in California, and throughout the West Coast, and changed the health care industry, the Kaiser Center is a significant landmark testifying to an important industrial institution that helped Oakland remain a significant site of commercial and industrial activities in the post-War era.

The complex is also significant as a reminder of the movement of Oakland's Downtown commercial core toward Grand Avenue and Lake Merritt. The Kaiser Center led the shift of the commercial core from 14th and Broadway in downtown Oakland to Lake Merritt. While earlier residential towers such as the Lake Merritt Hotel (1927) and the Bellevue-Staten Building (1929) had been present on the lake, the Kaiser Center was the first true modern commercial skyscraper complex to be located on Lake Merritt. Other modern office towers followed the shift away from downtown including the Ordway Building (1970), the twenty-seven-story Lake Merritt Plaza (1985) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s are located on prominent intersections in the immediate area.

Criterion 2 (Persons). The Kaiser Center appears eligible for the California Register under Criterion 2 (Persons) for its association with Henry J. Kaiser. Kaiser is significant as an innovative industrialist who built more ships than any other builder during World War II, completed massive construction projects like the Hoover Dam, headed the first company to manufacture steel on the West Coast, and developed a health care organization for workers that became a model for Health Maintenance Organizations (HMOs) across the country. Kaiser was influential in the design of the Kaiser Center; purportedly telling the management team and the architects to "double it" when asked his opinion of the proposed size of the building. Kaiser is also frequently credited for the creation of roof garden. Additionally, Kaiser held his offices, where he oversaw his multitude of companies and had an apartment at the 27th floor of the building. While many of Kaiser's industrial buildings still exist, the Kaiser Center in Oakland is the only remaining corporate headquarters connected to Kaiser Industries. Kaiser's earlier Oakland headquarters building, at 1924 Broadway, was demolished in the 1990s and therefore the Kaiser Center is an important building that expresses the importance of Oakland as the world headquarters of Kaiser Industries.

Criterion 3 (Architecture). The Kaiser Center appears eligible for the California Register under Criterion 3 for embodying the distinctive characteristics of the Modern style. The Kaiser Center is a well-preserved example of the style as applied to a corporate headquarters complex. Characteristic features of the complex include its variety of building types: office tower, retail wings, and parking garage all designed in a compatible style; its site in a landscaped plaza with views to Lake Merritt. The complex appears as a strong horizontal base that is contrasted by a vertical office tower. The office tower features structural piers elevating the building's mass above the plaza, a mezzanine podium at the base, a T-shaped plan, a sweeping curved façade, flat roof, polychrome aluminum and glazed wall surfaces, aggregate concrete panels at secondary facades, and standardized bays with little variation. The Mall Buildings are completed in the same style and feature rectangular plans, flat roofs, structural piers elevating the building's mass above the first floor, and dolomite panel cladding. The materials used throughout the complex were selected to showcase the variety of Kaiser manufactured materials including aluminum and dolomite.

The Kaiser Center is also important as a designed office and retail complex, with an office tower, retail, landscaped open space, and parking incorporated on one site. Kaiser's headquarters was not envisioned as solely an office building, but as a group of associated buildings and landscapes that were intended to be used by both Kaiser Industries employees and Oakland community members. In addition to being an example of a type, the Kaiser Center is also significant as the work of a master, Welton Becket & Associates. Welton Becket & Associates was an important modernist architecture firm working throughout the United States. The firm specialized in corporate headquarters, hotels, and cultural centers and was the largest architecture firm in the United States in the 1950s. The Kaiser Center is an excellent example of Welton Becket's work for corporate clients, who relied upon the firm to embody the corporation's philosophy in physical form. Welton Becket's design for the Kaiser Center showcases not only the materials produced by Kaiser Industries but also the characteristics Kaiser Industries were known for: innovation, in the use of a curved façade; and concern for employee well-being embodied in the inclusion of a roof garden.

The roof garden is significant for its design and as the largest contiguous roof garden in North America at the time of its construction. The garden features many of the hallmarks of modern landscape design including undulating topography, curvilinear pathways, geometrically shaped lawns, simple materials such as concrete pathways, planters, and benches; trimmed hedges, shrubs, specimen trees, and an asymmetrical pool. The design by Osmundson & Staley is indicative of the Bay Area Modern landscape architecture popularized by designers such as Thomas Church, Robert Royston, and Lawrence Halprin. The Kaiser Center roof garden by Osmundson & Staley exemplifies the mid-century California Style first popularized by Church and his contemporaries in the 1940s. The California Style emphasized the importance of indoor/outdoor living and relied heavily on a modern landscape architectural vocabulary to achieve this effect. The decision to include a roof garden as part of the Kaiser Center complex marked an important recognition of the potential of the roof garden to create a more healthful and attractive office environment within the city.

Integrity. Page & Turnbull found that exterior of the Kaiser Center, inclusive of the office tower, mall buildings, and roof garden, have been little altered since their original construction in 1960, and retains sufficient integrity to convey their historic significance. The Page & Turnbull report (Page & Turnbull, 2009) also identified a number of character-defining exterior features of the Kaiser Center that enable the property to convey its historic identity. The character-defining exterior features of the office tower includes its overall shape, siting, and massing, as well as the building's curtain wall comprised of polychrome aluminum cladding and aggregate wall panels (i.e., dolomite). The character-defining exterior features of the mall buildings includes their overall shape, siting, and massing, as well as their aggregate wall panels (i.e., dolomite) and their appearance of the main massing of the buildings "floating" above the first floor. However, it should be noted that it is not structurally or economically feasible to reuse the dolomite panels as part of a new building façade (Page & Turnbull, 2009). The character-defining features of the roof garden include the axial plan (north-south axis from 20th Street Mall garden entrance to central lawn), the undulating topography consisting of irregularly shaped lawns, curvilinear paths and aggregate walkways, the reflecting pool, low perimeter wall, the original furnishings including benches and water fountain, and the perimeter plantings.

Project Vicinity

Historical resources within a one-block area of the Project Site that are listed in the California Register include the Beaux-Arts style Regillus Apartments & Garage (1921) at 200 Lakeside Drive, the Schilling House Garage (1909) at 244 Lakeside Drive, and Lakeside Drive Apartments & Garage (1924) located at 244 Lakeside Drive. The August Schilling Gardens located behind 244 Lakeside Drive, and Snow Park at 19th Street between Alice and Harrison Streets, are also listed in the California Register. These properties are also contributors to the National Register-eligible Lake Merritt Historic District. As described above, the 244 Lakeside Drive Building Group API, as well as the Lake Merritt API, are located directly across the Harrison and 20th Street intersection from the project site.

National Register of Historic Places on the Project Site and Vicinity

Project Site

The Kaiser Center is not listed in the National Register. However, according to the Oakland Cultural Heritage Survey, the Kaiser Center appears to be potentially eligible to the National Register both individually and as a potential contributor to the Lake Merritt Historic District (see discussion above). As a property eligible for listing in the National Register, both individually and as a contributor to a Nation Register-eligible historic district, the Kaiser Center is a historical resource under CEQA Guidelines Section 15064.5.

Project Vicinity

The Lake Merritt Wild Duck Refuge is listed on the National Register (Site #66000205) as a National Historic Landmark. The site is significant as the first official wildlife refuge in the United States. National Register-listed resources in the general Project vicinity include the Cameron-Stanford House at 1426 Lakeside Drive, the Harrison and Fifteenth Streets Historic District (between 1401--1501 Harrison Street, 300--312 14th Street, and 300--349 15th Street), the Oakland YWCA Building at 1515 Webster Street, and the Paramount Theater at 2025 Broadway. Aside from the Lake Merritt Wild Duck Refuge, all other resources are three to four blocks (between 0.25 and 0.5 mile) away from the Project Site.

Archaeological Resources

A records search was conducted at the Northwest Information Center (NWIC) of the California Historical Resources Information System at Sonoma State University on April 22, 2008 (File No. 07-1502). The records were accessed by utilizing the Oakland West, California, U.S. Geological Survey 7.5-minute quadrangle base maps. The records search, which encompassed a one-half-mile radius around the Kaiser Center Project Site, was conducted to: (1) determine whether known cultural resources had been recorded within or adjacent to the Project Site; (2) assess the likelihood of unrecorded cultural resources based on historical references and the distribution of nearby sites; and (3) develop a context for the identification and preliminary evaluation of cultural resources.

During the records search, the following sources were reviewed: the *California Inventory of Historical Resources* (OHP, 1976), *California Historical Landmarks* (OHP, 1990), *California Points of Historical Interest* (OHP, 1992), and *Historic Properties Directory Listing* (OHP, 2007). The *Historic Properties Directory Listing* includes listings of the National Register and the California Register, and the most recent listings of California Historical Landmarks and California Points of Historical Interest. Sanborn Fire Insurance Company maps from 1889, 1902, 1911, and 1951 were also consulted to determine the sensitivity for historic-period archaeological resources within the Project Site.

The records search at the NWIC revealed no recorded archaeological resources in the Project Site. Five recorded archaeological resources have been identified within a ½-mile radius of the Project Site. Each of these is described below.

One prehistoric archaeological site (CA-ALA-22) is located approximately 0.5 mile southwest of the Project Site. Remains from at least one human burial were discovered in 1928 during excavation for an elevator shaft in the basement of the Easton Building at the corner of Broadway and 13th Street. According to the San Francisco Chronicle, the bones were uncovered approximately 1 foot below the concrete basement floor; approximately 15 feet from the street or ground level. A large animal tooth was also discovered beneath the building's basement floor (*San Francisco Chronicle*, July 1, 1928:1).

One prehistoric archaeological site is located near Lake Merritt, approximately one mile from the Project Site. The shell mound was recorded by N.C. Nelson in 1909 on the south side of the lake

(Nelson's 314a; CA-ALA-5). Subsequent surveyors have been unable to relocate the site although an alternate location has been proposed. An additional archaeological site, P-01-010694, is located approximately 200 meters west of the mapped location of CA-ALA-5. The site contains shell and dark sand although no artifactual materials were observed (Baker and Smith, 2004).

Three historic-period archaeological sites are located within a ½-mile radius of the Project Site. Two abandoned manholes constructed of concrete and red masonry brick were uncovered during trenching for fiber-optic cable. The resources are located in the roadways at the intersection of 23rd and Waverly streets (P-01-010534; Way, 2001a) and at 17th Street near Telegraph (P-01-010535; Way, 2001b). They date to the late 20th century and are not considered historic-period.

Archaeological site P-01-010532 is a concentration of historic-period refuse intermixed with demolition debris and dredging materials from Lake Merritt uncovered at the intersection of 20th and Harrison streets (Way, 2000). No diagnostic artifacts were observed. The materials may have been used as fill during road construction.

Materials relating to an old railway system were uncovered in the roadway at the intersection of 20th and Franklin streets (P-01-010529; Martorana and Way, 2000). Wooden railroad ties and hardware were intact from approximately 9 inches below the current road surface along a fragmented railroad bed.

Archaeological Sensitivity

During the historic-period the Project Site was the location of the Convent of Our Lady of the Sacred Heart. The school was established in 1868 and remained at the location until 1957. The 1889 Sanborn map shows that within the Project Site there was a large four-story boarding school building with an attached chapel and "sister's house." Outbuildings included a green house, a hen house, laundry facilities, sheds, a corral, and a windmill. A bathing tank, bath house, and boat house were located on the shore of Lake Merritt. Many of the same buildings can be seen on the 1902 Sanborn map. Some of the outbuildings had been replaced and the proposed boulevard along Lake Merritt (Harrison Street) is shown at the location of the former bathing facilities. Nine years later the Sanborn map shows a new large two-story building northwest of the boarding school building. The new building contained a gymnasium, music rooms, a dormitory, auditorium, and class rooms. Laundry facilities remained at the former location. A new two-story barn was located west of the laundry.

According to National Park Service guidelines, archaeological sites in urban areas "are likely to be more or less invisible, buried under modern created land surfaces." Here, "the reconnaissance consists of field checking predictions made on the basis of archival research" (National Park Service 1985:36). Predictions as to the location, nature, and significance of archaeological resources have been made on the basis of the archival record and previous experience with similar deposits in Oakland and other urban Bay Area locales (Praetzellis, 2001; Praetzellis, 2004).

The existing building at the Project Site has a one-story basement that extends approximately 10 feet below ground surface, therefore it is likely that this ground disturbance and construction has destroyed archaeological features and deposits created during the historic period. There is a low possibility for archaeological deposits associated with the Convent of Our Lady of the Sacred Heart to be located within the Project Site.

Furthermore, ground disturbance has also likely destroyed and/or disturbed any prehistoric archaeological features and materials. There is a low possibility that prehistoric archaeological resources are located at the Project Site.

Native American Consultation

On April 21, 2008, a sacred lands search request was submitted to the Native American Heritage Commission (NAHC) on for the Kaiser Center Project Site. A response from the NAHC was received on April 25, 2008. The records search of the sacred lands file failed to indicate the presence of Native American cultural resources in the Project Site. The NAHC provided a list of Native American contacts that might have further knowledge of the vicinity with respect to cultural resources. Each person or organization identified by the NAHC was contacted by letter on April 28, 2008. No response has been received as of July, 2010. Copies of the correspondence is provided in Appendix E.

Impacts and Mitigation Measures

Significance Criteria

The Proposed Project would have a significant impact on the environment if it would:

1. Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines §15064.5. Specifically, a substantial adverse change includes physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be "materially impaired." The significance of an historical resource is "materially impaired" when a project demolishes or materially alters, in an adverse manner, those physical characteristics of the resource that convey its historical significance and that justify its inclusion on, or eligibility for inclusion on an historical resource list (including the California Register of Historical Resources, the National Register of Historical Resources, Local Register, or historical resources survey form (DPR Form 523) with a rating of 1-5);
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines §15064.5;
3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
4. Disturb any human remains, including those interred outside of formal cemeteries.

Project Impacts and Mitigation Measures

Historic Architectural Resources (Buildings and Structures)

Historical resources are any building, structure, object, archaeological site, or traditional cultural place that is listed on or appears eligible for listing on the California Register for the purposes of CEQA.

Impact CUL-1: The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. (Potentially Significant)

The Proposed Project would demolish the two Kaiser Center Mall Buildings, which are components of a qualified historic resource (the Kaiser Center). Demolition is considered to be a significant adverse impact, since it would materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the federal, state, and local registers. The physical characteristics of the Mall Buildings that would be materially altered by the Project would include the Mall Buildings' height, massing, rectangular plans, dolomite wall panels, the appearance of main massing of the buildings "floating" above the first floor, the strong, solid horizontally-oriented band at the base of the tower, the relationship between the tower building's exterior finishes with the base of the complex, and the terrazzo floors.

Implementation of SCA CUL-4 would require the Project applicant to make a good faith effort to relocate the building to a site acceptable to the Planning and Zoning Division and the Oakland Cultural Heritage Survey. However, this may not be economically or physically feasible.

The mitigation measures described below would help reduce the significance of the impact to historic architectural resources. However, because design details are not yet available, this impact is conservatively identified (i.e., worst case scenario) as significant and unavoidable. Specifically, this is a Preliminary Development Plan application and the Project applicant has not prepared or submitted detailed architectural designs of the proposal for consideration by the City. Without those details, the impact must conservatively be determined to be significant and unavoidable at this point. The final, approved design may mitigate the impacts to less than significant levels, but such cannot be determined at this time.

Policy 3.8.1 of the Historic Preservation Element (HPE) of the City of Oakland General Plan states that measures appropriate to mitigate significant effects to an historic resource may include one or more of the following depending on the extent of the proposed addition or alteration:

1. Modification of the Project design to avoid adversely affecting the character-defining elements of the property.
2. Relocation of the affected Historical Resource to a location consistent with its historic or architectural character.

If the above measures are not feasible, then other measures may be considered including, but not limited to the following:

3. Modification of the Project design to include restoration of the remaining historic character of the property.
4. Modification of the Project design to incorporate or replicate elements of the building's original architectural design.
5. Salvage and preservation of significant features and materials of the structure in a local museum or within the Proposed Project.
6. Measures to protect the Historical Resource from effects of on-site or other construction activities.
7. Documentation in a Historic American Buildings Survey report or other appropriate format: photographs, oral history, video, etc.
8. Placement of a plaque, commemorative marker, or artistic or interpretive display on the site providing information on the historical significance of the resource.
9. Contribution to a Facade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource.

The following provides a list of measures that would help to reduce impacts to historic architectural resources.

Mitigation Measure CUL-1.1. The Project applicant shall modify the design of the base of the new structures to retain the existing street level design and character, and shall prepare a salvage program.

The Project applicant shall modify the design of the base of the new tower structures to retain the existing street level design and character of the Mall Buildings, which include its height, massing, flat roofs, dolomite panels, the strong, solid horizontally-oriented band at the base of the tower "floating" above the first floor, the relationship between the Office Tower's side exterior dolomite panels with the Mall Building's side exterior dolomite panels, and the terrazzo floors. Other than the terrazzo floors, the majority of the remaining historic fabric is expressed on the exterior of these buildings. This mitigation would satisfy Policy 3.8.1 (1) of the Historic Preservation Element of the City of Oakland General Plan (Modification of the Project design to avoid adversely affecting the character defining elements of the property).

It should be noted that it is not structurally or economically feasible to reuse the dolomite panels as part of a new building façade (Page & Turnbull, 2009; Turner, 2008). However, historic features such as dolomite panels and terrazzo flooring are easily replicated. All replicated elements should retain the character and quality of the original design, but not necessarily the individual physical elements of the dolomite panels themselves. In addition, the modified design would not be required to retain the precise dimensions of the existing Mall Buildings, but rather, should allow reasonable flexibility in their interpretation, consistent with the HRE report and the purpose of the mitigation measures. Retention of the quality and character of the Mall Buildings could reduce the impact on the environment to a less than significant level. However, because design details are not yet available, and it is therefore unknown whether the Proposed Project would meet Secretary of the Interior's Standards described above, this impact is conservatively deemed to be significant and unavoidable at this time. A copy of the HRE report is included in Appendix E.1. The

Turner letter discussing the infeasiblity of reusing the dolomite panels is included in Appendix E.3.

The Project Applicant shall also undertake a salvage program to save and reuse historically significant materials and features from the Mall Buildings at the site, such as terrazzo flooring, or possibly other materials or features not yet identified herein. As such the Project Applicant shall conduct a full survey of all historic architectural elements, including those which are suitable for re-use on the site, as well as those which can be salvaged for re-use off the site. The Project Applicant shall develop a reuse/salvage plan, whose goal is to maximize reuse of materials on and off the site, and submit such for Landmarks Preservation Advisory Board (LPAB) consideration. The LPAB would make advisory recommendations either to the Planning Commission or Development Director. Demolition shall not occur until all significant historic features or materials that have been identified, are properly removed and relocated for temporary storage under the supervision of a historic architect. The applicant shall implement the approved plan. Implementation of a salvage program would satisfy Policy 3.8.1 (5) of the Historic Preservation Element of the City of Oakland General Plan (Salvage and preservation of significant features and materials of the structure in a local museum or within the Proposed Project). While salvage and reuse of historic materials would help to reduce the impact of the loss of the Mall Buildings, the impact to historic resources is conservatively considered to be significant an unavoidable at this time since design and salvage details are not yet available.

Impacts to historic resources could be mitigated to a less-than-significant level if the Project applicant modifies the design of the base of the new structures to retain the existing street level design and character in accordance with the Secretary of the Interior's Standards, and completes the salvage program. However, because these activities have not yet been completed, the impact is conservatively deemed to be significant and unavoidable.

Mitigation Measure CUL-1.2. HABS /HALS Level Recordation: The Project applicant shall complete a recordation of the Kaiser Center which meets the requirements of the National Park Service's Historic American Buildings Survey (HABS) and the Historic American Landscape Survey (HALS).

A complete set of HABS/HALS documentation typically consists of a set of measured drawings (or a copy of original drawings if available), large-format black and white photographs, and a written history. A complete set of the HABS/HALS recordation photos, drawings, and report should be presented to following repositories:

- Library of Congress
- Oakland History Room at the Oakland Public Library.
- Oakland Heritage Alliance, and
- Oakland Cultural Heritage Survey.

This mitigation would satisfy Policy 3.8.1 (7) of the Historic Preservation Element of the City of Oakland General Plan (Documentation in a Historic American Building Survey report or other appropriate format: photographs, oral history, video, etc.)

While applications of HABS/ HALS efforts are common mitigation strategies used to reduce the significance of an adverse impact to historic resources, they do not alter the loss to community character and collective history. Section 15126.4(b)(2) of the Public Resources Code is clear in this regard: "In some circumstances, documentation of an historical resource, by way of historic narrative, photographs or architectural drawings, as mitigation for the effects of demolition of the resource will not mitigate the effects to a point where clearly no significant effect on the environment would occur."

Mitigation Measure CUL-1.3. Financial Contributions to a historic resource-related program such as the Façade Improvement Program or the Property Relocation Assistance Program: If Mitigation Measure CUL-1.1 is not satisfied, the Project applicants shall make a financial contribution to the City of Oakland, which can be used to fund other historic preservation projects at the Project Site or in the immediate vicinity.

This mitigation would satisfy Policy 3.8.1.(9) of the Historic Preservation Element of the City of Oakland General Plan (Contribution to a Façade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource. Contributions to the fund shall be determined by staff based on the linear feet of the facades to be demolished.

Potential preservation projects that may benefit from the fund could include, without limitation; 1) an update of the Lake Merritt Historic District survey and/or Lake Merritt historic context statement, or, 2) physical improvements to potential contributor(s) to the District so that they may become a formal contributor in the future, or improvements to existing contributor(s) that are currently in a state of disrepair.

However, such financial contribution, even in conjunction with Mitigation Measure CUL-1.2 (HALS/HABS Recordation), would not reduce the impacts to less than significant levels. Thus, the impact would remain significant and unavoidable if Mitigation Measure CUL-1.1 is not satisfied.

The City of Oakland would not impose Mitigation Measure CUL-1.3 (financial contribution) if the Project applicant can demonstrate through the subsequent submission and review and approval by the City (with review by the LPAB) of design modifications to the Proposed Project that they would meet the requirements of Mitigation Measure CUL-1.1. For conservative purposes, however, and because no such designs are currently available for review, Mitigation Measure CUL 1.3 is included in this document.

Significance after Implementation of Mitigation Measures: Conservatively Deemed Significant and Unavoidable.

Impact CUL-2: The proposed new construction would adversely affect remaining portion of the qualified historic resource on the Project Site. (Potentially Significant)

The Proposed Project would retain the Kaiser Center Office Tower, the majority of the Kaiser Center roof garden, and the Parking Garage, and construct two new commercial towers on the site of the existing Mall Buildings. The new construction would affect the resource's integrity of setting, since the Mall Buildings would be removed and the view corridor from the west on

21st Street to the rear of the Office Tower would be altered by the construction of the new commercial towers. Due to the substantial height difference between the proposed new towers and the adjacent historic Kaiser Center Office Tower, the Proposed Project would affect the resource's "setting" and "feeling," which are two aspects of historic integrity. The new construction would remove a portion of the historic roof garden and introduce new garden area. The impacts to the resource's setting and roof garden design are considered to be significant adverse impacts, since new construction would impact the character-defining features of the historic resource. Demolition and construction activities, such as vibration and dust, could also potentially damage the remaining historic resources on the Project Site.

Mitigation Measures CUL-2.1 through CUL-2.3, described below, would help reduce the significance of the impact to historic architectural resources by modifying the Project design to ensure that new additions to the Kaiser Center would be designed to relate to the architectural and landscape character, spatial relationships, and organizing principles of the existing design. However, because design details are not yet available, this impact is conservatively identified as significant and unavoidable.

Mitigation Measure CUL-2.1 Historically-Sensitive Roof Garden Design: The Project Applicant shall ensure that a qualified Historic Landscape Architect under the Historic Preservation Professional Qualifications Standards familiar with landscape history and historic resources designs a roof garden addition that is differentiated from the old and compatible with the historic design to protect the integrity of the historic roof garden.

The additional roof garden area would be designed specifically with respect to the following character-defining features of the garden; the viability of the plant palette under new shadows and altered micro-climate created by the proposed new towers; the north-south axial plan, curvilinear shaped lawns, and curvilinear aggregate pathways, original furnishings, undulating topography, irregularly shaped pools, and raised planters. Since the Kaiser Center roof garden was included in articles in many landscape architecture journals at the time of its construction, historic images of the roof garden are easily located. The landscape plan shall be submitted the LPAB for review and approval. The LPAB would make advisory recommendations to the Planning Commission, and the Applicant shall implement the approved plan. The qualified Historic Landscape Architect shall also evaluate the effects of implementing Mitigation Measure AES-1 (which is also AES-2), which includes installation of 20-foot trees, bamboo screening, canopies, and lattice fencing to reduce significant wind speeds within the roof garden, and sensitively incorporate these measures, as necessary, into the design to protect the integrity of the historic resource.

The proposed alterations to the lawns and walkways can be mitigated by clearly demarcating the original garden material and new configuration with signage and design features. As part of the design process for the buildings, garden entrances, and new garden area, the architects and landscape architect should consult with a historic landscape expert who would prepare a landscape plan to ensure that new designs are compatible yet differentiated from the historic garden material and plans. The restored portion of the garden, as well as any wind reduction elements introduced into the garden, must adhere to the Secretary of the Interior's Standards for the Treatment of Historic Properties with

Guidelines for the Treatment of Cultural Landscapes. In this way, the design of the new roof garden addition could reduce the impact to historic resources.

Mitigation Measure CUL-2.2. Historically Sensitive Tower Design: The Proposed Project shall be compatible with, yet clearly differentiated from, the existing Kaiser Center Office Tower.

Existing views of Downtown Oakland to the southwest and northwest should be maintained as part of the design of the towers at the roof garden level, possibly through the use of non-reflective, transparent glass, pursuant to SCA BIO-5 (Bird Collision Reduction), or other feasible methods. The final design of each tower will include an "amenity floor" at the roof garden level that will facilitate access and views to and from the rooftop garden, and incorporate publically accessible spaces such as, but not limited to, restaurant, fitness center, retail, and common areas. Plans should be reviewed and approved by the LPAB, which would make advisory recommendations to the Planning Commission.

Mitigation Measure CUL-2.3. Protection During Demolition and Construction: The Project applicant shall prepare a historic resources protection plan which describes how the resource (both building and landscape) will be protected from vibration, equipment, storage of materials, and dust resulting from demolition and construction activities.

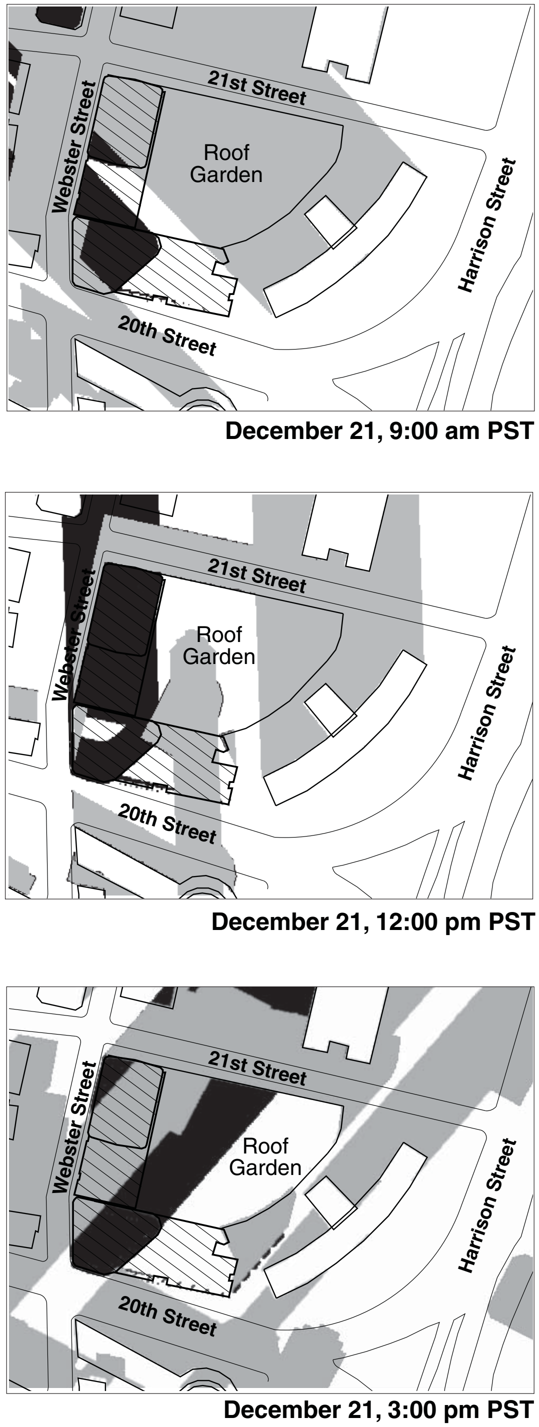
SCA CUL-5 shall be incorporated into the plan. To further reduce Impact CUL-2, the Project applicant shall also implement Mitigation Measure CUL-1.2 (HABS/HALS Level Recordation).

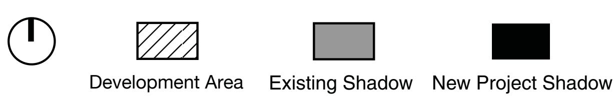
Significance after Implementation of Mitigation Measures: Conservatively Deemed Significant and Unavoidable.

Impact CUL-3: The Proposed Project would have indirect shadow effects on the historic roof garden. (Less than Significant)

For a detailed discussion project shadows, see Section IV.A, *Aesthetics, Shadow, and Wind*, in this EIR. This section focuses only on shadow effects to the historic roof garden. Shadows cast on to the historic roof garden specifically, and around the Project Site in general, depend greatly on the time of day and the time of year. Shadows cast by existing structures generally extend to the west and northwest in the morning, to the north at noon, and to the east and northeast in the afternoon. Shadows are generally longest during the shortest day of the year (December 21st), and shortest during the longest day of the year (June 21st).

Figures IV.A-6 through A-17 (in Section IV.A, *Aesthetics, Shadow and Wind*, of this EIR) identify Project and cumulative shadows on the historic roof garden. As shown on these figures, no new Project or cumulative shadows would be cast upon the roof garden at 9:00 am or 12:00 noon on March 21st, June 21st, September 21st, and December 21st. However, by 3:00 pm on these dates, the northeastern half of the roof garden would be in shadow, while the southwestern half would remain free of shadow, under both Project and cumulative conditions. **Figure IV.D-1**, is a close-up view of shadow effects on the roof garden during the December 21st scenario and delineates in more detail the shadow pattern that occurs when shadows are longest and most affect the roof garden.





SOURCE: Environmental Vision

Figure IV.D-1
Project Shadow Patterns - Historic Resources

While new shadow would be cast on a portion of the historic roof garden from the proposed new towers, particularly in the late afternoon, such shadow effects would not substantially detract from the use or enjoyment of the garden such that the garden would no longer remain eligible as an historic resource. In addition, the Project would result in a net increase of new, publicly accessible roof garden by approximately 4,500 square feet. Much of this new roof garden would be located on the southern end of the site along 20th Street, and would remain shadow-free for a good portion of the day, partially offsetting the existing garden areas which would be newly shaded. Finally, implementation of Mitigation Measure CUL-2.1, described above, would ensure that a historically sensitive roof garden design protects the integrity of the roof garden with respect to the viability of the plant palette under new shadows and altered micro-climate created by the proposed new towers. As a result, the Proposed Project would have a less-than-significant shadow impact on the historical Kaiser Center roof garden.

Mitigation: None required.

Impact CUL-4: The Proposed Project could affect the eligibility of the Lake Merritt Historic District. (Less than Significant)

According to the inventory form completed in 1986, the Lake Merritt Historic District consists of "Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries." As of 1986, the Lake Merritt Historic District included approximately 92 total resources, of which 64 were contributors, five were contingency contributors and 23 were non-contributors. It should be noted that contributors included six parks and two objects. As with most historic districts, changes have been made over time within the boundaries of the district. According to the inventory form, "the Lakeside area has gradually changed from a neighborhood of 19th century single family dwellings to one of 20th century apartment, civic, and office buildings."

Since the district was identified, a number of additions have been made including the Lake Merritt Plaza a 27-story office tower constructed in 1986, at 1999 Harrison Street, the 20-story The Essex on Lake Merritt, a residential building constructed in 2001, at the corner of Lakeside Drive and 17th Street, and the Cathedral of Christ the Light, constructed in 2008, on Harrison Street between 21st Street and Grand Avenue. One contributor, located at 1330 Lakeshore Drive was demolished and replaced by a non-contributor. Other smaller-scale development along the shores of Lake Merritt has also taken place during this time. However, these projects have retained the basic nature of the district, which includes a combination of residential, institutional, and commercial uses and a variety of building heights all focused on and respecting the lake. The northwest shore is predominantly high-rise, the southwest shore is predominantly mid- and high-rise, the southeast shore is predominantly mid-rise, and the northeast shore is predominantly mid-rise.

The proposed projects, located along the northwest shore, appear to be an adaptation of the district to meet the needs of the current day. As stated previously, the Kaiser Center Office tower was the first Modern high-rise office complex on Lake Merritt and led to an expansion of high-rise office tower development from downtown Oakland to the shores of Lake Merritt. While the Proposed Project includes towers that are substantially taller than extant towers in the district, they would not adversely affect the district's integrity. The proposed towers would be non-contributors to the district. The proposed towers would not directly front on the lake; they would be placed behind other existing historic buildings that contribute to the district, lessening the visual impact on the district. They would also perpetuate a pattern of building heights stepping down toward the lake.

The Lake Merritt Historic District currently includes approximately 107 total resources, of which 90 are contributors, and 17 are non-contributors. The Proposed Project would demolish a portion of one contributor to the district (the Mall Buildings at the Kaiser Center) and add two non-contributing buildings (two new office towers at the Kaiser Center) to the district. However, the district would retain over two-thirds contributing properties, therefore retaining its integrity and its API and NRHP status. Since the proposed deletions and additions to the district would not adversely affect the district's potential eligibility as an API or NRHP historic district, the Proposed Project would not cause a significant impact on the Lake Merritt Historic District.

Mitigation: None required.

Archaeological and Unique Archaeological Resources

Impact CUL-5: Construction of the Proposed Project could cause substantial adverse changes to the significance of archaeological resources at the Project Site. Archaeological resources are potentially historical resources as defined in CEQA Section 15064.5(a) or unique archaeological resources as defined in CEQA Section 21083.2(g). (Less than Significant)

During the historic-period the Project Site was the location of the Convent of Our Lady of the Sacred Heart. The school was established in 1868 and remained at the location until 1957. The existing building at the Project Site has a one-story basement that extends approximately 10 feet below ground surface, therefore it is likely that this ground disturbance and construction has destroyed archaeological features and deposits created during the historic period. Furthermore, ground disturbance has also likely destroyed and/or disturbed any prehistoric archaeological features and materials.

In the unlikely event that archaeological materials or human remains are inadvertently discovered during construction activity SCA CUL-1 Archaeological Resources should be applied.

Further, any archaeological property that meets the criteria listed at CEQA Section 21083.2 is considered a unique archaeological resource for the purposes of CEQA.

In the unlikely event that archaeological materials are unearthed during construction implementation of SCA CUL-1 Archaeological Resources also will reduce the Project's potential impact on unique archaeological resources to a less than significant level.

Mitigation: None required.

Paleontological Resources

Impact CUL-6: The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant)

As discussed above in the paleontological setting, the paleontological sensitivity of the units underlying the site is low. Deep excavations associated with building foundations and the 1.5 stories of underground parking are likely to disturb these geologic units of low paleontological sensitivity. However, it is nevertheless possible that fossils would be discovered during excavation associated with the Project. Because the significance of such fossils would be unknown, such an event represents a potentially significant impact to paleontological resources. If any fossils are discovered within the rock units, implementation of the following uniformly-applied SCA CUL-3 Paleontological Resources would reduce this impact to a less than significant level.

Mitigation: None required.

Human Remains

Impact CUL-7: The Proposed Project may adversely affect unidentified human remains at the Project Site. (Less than Significant)

There is no indication that the Project Site has been used for burial purposes in the recent or distant past. Therefore, it is unlikely that human remains would be encountered. However, in the event of the discovery of any human remains during Project construction activities, work would be halted and SCA CUL-2 Human Remains implemented. Damage to significant buried human remains would be a significant impact. Implementation of the following uniformly-applied SCA CUL-2 would reduce potential impacts to a less than significant level.

Mitigation: None required.

Cumulative Impacts

Impact CUL-8: The Proposed Project Could Have a Cumulative Impact to Historic Architectural Resources. (Less than Significant)

Geographic Context

Cumulative analysis includes a review of the Proposed Project and its relationship with past, present, and reasonably foreseeable projects. Given the nature of the potential impacts analyzed for this topic, the geographic scope would generally include projects within the Project area and include but not be limited to those on the City of Oakland's Active Major Development Projects list (see Section IV Introduction, **Table IV-1** List of Relevant Cumulative Projects from the City's Major Project List), that are within a five-block radius of the Project Site. The geographic context considered for the cumulative cultural resources impacts consists of the area that includes the Project Site which, when combined with the Proposed Project area, could result in cumulative impacts.

There are 13 reasonably foreseeable future development projects within the Project area, some of which could combine with the loss of a portion of the Kaiser Center complex to form a significant cumulative impact to historic resources. Of all the projects identified in Table IV-1, only the following six projects would affect historic resources:

Proposed Projects including Rehabilitation of Historic Resources

- 1938 Broadway; approximately 85,200 square foot retail/fitness club, approximately 829,500 square feet of office space, 220 residential units, 384 parking stalls, rehabilitation of the Tapscott Building, a historic resource.
- Oak to Ninth Mixed Use Development: demolition of the Ninth Avenue Terminal Building, a historic resource.
- Wood Street Development (formerly Central Station): renovation of the former 16th Street Train Station, a historic resource.
- 1443 Alice Street; 245 residential units; alterations to a historic resource.
- Emerald Views (formerly 222 19th Street Development Project); 42-story residential high-rise (457'-9" to the top of the pyramidal roof form), containing 370 residential units, 357 parking spaces in five levels of underground parking, 933 square foot café; and demolition of a historic resource (the garden associated with the historic August Schilling estate). Located within Lake Merritt Historic District and 244 Lakeside Drive Building Group API.
- Broadway West Grand at 2365 Broadway (formerly known as Negherbon Mixed Use Project); 367 residential units, 8, 500 square feet retail; demolition of seven historic resources (mostly former brick auto showrooms).

Cumulative Impacts to the Lake Merritt Historic District

Aside from the Proposed Project, the only other reasonably foreseeable project within the Lake Merritt Historic District boundaries is the proposed 42-story Emerald Views Development project. The proposed 34- and 42-story office towers associated with the Kaiser Center Project, in combination with the proposed 42-story Emerald Views development, may form a cumulative impact to historic resources within the Lake Merritt Historic District, as both would demolish contributors to the district (an historic garden and the Mall Buildings at the Project Site), and would introduce a total of three new non-contributing towers to the District.

The proposed towers of the Kaiser Center and Emerald Views can be understood as a continuation of the development of modern towers on the northwestern shores of Lake Merritt, a characteristic of the district that has already been established. Collectively, these projects would continue the trend of redevelopment along this portion of Lake Merritt. With approximately 90 contributory resources to the District, the combination of these projects would retain over two-thirds of its contributing properties, thereby retaining its integrity and its API and NRHP status. Since these proposed changes to the district would not adversely affect the district's potential eligibility to the NRHP or as an APE, no significant cumulative impacts to the Lake Merritt Historic District are anticipated.

Cumulative Impacts to Historic Resources in the Immediate Project Vicinity and to the City of Oakland

Taken collectively, the reasonably foreseeable projects listed above such as those along Broadway and Harrison Streets, contribute to the on-going demolition or alteration of historic resources within the Project vicinity. The Proposed Project would demolish a portion of a historic resource, therefore contributing to this trend. However, the Project is consistent with the typical development found in this area and would not directly or indirectly affect the eligibility of any other historic resources within the vicinity.

While cumulative development projects may affect individual historic resources, the affected resources include a broad range of building typologies, and would not have a clear, measurable impact on an individual type of historic resource. For example, the Proposed Project would demolish a portion of a Modern historic resource in the Lake Merritt Historic District. None of the other proposed projects would affect Modern historic resources, and only one other proposed project, the Emerald Views project, would affect the Lake Merritt area or a resource in the Lake Merritt Historic District. Therefore, the cumulative impact would be less than significant.

Other reasonably foreseeable projects throughout the City of Oakland which may affect citywide historic resources and have been considered in the cumulative analysis include alterations to the Ninth Avenue Terminal Building along the Oakland waterfront, and alterations to buildings at the former Oakland Army Base. Other projects that have been approved/constructed include those in the Waterfront Warehouse District along the Oakland Waterfront, and the Courthouse Condominiums project at 29th and Telegraph Avenue. However, such citywide projects are too far away from the Project Site (and would affect such different types of historical buildings compared with the Modern Kaiser Center), that such projects would not be cumulatively considerable. As such, the Proposed Project would have no significant cumulative impacts to historic resources on a citywide basis.

Mitigation: None required.

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E. Geology, Soils and Geohazards

This section describes geologic and seismic conditions in the Proposed Project vicinity to provide relevant background information of the physical characteristics of the Project Site with respect to soils and potential geologic hazards. The following information is compiled from geologic maps and reports available from the City of Oakland, the California Geological Survey (CGS; formerly California Divisions of Mines and Geology), the Association of Bay Area Governments (ABAG), as well as the draft geotechnical evaluation report completed for the Kaiser Center Project (Treadwell and Rollo, 2008). Based on the evaluation of geologic and seismic conditions in the Project vicinity, potential impacts are discussed and evaluated, and appropriate SCAs and/or mitigation measures are identified, as necessary.

Setting

The Project Site is situated within the Coast Ranges geomorphic province of California. The Coast Ranges is the largest of the state's geomorphic provinces extending approximately 400 miles from the Klamath Mountains (near northern Humboldt County) to the Santa Ynez River in Santa Barbara County. The province lies between the Pacific Ocean and the Great Valley (Sacramento and San Joaquin valleys) provinces and is characterized by a series of northwest trending mountain ridges and valleys, running generally parallel to the San Andreas Fault zone. These mountain ridges and valleys have been formed by tectonic forces that compressed ancient sedimentary deposits over the course of millions of years.

The San Francisco Bay is located in a broad depression in the Franciscan bedrock resulting from an east-west expansion between the San Andreas and the Hayward fault systems. The bedrock surface can be found at elevations of 200 to 2,000 feet below mean sea level across the Bay Area. Sedimentary deposits that overlie the Franciscan bedrock originated from millions of years of erosion, deposition, and changes in sea level. Geologists categorize these sedimentary deposits into geologic formations based on the period of deposition and material type, as described below for the San Francisco Bay region.

- The Alameda Formation is the deepest and oldest of these sedimentary deposits and consists of a mixture of clay, silt, sand, gravel, and some shells with predominantly silt and clay sediments surrounding discontinuous layers of sand and gravel;
- Overlying the Alameda Formation is the San Antonio Formation which consists of sandy clays, gravelly clays, clayey sands and gravels with interbedded silty clay deposits.
- Younger alluvial deposits once referred to as the Temescal Formation are deposited on top of the San Antonio and consist of sandy clays, clayey sands, sands and gravels. The source material for these alluvial deposits comes from the Berkeley Hills.

It is estimated the Project Site is underlain by 7 to 13 feet of fill consisting of medium stiff to stiff silty clay and loose to dense sand and gravelly sand. The draft geotechnical report indicates that in the late 1800s and early 1900s, fill was placed over mud and tidal flats that bordered Lake Merritt. The fill is underlain by creek bank and shoreline deposits associated with the ancient San Antonio Creek and Lake Merritt. These deposits consist of soft to medium stiff clay with peat lenses and medium dense sand and gravel. These deposits are generally 3 to 7 feet thick, except at the southeast corner of the site where the thickness of these deposits increases to a maximum of 20 feet along the old shoreline of San Antonio Creek. (Treadwell and Rollo, 2008).

The creek bank and shoreline deposits are underlain by the Temescal formation, which consists of stiff to very stiff clay with intermittent lenses of dense sand and gravel. The Temescal formation varies from about five feet thick near 20th Street to about 50 feet thick near 21st Street. Beneath the Temescal Formation is the San Antonio Formation, which consists of very stiff to hard sandy clay and sandy silt, with dense to very dense silty sand and silt lenses. The San Antonio formation is underlain by the Alameda Formation, which consists primarily of very stiff to hard silty clay. Sandstone bedrock was previously encountered by others at a nearby site (155 Grand Avenue, near 21st and Harrison Streets) at a depth of about 515 feet below the ground surface. (Treadwell and Rollo, 2008).

Seismicity

Seismic hazards include those hazards that could reasonably be expected to occur in the area during a major earthquake on any of the active faults in the region. Some hazards can be more severe than others, depending on the location, underlying materials, and level of ground shaking. The Project Site, like the entire Bay Area, lies within an area that contains many active and potentially active faults and is considered to be an area of high seismic activity.[1] The United States Geological Survey (USGS) Working Group on California Earthquake Probabilities evaluated the probability of one or more earthquakes of Richter magnitude 6.7 or higher occurring in the San Francisco Bay Area within the next 30 years (USGS, 2008).[2] The result of the evaluation indicated a 63-percent likelihood that such an earthquake event will occur in the Bay Area between 2007 and 2037 (USGS, 2008).

Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material. The composition of underlying soils, even those relatively distant from faults, can intensify ground shaking. For this reason, earthquake intensities are also measured in terms of their observed effects at a given locality. The Modified Mercalli (MM) intensity scale (**Table IV.E-1**) is commonly used to measure earthquake damage due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X can cause moderate to significant structural damage.[3] The intensities of an earthquake will vary over the region of a fault and generally decrease with distance from the epicenter of the earthquake.

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1 An "active" fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years). A "potentially active" fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not, of course, mean that faults lacking evidence of surface displacement are necessarily inactive. "Sufficiently active" is also used to describe a fault if there is some evidence that Holocene displacement occurred on one or more of its segments or branches (Hart, 1997).

2 Richter magnitude is a measure of the size of an earthquake as recorded by a seismograph. Richter magnitudes vary logarithmically, with each whole number step representing a ten-fold increase in the amplitude of the recorded seismic waves. Earthquake magnitudes are also measured by their Moment Magnitude (Mw) which is related to the physical characteristics of a fault including the rigidity of the rock, the size of fault rupture, and movement or displacement across a fault.

3 The damage level represents the estimated overall damage that will occur for various MM intensity levels. Damage, however, is not uniform, as the age, material, type, method of construction, size, and shape of a building all affect its performance.

TABLE IV.E-1
MODIFIED MERCALLI INTENSITY SCALE

Intensity Value	Intensity Description	Average Peak Acceleration (% g[a])
I	Not felt except by a very few persons under especially favorable circumstances.	< 0. 17 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.17-1.4 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	0.17-1.4 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	1.4–3.9g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	3.5 – 9.2 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	9.2 – 18 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	18 – 34 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	34 – 65 g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	65 – 124 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	> 124 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	> 1.24 g
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	> 1.24 g

a g (gravity) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

SOURCE: ABAG, 2008c

According to the Association of Bay Area Governments (ABAG) Shaking Intensity Maps and Information, the Project Site is located in an area subject to “moderate” to “strong” ground shaking (Modified Mercalli Intensity VI to VII) from earthquakes along the entire San Andreas (similar to the 1906 Earthquake), and “violent” to “very violent” ground shaking (Modified Mercalli Intensity IX to X) from the Northern and Southern segments of the Hayward Fault (ABAG, 2008b).

The Project area is not in an Alquist-Priolo Earthquake Fault Zone[4], and no known active fault exists on or in the Project area boundaries. The closest active faults is the Hayward-Rodgers Creek fault approximately 5 miles east of the Project area (Treadwell and Rollo, 2008). Like the entire Bay Area, the Project Site is subject to ground shaking in the event of an earthquake on the regional faults.

Regional Faults

The San Andreas, Hayward-Rodgers Creek, and Calaveras faults pose the greatest threat of significant damage in the Bay Area according to the USGS Working Group (USGS, 2008). These three faults exhibit strike-slip orientation and have experienced movement within the last 150 years.[5] Other principal faults capable of producing significant ground shaking in the Bay Area are listed on **Table IV.E-2**, and include the Rodgers Creek fault, the Concord–Green Valley fault, and the Marsh Creek–Greenville fault. These faults are considered active, and there are many other potentially active and inactive faults located throughout the Bay Area. Considerable seismic events can occur on faults with a long period of inactivity, although it is generally considered less likely. Occasionally, faults classified as inactive can exhibit secondary movement during a major event on another active fault.

TABLE IV.E-2
ACTIVE FAULTS IN THE PROJECT SITE VICINITY

Fault	Distance and Direction from Project	Recency of Movement	Fault Classification[a]	Historical Seismicity[b]	Maximum Moment Magnitude Earthquake (Mw)[c]
Hayward	5 miles east	Historic (1868 rupture)	Active	M 6.8, 1868 Many <M 4.5	7.3
Calaveras	23 miles east	Historic (1861 1911, 1984)	Active	M 5.6–M 6.4, 1861 M 6.2, 1911, 1984	6.9
Concord-Green Valley	26 miles east	Historic (1955)	Active	Historic active creep	6.7
San Andreas	24 miles west	Historic (1906; 1989 ruptures)	Active	M 7.1, 1989 M 8.25, 1906 M 7.0, 1838 Many <M 6	7.9

[a] See footnote 1.

[b] Richter magnitude (M) and year for recent and/or large events. The Richter magnitude scale reflects the maximum amplitude of a particular type of seismic wave.

[c] Moment Magnitude (Mw) is related to the physical size of a fault rupture and movement across a fault. Moment magnitude provides a physically meaningful measure of the size of a faulting event (CGS, 2002). The Maximum Moment Magnitude Earthquake, derived from the joint CGS/USGS Probabilistic Seismic Hazard Assessment for the State of California, 1996 (Peterson, 1996).

SOURCES: (1) Hart, 1997; (2) Jennings, 1994; (3) Peterson, 1996; (4) USGS, 2003; (5) Treadwell and Rollo, 2008.

[4] An Alquist-Priolo Earthquake Fault Zone is an established regulatory zone around the surface traces of active faults. Local agencies must regulate most development projects within the zones.

[5] A strike-slip fault is a fault in which movement is horizontal, parallel to the strike of the fault plane.

Hayward Fault

The Hayward Fault Zone is the southern extension of a fracture zone that includes the Rodgers Creek fault (north of San Pablo Bay), the Healdsburg fault (Sonoma County), and the Maacama fault (Mendocino County). The Hayward fault trends to the northwest within the East Bay, extending from San Pablo Bay in Richmond, 60 miles south to east San José. The Hayward fault in San José converges with the Calaveras fault, a similar type fault that extends north to Suisun Bay. The Hayward fault is designated by the Alquist-Priolo Earthquake Fault Zoning Act as an active fault.

A characteristic feature of the Hayward fault is its well-expressed and relatively consistent fault creep. Although large earthquakes on the Hayward fault have been rare since 1868, slow fault creep has continued to occur and has caused measurable offset. Fault creep on the East Bay segment of the Hayward fault is estimated at 9 millimeters per year (Peterson, 1996). However, a large earthquake could occur on the Hayward fault with an estimated moment magnitude (Mw) of about Mw 7.3. The USGS Working Group on California Earthquake Probabilities includes the Hayward–Rodgers Creek Fault Systems in the list of those faults that have the highest probability of generating earthquakes of magnitude (M) 6.7 or greater in the Bay Area (USGS, 2008).

Calaveras Fault

The Calaveras fault is a major right-lateral strike-slip fault that has been active during the last 11,000 years. The Calaveras fault is located in the eastern San Francisco Bay region and generally trends along the eastern side of the East Bay Hills, west of San Ramon Valley, and extends into the western Diablo Range, and eventually joins the San Andreas Fault Zone south of Hollister. The northern extent of the fault zone is somewhat conjectural and could be linked with the Concord fault.

The Calaveras fault has been the source of numerous moderate magnitude earthquakes, and the probability of a large earthquake (greater than M6.7) is much lower than on the San Andreas or Hayward faults (USGS, 2008). However, this fault is considered capable of generating earthquakes with Mw 6.9.

Concord-Green Valley

The Concord and Green Valley faults are part of the larger San Andreas Fault system. The Concord fault extends from the northwestern slope of Mt. Diablo north to Suisun Bay, where the Green Valley fault is generally thought to be connected to the Concord fault and continues north to Wooden Valley in Napa County. Several site-specific studies on these faults have been conducted in compliance with the Alquist-Priolo Earthquake Fault Zoning Act, and they report the most recent displacement on these faults between 2,600 and 2,700 years ago in the late Holocene.

San Andreas Fault

The San Andreas Fault Zone is a major structural feature that forms at the boundary between the North American and Pacific tectonic plates, extending from the Salton Sea in Southern California near the border with Mexico to north of Point Arena, where the fault trace extends out into the

Pacific Ocean. The main trace of the San Andreas fault runs through the Bay Area and trends northwest through the Santa Cruz Mountains along the eastern side of the San Francisco Peninsula. As the principal strike-slip boundary between the Pacific plate to the west and the North American plate to the east, the San Andreas is often a highly visible topographic feature, such as between Pacifica and San Mateo, where Crystal Springs Reservoir and San Andreas Lake clearly mark the rupture zone.

Seismic Hazards

Ground Shaking

Strong ground shaking from a major earthquake could affect the Project Site during the next 30 years. An earthquake on any one of the active faults (listed in Table IV.H-2) could potentially produce a range of ground shaking intensities at the Project Site. Ground shaking may affect areas hundreds of miles distant from the earthquake's epicenter. Historic earthquakes have caused strong ground shaking and damage in the San Francisco Bay Area, the most recent being the Loma Prieta earthquake (moment magnitude 6.9) in October 1989. The epicenter was approximately 50 miles south of the Project Site, and the earthquake caused very strong ground shaking for about 20 seconds and resulted in varying degrees of structural damage as far as 50 miles away. This event produced moderate (Modified Mercalli VI) to very strong (Modified Mercalli VIII) shaking intensities in the Project area (ABAG, 2008b). The 1906 San Francisco earthquake, with an estimated moment magnitude of 7.9, produced moderate (Modified Mercalli VI) to strong (Modified Mercalli VII) shaking intensities in the Project area (ABAG, 2008b).

The common way to describe ground motion during an earthquake is the duration of the shaking. However, a common measure of ground motion is also the peak ground acceleration (PGA). The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as the percentage of the equivalent acceleration of gravity (g), which is approximately 980 centimeters per second squared. (In terms of automobile acceleration, one "g" of acceleration is a rate of increase in speed equivalent to a car accelerating from a standstill to 60 mph in less than 3 seconds.) For comparison purposes, the maximum peak acceleration value recorded during the Loma Prieta earthquake was in the vicinity of the epicenter, near Santa Cruz, at 0.64 g. The lowest values recorded were 0.06 g in the bedrock on Yerba Buena Island.

An earthquake on the Hayward fault would likely produce more severe ground shaking than was observed during the Loma Prieta earthquake if the epicenter of the earthquake were closer in vicinity to the Project Site, and along the Hayward fault. Probabilistic seismic hazard maps indicate that peak ground acceleration in the Project region could reach or exceed 0.7 g (CGS, 2003).

Surface Fault Rupture

Seismically induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, sense, and nature of fault rupture can vary for different faults or even along different strands of the same fault. Ground rupture is considered more likely along active faults (see Table IV.E-2).

The Project Site is not within an Alquist-Priolo Fault Rupture Hazard Zone, as designated through the Alquist-Priolo Earthquake Fault Zoning Act, and no mapped active faults are known to pass through the immediate Project region. Therefore, the risk of ground rupture at the site is low and is not discussed further in this analysis.

Liquefaction

Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Soils susceptible to liquefaction include saturated loose to medium dense sands and gravels, low-plasticity silts, and some low-plasticity clay deposits. Liquefaction and associated failures could damage foundations, disrupt utility service, and can cause damage to roadways.

Hazard maps available through ABAG and produced by the USGS depict liquefaction and lateral spreading hazards for the entire Bay Area in the event of a significant seismic event (ABAG, 2008a).[6] According to these maps, the Project area has low to very high liquefaction susceptibility due to the variability in subsurface material in the vicinity of the site. Additionally, the draft geotechnical site investigation indicated that the soils underlying the Project Site are comprised of zones of potentially liquefiable medium dense silty sand, clayey sand, and gravelly sand (creek bank and shoreline deposits) (Treadwell and Rollo, 2008). Additionally, it has been reported that the groundwater level decreases from west to east (towards Lake Merritt) and varies between an elevation of 0 to 3 feet, and similar groundwater elevations were measured at the site at 21st and Harrison Streets (Treadwell and Rollo, 2008). Groundwater levels should be expected to fluctuate 1 to 2 feet between wet and dry seasons, depending on rainfall amounts and the level of Lake Merritt, which is controlled by flood gates (Treadwell and Rollo, 2008).

Landslides

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. A slope failure is a mass of rock, soil, and debris displaced downslope by sliding, flowing, or falling. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Landslides may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslide-susceptible areas are characterized by steep slopes and downslope creep of surface materials. Debris flows consist of a loose mass of rocks and other granular material that, if saturated and present on a steep slope, can move downslope. The rate of rock and soil movement can vary from a slow creep over many years to a sudden mass

6 Lateral spreading is a ground failure associated with liquefaction and generally results from predominantly horizontal displacement of materials toward relatively unsupported free slope faces.

movement. Landslides occur throughout the state of California, but the density of incidents increases in zones of active faulting.

The Project Site is not located in an area where earthquake-induced landslides are likely to occur because of the relatively flat topography of the Project area. Therefore, the risk of landslide at the site is low and is not discussed further in this analysis.

Geologic Hazards

Considering the geologic context of the Project area and nature of the Project, other typical geologic hazards could include soil erosion and expansive soil. These hazards are discussed briefly here.

Expansive Soils

Expansive soils possess a “shrink-swell” behavior. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying. Structural damage to buildings can occur over a long period of time, usually as a result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils. Soils in the area have been characterized as having a medium to high expansion potential, or shrink-swell behavior. According to the draft geotechnical evaluation conducted by Treadwell and Rollo (2008), the fill, creek bank, and shoreline deposits are not suitable for support of the proposed building loads because of their relatively low strength and high potential for compression and/or consolidation settlement. Also, isolated layers of the creek bank and shoreline deposits may be susceptible to soil liquefaction and associated ground failures..

Soil Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, the action of waves, wind and underground water. Excessive soil erosion can eventually lead to damage of building foundations and roadways. The Proposed Project includes excavation for graded soils, use of fill material, and possibly additional imported soil material. However, as part of building design requirements, the Project area will be sloped for rapid removal of surface water runoff from the foundation systems, which would reduce the risk of soil erosion that would lead to damage of building foundations and roadways.

Regulatory Setting

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zone Act), signed into law December 1972, requires the delineation of zones along active faults in California. The Alquist-Priolo Act regulates development on or near active fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces[7]. Cities and counties must regulate certain development projects within the delineated zones, and regulations include withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement (Hart, 1997). Surface fault rupture, however, is not necessarily restricted to the area within an Alquist-Priolo Zone.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 addresses non-surface fault rupture earthquake hazards, including liquefaction and seismically induced landslides, and its purpose is to protect public safety from the effects of strong ground shaking, liquefaction, landslides, and other ground failure, and other hazards caused by earthquakes. The Act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design.

California Building Code

The California Building Code (CBC) has been codified in the California Code of Regulations (CCR) as Title 24, Part 2. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. The purpose of the CBC is to establish minimum standards to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, and general stability by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all building and structures within its jurisdiction. The CBC is based on the International Building Code. The 2007 CBC is based on the 2006 International Building Code (IBC) published by the International Code Conference. In addition, the CBC contains necessary California amendments which are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion into building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

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[7] A "structure for human occupancy" is defined by the Alquist-Priolo Act as any structure used or intended for supporting or sheltering any use or occupancy that has an occupancy rate of more than 2,000 person-hours per year.

City of Oakland Regulations

Ordinances and Oakland Municipal Code

The City of Oakland implements the following regulations and ordinances aimed at reducing soil erosion and protecting water quality and water resources:

The City's Grading Ordinance (Ordinance No. 10312 is intended to reduce erosion during grading and construction activities. Pursuant to this ordinance, Chapter 13.16 of the Oakland Municipal Code requires that a Project applicant obtain grading permits for earth moving activities under specified conditions of 1) volume of earth to be moved, 2) slope characteristics, 3) areas where "land disturbance" or 4) stability problems have been reported. To obtain a grading permit, the Project applicant must prepare and submit to the Public Works Agency a soils report, a grading plan, and an erosion and sedimentation control plan for approval (Oakland Municipal Code, 2009).

The City also implements the Sedimentation and Erosion Control Ordinance (Ordinance No. 10446) also aimed at reducing erosion during construction and operations. As a condition of development or redevelopment, the Chief of Building Services or his or her designee may require implementation of continuous or post construction best management practices such as good housekeeping practices or storm water treatment systems.

Building Services Division

In addition to compliance with building standards set forth by the 2006 IBC and 2007 CBC, the Project applicant will be required to submit to the Oakland Building Services Division an engineering analysis accompanied by detailed engineering drawings for review and approval prior to excavation, grading, or construction activities on the Project Site. Specifically, an engineering analysis report and drawings of relevant grading or construction activities on a Project Site would be required to address constraints and incorporate recommendations identified in geotechnical investigations. These required submittals and City reviews ensure that the buildings are designed and constructed in conformance with the seismic and other requirements of all applicable building code regulations, pursuant to standard City of Oakland procedures.

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

In addition to compliance with building standards set forth by the 2006 IBC and 2007 CBC, the Project applicant will be required to submit to the Oakland Building Services Division an engineering analysis accompanied by detailed engineering drawings for review and approval prior to excavation, grading, or construction activities on the Project Site. Specifically, an engineering analysis report and drawings of relevant grading or construction activities on a Project Site would be required to address constraints and incorporate recommendations identified in geotechnical investigations. These required submittals and City reviews ensure that the buildings are designed and constructed in conformance with the seismic and other requirements of all applicable building code regulations, pursuant to standard City of Oakland procedures.

The City of Oakland's SCAs relevant to reducing impacts geologic and seismic impacts due to the proposed Project are listed below. If the Project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the proposed Project to help ensure less than significant impacts from geologic and seismic conditions. The SCA are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA GEO-1 Erosion and Sedimentation Control Plan**

  Prior to any grading activities. The project applicant shall obtain a grading permit if required by the Oakland Grading Regulations pursuant to Section 15.04.780 of the Oakland Municipal Code. The grading permit application shall include an erosion and sedimentation control plan for review and approval by the Building Services Division. The erosion and sedimentation control plan shall include all necessary measures to be taken to prevent excessive stormwater runoff or carrying by stormwater runoff of solid materials on to lands of adjacent property owners, public streets, or to creeks as a result of conditions created by grading operations. The plan shall include, but not be limited to, such measures as short-term erosion control planting, waterproof slope covering, check dams, interceptor ditches, benches, storm drains, dissipation structures, diversion dikes, retarding berms and barriers, devices to trap, store and filter out sediment, and stormwater retention basins. Off-site work by the project applicant may be necessary. The project applicant shall obtain permission or easements necessary for off-site work. There shall be a clear notation that the plan is subject to changes as changing conditions occur. Calculations of anticipated stormwater runoff and sediment volumes shall be included, if required by the Director of Development or designee. The plan shall specify that, after construction is complete, the project applicant shall ensure that the storm drain system shall be inspected and that the project applicant shall clear the system of any debris or sediment.

  Ongoing throughout grading and construction activities. The project applicant shall implement the approved erosion and sedimentation plan. No grading shall occur during the wet weather season (October 15 through April 15) unless specifically authorized in writing by the Building Services Division.

- **SCA GEO-2 (same as SCA CUL-5 and SCA NOI-6) Vibrations Adjacent to Historic Structures**

  Prior to issuance of a demolition, grading or building permit. The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage the Kaiser Center Tower building or other nearby historic structures (as described in Section IV.D *Cultural Resources*), and design means and methods of construction that shall be utilized to not exceed the thresholds. The engineer's analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

- **SCA GEO-3 Soils Report**

  Required as part of the submittal of a Tentative Tract or Tentative Parcel Map. A preliminary soils report for each construction site within the project area shall be required as part if this project and submitted for review and approval by the Building Services Division. The soils reports shall be based, at least in part, on information obtained from on-site testing. Specifically the minimum contents of the report should include:

  1. Logs of borings and/or profiles of test pits and trenches:

a. The minimum number of borings acceptable, when not used in combination with test pits or trenches, shall be two (2), when in the opinion of the Soils Engineer such borings shall be sufficient to establish a soils profile suitable for the design of all the footings, foundations, and retaining structures.

b. The depth of each boring shall be sufficient to provide adequate design criteria for all proposed structures.

c. All boring logs shall be included in the soils report.

2. Test pits and trenches

a. Test pits and trenches shall be of sufficient length and depth to establish a suitable soils profile for the design of all proposed structures.

b. Soils profiles of all test pits and trenches shall be included in the soils report.

3. A plat shall be included which shows the relationship of all the borings, test pits, and trenches to the exterior boundary of the site. The plat shall also show the location of all proposed site improvements. All proposed improvements shall be labeled.

4. Copies of all data generated by the field and/or laboratory testing to determine allowable soil bearing pressures, sheer strength, active and passive pressures, maximum allowable slopes where applicable and any other information which may be required for the proper design of foundations, retaining walls, and other structures to be erected subsequent to or concurrent with work done under the grading permit.

5. A written Soils Report shall be submitted which shall include but is not limited to the following:

a. Site description

b. Local and site geology

c. Review of previous field and laboratory investigations for the site

d. Review of information on or in the vicinity of the site on file at the Information Counter, City of Oakland, Office of Planning and Building.

e. Site stability shall be addressed with particular attention to existing conditions and proposed corrective attention to existing conditions and proposed corrective actions at locations where land stability problems exist.

f. Conclusions and recommendations for foundations and retaining structures, resistance to lateral loading, slopes, and specifications, for fills, and pavement design as required.

g. Conclusions and recommendations for temporary and permanent erosion control and drainage. If not provided in a separate report they shall be appended to the required soils report.

h. All other items which a Soils Engineer deems necessary.

i. The signature and registration number of the Civil Engineer preparing the report.

- **SCA GEO-4 Geotechnical Report**

  Prior to required as part of the submittal of a tentative Tract Map or tentative Parcel Map.

1. A site-specific, design level geotechnical investigation for the construction site within the project area (which is typical for any large, phased development project) shall be required as part of this project. Specifically:

    a. Each investigation shall include an analysis of expected ground motions at the site from identified faults. The analyses shall be accordance with applicable City ordinances and polices, and consistent with the most recent version of the California Building Code, which requires structural design that can accommodate ground accelerations expected from identified faults.

    b. The investigations shall determine final design parameters for the walls, foundations, foundation slabs, surrounding related improvements, and infrastructure (utilities, roadways, parking lots, and sidewalks).

    c. The investigations shall be reviewed and approved by a registered geotechnical engineer. All recommendations by the project engineer, geotechnical engineer, shall be included in the final design, as approved by the City of Oakland.

    d. The geotechnical report shall include a map prepared by a land surveyor or civil engineer that shows all field work and location of the "No Build" zone. The map shall include a statement that the locations and limitations of the geologic features are accurate representations of said features as they exist on the ground, were placed on this map by the surveyor, the civil engineer or under their supervision, and are accurate to the best of their knowledge.

    e. Recommendations that are applicable to foundation design, earthwork, and site preparation that were prepared prior to or during the projects design phase, shall be incorporated in the project.

    f. Final seismic considerations for the site shall be submitted to and approved by the City of Oakland Building Services Division prior to commencement of the project.

    g. A peer review is required for the Geotechnical Report. Personnel reviewing the geologic report shall approve the report, reject it, or withhold approval pending the submission by the applicant or subdivider of further geologic and engineering studies to more adequately define active fault traces.

2. Tentative Tract or Parcel Map approvals shall require, but not be limited to, approval of the Geotechnical Report.

To implement SCA GEO-4, the Project shall implement the following Project-specific Conditions of Approval:

1. Structural foundation support may have to be obtained from the competent soil of the Temescal or San Antonio formation located approximately 10 to 20 feet below ground surface.

2. Use a rigid mat foundation designed for both short-term elastic settlement during construction and long-term consolidation settlement of the deep clay underlying the site, and/or the use of deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system.

3. Use tiedown anchors to prevent buoyancy of the building if the proposed structures are not heavy enough to overcome the hydrostatic uplift pressure of the groundwater (Treadwell and Rollo, 2008).

Impacts and Mitigation Measures

Significance Criteria

The Project would have a significant geological resource or seismic impact if it would:

1. Expose people or structures to substantial risk of loss, injury, or death involving:
   - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map or Seismic Hazards Map issued by the State Geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mines and Geology Special Publications 42 and 117 [Hart, 1997; Parrish, 2008] and PRC §2690 et. seq.);
   - Strong seismic ground shaking;
   - Seismic-related ground failure, including liquefaction, lateral spreading, subsidence, collapse; or
   - Landslides;
2. Result in substantial soil erosion or loss of topsoil, creating substantial risks to life, property, or creeks/waterways;
3. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994, as it may be revised), creating substantial risks to life or property;
4. Be located above a well, pit, swamp, mound, tank vault, or unmarked sewer line, creating substantial risks to life or property;
5. Be located above landfills for which there is no approved closure and post-closure plan, or unknown fill soils, creating substantial risks to life or property ; or
6. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Approach to Analysis

Because the Proposed Project would not use septic tanks or alternative wastewater disposal systems, the Proposed Project would have no impact resulting from use of wastewater disposal systems in unsupportive soils. Therefore, this topic will not be analyzed further in this EIR. As discussed above, the risks associated with surface fault rupture and landslides occurring at the site are low and are considered less than significant and are not discussed further in this section. Because the Proposed Project would replace existing development and no new storm drain or sewer main facilities would be needed (BKF, 2008), the potential for long-term erosion issues to cause a geologic hazard are also considered less than significant and are not discussed further in this section; construction related erosion issues are addressed in Section IV.G *Hydrology and Water Quality*.

The following analysis focuses on potential Project impacts related to seismicity and erosion. The analyses are based on the findings of the draft geotechnical evaluation provided by Treadwell and Rollo (2008), as well as Proposed Project plans, current conditions at the Project Site and its surroundings, and various maps, resources, and applicable regulations and guidelines cited throughout this section.

Operational Impacts

Impact GEO-1: Redevelopment in the Project area could expose people or structures to seismic hazards such as groundshaking or liquefaction. (Less than Significant)

The Proposed Project is located in the San Francisco Bay Area, a region of intense seismic activity. Recent studies by the United States Geological Survey (USGS) indicate there is a 62 percent likelihood of a Richter magnitude 6.7 or higher earthquake occurring in the Bay Area before 2032. The Hayward Fault Zone, the active fault nearest the Project Site, is the most likely of the active Bay Area faults to experience a major earthquake. A seismic event in the Bay Area could produce ground shaking at the Proposed Project area that are very strong to very violent (MM-III to MM-X) (ABAG, 2008b). Seismic shaking can also trigger ground-failures caused by liquefaction.[8] The Project Site is located in a Seismic Hazard Zone for liquefaction, as designated by the CGS (ABAG, 2008a).

Based on the MMI scale, an earthquake of this intensity on the Hayward fault would cause considerable structural damage, even in well-designed structures. Ground shaking of this intensity could lead to structural building damage, movement or damage of internal building components, or power failure. Substantial cracks could appear in the ground, and the shaking could cause other secondary damaging effects such as the failure of underground pipes. As a comparison, the great 1906 San Francisco earthquake, with an M 7.9, produced strong (MM-VII) shaking intensities in the Project area (ABAG, 2008b). A characteristic earthquake on the Calaveras, San Andreas, or Concord-Green Valley (listed in **Table IV.E-2**) could produce moderate (MM-VI) to strong (MM-V) ground shaking intensities (ABAG, 2008b). Earthquakes of this intensity may move heavy furniture and cause slight damage.

In accordance with City of Oakland requirements, the Project sponsor would be required to prepare a geotechnical report for the Project that includes generally accepted and appropriate engineering techniques for determining the susceptibility of the Project Site to various geologic and seismic hazards. The geotechnical report would include an analysis of ground shaking effects, liquefaction potential, and provide recommendations to reduce these hazards. Because the Project Site is within a Seismic Hazard Zone for liquefaction, recommendations for the mitigation and reduction of liquefaction would be prepared in accordance with CGS Guidelines for Evaluating and Mitigating Seismic Hazards (CDMG [now CGS], 1997). Geotechnical and seismic design criteria would conform to engineering recommendations consistent with the

8 Liquefaction is the process by which saturated, loose, fine-grained, granular, soil, like sand, behaves like a dense fluid when subjected to prolonged shaking during an earthquake.

seismic requirements set forth in the 2006 IBC and the 2007 California Building Code (Title 24) additions.

In addition to compliance with building standards set forth by the 2006 IBC, the Project sponsor would be required to submit an engineering analysis accompanied by detailed engineering drawings to the City of Oakland Building Services Division prior to excavation, grading, or construction activities on the Project Site. This is consistent with standard City of Oakland practices to ensure that all buildings are designed and built in conformance with the seismic requirements of the City of Oakland Building Code. An engineering analysis report and drawings and relevant grading or construction activities on a Project Site would be required to address constraints and incorporate recommendations identified in geotechnical investigations. These required submittals ensure that the buildings are designed and constructed in conformance with the requirements of all applicable building code regulations, pursuant to standard City procedures. SCA GEO-4 Geotechnical Report would ensure that the Project conforms to all applicable building code regulations.

Mitigation: None required.

Impact GEO-2: Redevelopment in the Project area could be subjected to geologic hazards, including expansive soils and differential settlement. (Less than Significant)

Soils containing a high percentage of clays are generally most susceptible to expansion. Expansive soils can damage foundations of above-ground structures, paved roads and streets, and concrete slabs. Expansive soils are common in low-lying alluvial valleys and along the shoreline of the San Francisco Bay. As previously discussed, the draft geotechnical evaluation conducted by Treadwell and Rollo (2008) has reported that the fill, creek bank, and shoreline deposits are likely not suitable for support of the proposed building loads because of their relatively low strength and high potential for compression and/or consolidation settlement. Also, isolated layers of the creek bank and shoreline deposits may be susceptible to soil liquefaction and associated ground failures. The draft geotechnical evaluation also identifies that potential hydrostatic uplift could occur due to the shallow groundwater table at the site.

Due to the fact that settlement will likely occur, the final structural design will be required to address the potential for expansive soils to increase structural damage (Treadwell and Rollo, 2008). The draft geotechnical evaluation identified various construction methods and building designs that would serve to overcome the expansive soils and differential settlement conditions at the site. These methods are listed below and are incorporated into SCA GEO-4 as specific to the Project:

- Structural foundation support may have to be obtained from the competent soil of the Temescal or San Antonio formation located approximately 10 to 20 feet below ground surface.
- Use a rigid mat foundation designed for both short-term elastic settlement during construction and long-term consolidation settlement of the deep clay underlying the site,

and/or the use of deep foundations, such as drilled piers, driven piles, or an equivalent proprietary design-build deep foundation system.

- Use tiedown anchors to prevent buoyancy of the building if the proposed structures are not heavy enough to overcome the hydrostatic uplift pressure of the groundwater (Treadwell and Rollo, 2008).

The City of Oakland requires preparation of a geotechnical report, as well as compliance with and implementation of the geotechnical report recommendations. Compliance with the geotechnical report recommendations, required as part of SCA GEO-4 Geotechnical Report would reduce the potential for the Project to result in geological hazards such as soil expansion and differential settlement.

Mitigation: None required.

Cumulative Impacts

Impact GEO-3: The development proposed as part of the Proposed Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, would not result in significant cumulative impacts with respect to geology, soils or seismicity. (Less than Significant)

Geographic Context

Although the entire Bay Area is situated within a seismically active region with a wide range of geologic and soil conditions, these conditions can vary widely within a short distance, making the cumulative context for potential impacts resulting from exposing people and structures to related risks one that is more localized or even site-specific. Potential cumulative geology and seismic impacts do not extend far beyond a project's boundaries, since such geological impacts are typically confined to discrete spatial locations and do not combine to create an extensive cumulative impact. The exception to this generalization would occur where a large geologic feature (e.g., fault zone, massive landslide) might affect an extensive area, or where the development effects from the Project could affect the geology of an off-site location. These circumstances are not present on the Project Site, and do not apply to the Proposed Project. The Project Site is located near other development and has the opportunity to combine with structural damage from other past, present, and reasonably foreseeable future projects. These include but are not limited to projects listed in Table IV-1, List of Relevant Cumulative Projects from the City's Major Project List.

Impacts

During the early part of the 1900s, nonprofit organizations developed model building codes used throughout the United States. Although these regional code developments were effective and responsive to regulatory needs, the time came for a single set of codes. The International Code Council was established as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes, now known as the Uniform Building Code. Within California, additional state requirements were added to the UBC to form the California Model Building Codes (CBC). Localities, such as the City of Oakland, may adopt additional amendments to the CBC through local ordinance. The trend in building codes has been increased rigor in the design and implementation requirements for geotechnical and seismic safety. These requirements, as specified by state and local regulation with the adoption of the CBC and amendments, have progressively become more rigorous in requirements mandating a greater reduction of risk to life, health, and safety, and minimized seismic risk.

The cumulative analysis considers the Proposed Project combined with other past, present, existing, pending and reasonably foreseeable projects. Many existing buildings (i.e., past projects) in the surrounding area have been built in accordance with building code requirements for geotechnical and seismic safety in effect at the time of building construction. Present, pending and future projects within the proposed Project's geographic area are subject to these enhanced requirements and result in reduced geologic and seismic hazards. As present and future projects replace aging infrastructure and older structures with new, more rigorously regulated projects, the potential for cumulative seismic risks is incrementally reduced over time.

The SCAs discussed above, including appropriate grading requirements, and compliance with the Uniform Building Code as locally amended would reduce the potential for cumulative geologic and seismic effects from the Proposed Project Site and surrounding area. Therefore, implementation of the Project together with the impact of past, present, existing, pending and reasonably foreseeable future development would not result in any significant cumulative geologic and seismic impacts. Moreover, given that the Project will remove older structures and replace them with new structures that must comply with current and future building code requirements for geologic and seismic safety, the Project would not make any considerable contribution to any potential cumulative impact, because it will improve geologic and seismic safety on the Project Site. The impact would be less than significant.

Mitigation: None required.

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United States Geological Survey (USGS), *The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2), Open File Report 2007-1437,* http://pubs.usgs.gov/of/2007/1437/, 2008.

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F. Hazardous Materials

This section discusses the hazardous materials issues related to the existence of hazardous materials associated with the Project Site, Project construction, and Project operations. This section provides an overview of the regulatory setting that is applicable to health and safety regarding hazardous materials at the Project Site and identifies potential Project impacts and appropriate SCAs and/or mitigation measures, as necessary.

Introduction

Materials and waste may be considered hazardous if they are poisonous (toxicity), can be ignited by open flame (ignitability), corrode other materials (corrosivity), or react violently, explode or generate vapors when mixed with water (reactivity). The term "hazardous material" is defined in the State Health and Safety Code (Chapter 6.95, Section 25501[o]) as any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment.

A hazardous waste, for the purpose of this EIR, is any hazardous material that is abandoned, discarded, or recycled, as defined in the State Health and Safety Code (Chapter 6.95, Section 25125). The transportation, use, and disposal of hazardous materials, as well as the potential releases of hazardous materials to the environment, are closely regulated through many state and federal laws.

Setting

Geology and Groundwater

Regional

The San Francisco Bay was created from a structural depression formed between the San Andreas and Hayward faults. Deposits along the bay margin include what is known as Bay Mud, a natural marine deposit that consists of generally uniform, soft, saturated clay and silt, organic material and some sand. The Project area is located in the East Bay plain, a broad alluvial terrace created from sediments transported from the East Bay hills towards San Francisco Bay. Near the bay margin, the alluvial materials of the East Bay transition into the bay mud estuarine deposits. These alluvial materials constitute the waterbearing units for the East Bay groundwater basin. Lake Merritt was originally a tidal estuary which was later dammed to increase water levels and create a more scenic lake. The lake is surrounded by deposits from former marine terraces.

Project Site – Historical Use

The Project Site was developed in its current state by 1959. Prior to that, the site was occupied by the Holy Sacred Heart Convent (EMG, 2005). From 1958 to 1991 a gasoline filling station associated with tenant operations was located at the site in the underground parking garage. In

1991 a total of six underground storage tanks (USTs) were removed from the site. Four of the tanks were located in the driveway area of the parking garage which were used as part of the filling station. One UST was located at the northeastern portion of the garage and the other along the eastern portion. The tanks were removed along with surrounding impacted soils and the groundwater was monitored until 1993. A closure letter from the Alameda County Health Care Services agency was issued on October 21, 1993 indicating that no further action was warranted at the site and there was no threat to human health or the environment.

Hazardous Materials Use

The Project Site currently includes various existing commercial uses which include a drug store, a bank branch, and a health club. In addition, the building contains a roof garden with large landscaped areas. Hazardous materials may be currently used in operations to some degree (such as chemicals that may be used for maintaining the linked pools in the roof garden) and as a consequence, the facility generates limited quantities of hazardous waste. Any hazardous material that is not consumed and can no longer be used is designated as a hazardous waste material. However, the aforementioned commercial uses do not typically use significant quantities of hazardous materials and as a result likely generate nominal volumes of hazardous waste.

Hazardous Building Materials Associated with Demolition

Implementation of the Project would include demolition of some portions of the existing structures on the Project Site. The Project Site was originally developed decades ago, and like many older buildings, may contain building materials that are considered to contain hazardous materials which can be hazardous to people and the environment once disturbed. These materials include lead-based paint, asbestos, and polychlorinated biphenyls (PCBs).

Prior to the EPA ban in 1978, lead-based paint was commonly used on interior and exterior surfaces of buildings. Through such disturbances as sanding and scraping activities, or renovation work, or gradual wear and tear, old peeling paint, or paint dust particulates have been found to contaminate surface soils or cause lead dust to migrate and affect indoor air quality. Exposure to residual lead can cause severe adverse health effects especially in children.

Asbestos is a naturally occurring fibrous material that was extensively used as a fireproofing and insulating agent in building construction materials before such uses were banned by the U.S. Environmental Protection Agency (USEPA) in the 1970s. Asbestos was commonly used for insulation of heating ducts as well as ceiling and floor tiles to name a few typical types of materials. Similar to lead-based paint, contained within the building materials asbestos fibers present no significant health risk, but once these tiny fibers are disturbed they become airborne and create potential exposure pathways. The fibers are very small and cannot be seen with the naked eye. Once they are inhaled they can become lodged into the lung potentially causing lung disease or other pulmonary complications.

PCBs are organic oils that were formerly used primarily as insulators in many types of electrical equipment including transformers and capacitors. After PCBs were determined to be a carcinogen in the mid to late1970s, the USEPA banned PCB use in most new equipment and began a program to phase out certain existing PCB-containing equipment. Fluorescent lighting ballasts manufactured after January 1, 1978, do not contain PCBs and are required to have a label clearly stating that PCBs are not present in the unit. Additional information about these materials is provided in the Regulatory Setting Section below.

Regulatory Context

The Proposed Project is subject to government health and safety regulations applicable to the transportation, use, and disposal of hazardous materials. This section provides an overview of the regulatory setting that is applicable to the health and safety at the Project Site.

Federal

Hazardous Materials Management

The primary federal agencies with responsibility for hazardous materials management include the USEPA, U.S. Department of Labor Occupational Safety and Health Administration (Fed/OSHA), and the U.S. Department of Transportation (DOT). Federal laws, regulations, and responsible agencies are summarized in **Table IV.F-1** and are discussed in detail in this section.

**TABLE IV.F-1
FEDERAL LAWS AND REGULATIONS RELATED TO
HAZARDOUS MATERIALS MANAGEMENT**

Classification	Law or Responsible Federal Agency	Description
Hazardous Materials Management	Community Right-to-Know Act of 1986 (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA)	Imposes requirements to ensure that hazardous materials are properly handled, used, stored, and disposed of and to prevent or mitigate injury to human health or the environment in the event that such materials are accidentally released.
Hazardous Waste Handling	Resource Conservation and Recovery Act of 1976 (RCRA)	Under RCRA, the EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste from “cradle to grave.”
	Hazardous and Solid Waste Act	Amended RCRA in 1984, affirming and extending the “cradle to grave” system of regulating hazardous wastes. The amendments specifically prohibit the use of certain techniques for the disposal of some hazardous wastes.
Hazardous Materials Transportation	U.S. Department of Transportation (DOT)	Has the regulatory responsibility for the safe transportation of hazardous materials. The DOT regulations govern all means of transportation except packages shipped by mail (49 CRF).
	U.S. Postal Service (USPS)	USPS regulations govern the transportation of hazardous materials shipped by mail.
Occupational Safety	Occupational Safety and Health Act of 1970	Fed/OSHA sets standards for safe workplaces and work practices, including the reporting of accidents and occupational injuries (29 CFR).
Structural and Building Components (Lead-based paint, PCBs, and asbestos)	Toxic Substances Control Act (TSCA)	Regulates the use and management of PCBs in electrical equipment, and sets forth detailed safeguards to be followed during the disposal of such items.
	U.S. EPA	The EPA monitors and regulates hazardous materials used structural and building components and affects on human health.

State and local agencies often have either parallel or more stringent regulations than federal agencies. In most cases, state law mirrors or overlaps federal law and enforcement of these laws is the responsibility of the state or of a local agency to which enforcement powers are delegated. For these reasons, the requirements of the law and its enforcement are discussed under either the state or local agency section.

State

In January 1996, the California Environmental Protection Agency (Cal EPA) adopted regulations implementing a Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program). The program has six elements: hazardous waste generators and hazardous waste on-site treatment; underground storage tanks; aboveground storage tanks; hazardous materials release response plans and inventories; risk management and prevention programs; and Unified Fire Code hazardous materials management plans and inventories. The plan is implemented at the local level. The Certified Unified Program Agency (CUPA) is the local agency that is responsible for the implementation of the Unified Program. In Oakland, the Alameda County Department of Environmental Health (ACDEH) is the designated CUPA for all businesses.

Hazardous Materials Management

The California Hazardous Materials Release Response Plans and Inventory Law of 1985 (Business Plan Act) requires that any business that handles hazardous materials prepare a business plan, which must include the following:

- Details, including floor plans, of the facility and business conducted at the site;
- An inventory of hazardous materials that are handled or stored on site;
- An emergency response plan; and
- A safety and emergency response training program for new employees with annual refresher courses

Hazardous Waste Handling

The Cal EPA Department of Toxic Substances Control (DTSC) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. State and federal laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of, and, in the event that such materials are accidentally released, to prevent or to mitigate injury to health or the environment. Laws and regulations require hazardous materials users to store these materials appropriately and to train employees to manage them safely.

Under the federal Resource Conservation and Recovery Act of 1976 (RCRA), whose responsibilities are described in Table IV.F-1, above, individual states may implement their own hazardous waste programs in lieu of RCRA, as long as the state program is at least as stringent as federal RCRA requirements. In California, the DTSC regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. The hazardous waste regulations establish criteria for identifying, packaging, and labeling hazardous wastes; prescribe management of hazardous waste; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous wastes that cannot be disposed of in landfills.

Hazardous Materials Transportation

The State of California has adopted DOT regulations for the intrastate movement of hazardous materials. State regulations are contained in Title 26 of the California Code of Regulations (CCR). In addition, the State of California regulates the transportation of hazardous waste originating in the state and passing through the state (26 CCR). Both regulatory programs apply in California. The two state agencies that have primary responsibility for enforcing federal and state regulations and responding to hazardous materials transportation emergencies are the California Highway Patrol (CHP) and the California Department of Transportation (Caltrans).

Occupational Safety

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations in California. Because California has a federally approved OSHA program, it is required to adopt regulations that are at least as stringent as those found in Title 29 of the Code of Federal Regulations (CFR). Cal/OSHA standards are generally more stringent than federal regulations.

Cal/OSHA regulations (8 CCR) concerning the use of hazardous materials in the workplace require employee safety training, safety equipment, accident and illness prevention programs, hazardous substance exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA enforces hazard communication program regulations, which contain training and information requirements, including procedures for identifying and labeling hazardous substances, and communicating hazard information relating to hazardous substances and their handling. The hazard communication program also requires that Materials Safety Data Sheets (MSDS) be available to employees, and that employee information and training programs be documented. These regulations also require preparation of emergency action plans (escape and evacuation procedures, rescue and medical duties, alarm systems, and training in emergency evacuation).

State laws, like federal laws, include special provisions for hazard communication to employees in research laboratories, including training in chemical work practices. Specific, more detailed training and monitoring is required for the use of carcinogens, ethylene oxide, lead, asbestos, and certain other chemicals listed in 29 CFR. Emergency equipment and supplies, such as fire extinguishers, safety showers, and eye washes, must also be provided and maintained in accessible places.

Cal/OSHA (8 CCR), like Fed/OSHA (29 CFR) includes extensive, detailed requirements for worker protection applicable to any activity that could disturb asbestos-containing materials, including maintenance, renovation, and demolition. These regulations are also designed to ensure that persons working near the maintenance, renovation, or demolition activity are not exposed to asbestos.

Emergency Response

California has developed an emergency response plan to coordinate emergency services provided by federal, state, and local government and private agencies. Responding to hazardous materials incidents is one part of this plan. The plan is administered by the State Office of Emergency Services (OES), which coordinates the responses of other agencies, including Cal EPA, CHP, CDFG, the San Francisco Bay Regional Water Quality Control Board (RWQCB), and the Alameda County Fire Department (ACFD). The ACFD provides first response capabilities, if needed, for hazardous materials emergencies within the Project area.

Structural and Building Components

Implementation of the Project would include demolition of structures which, due to their age, may contain asbestos, polychlorinated biphenyls (PCBs), or lead and lead-based paint. In addition, removal of existing aboveground or underground storage tanks may be required.

Asbestos. State laws and regulations prohibit emissions of asbestos from asbestos-related manufacturing, demolition, or construction activities; require medical examinations and monitoring of employees engaged in activities that could disturb asbestos; specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers; and require notice to federal and local governmental agencies prior to beginning renovation or demolition that could disturb asbestos. Asbestos represents a human health risk when asbestos fibers become airborne (friable) and are inhaled into the lungs.

The BAAQMD is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified ten days in advance of any proposed demolition or abatement work. Cal/OSHA regulates asbestos removal to ensure the health and safety of workers removing asbestos containing materials and also must be notified of asbestos abatement activities.

Polychlorinated Biphenyls (PCBs). As previously discussed, PCBs are organic oils that were formerly placed in many types of electrical equipment and in fluorescent lighting ballasts. PCBs are highly persistent in the environment and are toxic. In 1979, the USEPA banned the use of PCBs in most new electrical equipment and began a program to phase out certain existing PCB-containing equipment. The use and management of PCBs in electrical equipment is regulated pursuant to the Toxic Substances Control Act (40 CFR). Fluorescent lighting ballasts that contain PCBs, regardless of size and quantity, are regulated as hazardous waste and must be transported and disposed of as hazardous waste.

Lead and Lead-Based Paint. The California Code of Regulations, Title 22, considers waste soil with concentrations of lead to be hazardous if it exceeds a total concentration of 1,000 parts per million (ppm) and a soluble[1] concentration of 5 ppm. Both the federal and California OSHAs regulate all worker exposure during construction activities that involve lead-based paint. The Interim Final Rule found in 29 CFR Part 1926.62 covers construction work where employees may be exposed to lead during such activities as demolition, removal, surface preparation for

[1] Capable of being dissolved, especially in water.

re-painting, renovation, clean up and routine maintenance. The OSHA-specified method of compliance includes respiratory protection, protective clothing, housekeeping, hygiene facilities, medical surveillance, training, etc.

Local

Soil and Groundwater Contamination

In Alameda County, remediation of contaminated sites is performed under the oversight of the ACDEH and the San Francisco Bay RWQCB. The ACDEH implements a local oversight program under contract with the SWRCB to provide regulatory oversight of the investigation and cleanup of soil and groundwater contamination from leaking petroleum USTs and ASTs. At sites where contamination is suspected or known to have occurred, the project sponsor is required to perform a site investigation and prepare a remediation plan, if necessary. For typical development projects, actual site remediation is completed either before or during the construction phase of the project. Future investigation and remediation of soil or groundwater contamination that is known, or has not yet been identified, would be subject to oversight by ACDEH.

Alameda County Hazardous Waste Management Program

Assembly Bill 2948 requires counties and cities either to adopt a county hazardous waste management plan as part of their general plan, or enact an ordinance requiring that all applicable zoning subdivision, conditional use permit, and variance decisions be consistent with the county hazardous waste management plan. Once each County had its Hazardous Waste Management Program approved by the State, each city had 180 days to either 1) adopt a City Hazardous Waste Management Plan containing specified elements consistent with the approved County Hazardous Waste Management Plan, 2) incorporate the applicable portions of the approved Plan, by reference, into the City's General Plan, or 3) enact an ordinance which requires that all applicable zoning, subdivision, conditional use permits, and variance decisions be consistent with the specified portions of the plan. Alameda County has adopted a Hazardous Waste Management Program that addresses procedures for hazardous materials incidents.

Under the Unified Hazardous Waste and Hazardous Materials Management Regulatory Program, the ACDEH is certified by the DTSC to implement the following programs:

- Hazardous Materials Management Plan and Inventory (HMMP) and the Hazardous Materials Business Plan (HMBP)
- Risk Management program (RMP)
- Underground Storage tank (UST) program
- Spill Prevention, Control and Countermeasure (SPCC) Plan for ASTs
- Hazardous waste generators
- On-site hazardous waste treatment (tiered permit).

Submittal of updated HMMP and HMBP to the ACDEH in accordance with changes to hazardous materials storage and disposal locations and volumes in association with implementation of the

Project and future operation would be required. Potential removal or installation of USTs or ASTs under the Project would also be subject to oversight by ACDEH.

Local Plans and Policies

Discussion of the Project's overall consistency with the Oakland General Plan is provided in Section IV.H, *Land Use, Plans and Policies*, of this EIR. General Plan policies that are also significance criteria or contain a regulatory threshold which the Project must meet are addressed in this section.

City of Oakland Standard Conditions and Uniformly Applied Development Standards

The City of Oakland's SCAs relevant to reducing hazards and hazardous waste/materials impacts due to the proposed Project are listed below. If the Project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the proposed Project to help ensure less than significant impacts from hazards and hazardous wastes/materials. The SCA are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA HAZ-1 Hazards Best Management Practices**

  Prior to commencement of demolition, grading, or construction. The project applicant and construction contractor shall ensure that construction of Best Management Practices (BMPs) are implemented as part of construction to minimize the potential negative effects to groundwater and soils. These shall include the following:

  a) Follow manufacturers recommendations on use, storage, and disposal of chemical products used in construction;

  b) Avoid overtopping construction equipment fuel gas tanks;

  c) During routine maintenance of construction equipment, properly contain and remove grease and oils;

  d) Properly dispose of discarded containers of fuels and other chemicals.

  e) Ensure that construction would not have a significant impact on the environment or pose a substantial health risk to construction workers and the occupants of the proposed development. Soil sampling and chemical analyses of samples shall be performed to determine the extent of potential contamination beneath all UST's, elevator shafts, clarifiers, and subsurface hydraulic lifts when on-site demolition, or construction activities would potentially affect a particular development or building.

  f) If soil, groundwater or other environmental medium with suspected contamination is encountered unexpectedly during construction activities (e.g., identified by odor or visual staining, or if any underground storage tanks, abandoned drums or other hazardous materials or wastes are encountered), the applicant shall cease work in the vicinity of the suspect material, the area shall be secured as necessary, and the applicant shall take all appropriate measures to protect human health and the environment. Appropriate measures shall include notification of regulatory agency(ies) and implementation of the actions described in the City's Standard

Conditions of Approval, as necessary, to identify the nature and extent of contamination. Work shall not resume in the area(s) affected until the measures have been implemented under the oversight of the City or regulatory agency, as appropriate.

- **SCA HAZ-2 Site Review by the Fire Services Division**

  Prior to issuance of any demolition, grading or building permit. The project applicant shall submit plans for site review and approval to the Fire Prevention Bureau Hazardous Materials Unit. Property owner may be required to obtain or perform a Phase II hazard assessment.

- **SCA HAZ-3 Phase I and/or Phase II Reports**

  Prior to issuance of demolition, grading, or building permits The project applicant shall submit to the Fire Prevention Bureau, Hazardous Materials Unit, a Phase I environmental site assessment report, and a Phase II report if warranted by the Phase I report for the project site. The reports shall make recommendations for remedial action, if appropriate, and should be signed by a Registered Environmental Assessor, Professional Geologist, or Professional Engineer.

- **SCA HAZ-4 Asbestos Removal in Structures**

  Prior to issuance of a demolition permit. If asbestos-containing materials (ACM) are found to be present in building materials to be removed, demolition and disposal, the Project Applicant shall submit specifications signed by a certified asbestos consultant for the removal, encapsulation, or enclosure of the identified ACM in accordance with all applicable laws and regulations, including but not necessarily limited to: California Code of Regulations, Title 8; Business and Professions Code; Division 3; California Health & Safety Code 25915-25919.7; and Bay Area Air Quality Management District, Regulation 11, Rule 2, as may be amended.

- **SCA HAZ-5 Lead-Based Paint/Coatings, Asbestos, or PCB Occurrence Assessment**

  Prior to issuance of any demolition, grading or building permit. The project applicant shall submit a comprehensive assessment report to the Fire Prevention Bureau, Hazardous Materials Unit, signed by a qualified environmental professional, documenting the presence or lack thereof of asbestos-containing materials (ACM), lead-based paint, and any other building materials or stored materials classified as hazardous waste by State or federal law.

- **SCA HAZ-6 Environmental Site Assessment Reports Remediation**

  Prior to issuance of a demolition, grading, or building permit If the environmental site assessment reports recommend remedial action, the project applicant shall:

  a) Consult with the appropriate local, State, and federal environmental regulatory agencies to ensure sufficient minimization of risk to human health and environmental resources, both during and after construction, posed by soil contamination, groundwater contamination, or other surface hazards including, but not limited to, underground storage tanks, fuel distribution lines, waste pits and sumps.

b) Obtain and submit written evidence of approval for any remedial action if required by a local, State, or federal environmental regulatory agency.

Submit a copy of all applicable documentation required by local, State, and federal environmental regulatory agencies, including but not limited to: permit applications, Phase I and II environmental site assessments, human health and ecological risk assessments, remedial action plans, risk management plans, soil management plans, and groundwater management plans.

- **SCA HAZ-7 Lead-based Paint Remediation**

  Prior to issuance of any demolition, grading or building permit If lead-based paint is present, the project applicant shall submit specifications to the Fire Prevention Bureau, Hazardous Materials Unit signed by a certified Lead Supervisor, Project Monitor, or Project Designer for the stabilization and/or removal of the identified lead paint in accordance with all applicable laws and regulations, including but not necessarily limited to: Cal/OSHA's Construction Lead Standard, 8 CCR1532.1 and DHS regulation 17 CCR Sections 35001 through 36100, as may be amended.

- **SCA HAZ-8 Other Materials Classified as Hazardous Waste**

  Prior to issuance of any demolition, grading or building permit. If other materials classified as hazardous waste by State or federal law are present, the Project Applicant shall submit written confirmation to Fire Prevention Bureau, Hazardous Materials Unit that all State and federal laws and regulations shall be followed when profiling, handling, treating, transporting and/or disposing of such materials.

- **SCA HAZ-9 Health and Safety Plan per Assessment**

  Prior to issuance of any demolition, grading or building permit If the required lead-based paint/coatings, asbestos, or PCB assessment finds presence of such materials, the project applicant shall create and implement a health and safety plan to protect workers from risks associated with hazardous materials during demolition, renovation of affected structures, and transport and disposal.

- **SCA HAZ-10 Best Management Practices for Soil and Groundwater Hazards**

  Ongoing throughout demolition, grading, and construction activities The project applicant shall implement all of the following Best Management Practices (BMPs) regarding potential soil and groundwater hazards.

  a) Soil generated by construction activities shall be stockpiled onsite in a secure and safe manner. All contaminated soils determined to be hazardous or non-hazardous waste must be adequately profiled (sampled) prior to acceptable reuse or disposal at an appropriate off-site facility. Specific sampling and handling and transport procedures for reuse or disposal shall be in accordance with applicable local, state and federal agencies laws, in particular, the Regional Water Quality Control Board (RWQCB) and/or the Alameda County Department of Environmental Health (ACDEH) and policies of the City of Oakland.

  b) Groundwater pumped from the subsurface shall be contained onsite in a secure and safe manner, prior to treatment and disposal, to ensure environmental and health issues are resolved pursuant to applicable laws and policies of the City of Oakland, the RWQCB and/or the ACDEH. Engineering controls shall be utilized, which include impermeable barriers to prohibit groundwater and vapor intrusion into the building (pursuant to the SCA regarding Radon or Vapor Intrusion from Soil and Groundwater Sources

c) Prior to issuance of any demolition, grading, or building permit, the applicant shall submit for review and approval by the City of Oakland, written verification that the appropriate federal, state or county oversight authorities, including but not limited to the RWQCB and/or the ACDEH, have granted all required clearances and confirmed that the all applicable standards, regulations and conditions for all previous contamination at the site. The applicant also shall provide evidence from the City's Fire Department, Office of Emergency Services, indicating compliance with the Standard Condition of Approval requiring a Site Review by the Fire Services Division pursuant to City Ordinance No. 12323, and compliance with the Standard Condition of Approval requiring a Phase I and/or Phase II Reports.

- **SCA HAZ-11 Hazardous Materials Business Plan**

Prior to issuance of a business license The project applicant shall submit a Hazardous Materials Business Plan for review and approval by Fire Prevention Bureau, Hazardous Materials Unit. Once approved this plan shall be kept on file with the City and will be updated as applicable. The purpose of the Hazardous Materials Business Plan is to ensure that employees are adequately trained to handle the materials and provides information to the Fire Services Division should emergency response be required. The Hazardous Materials Business Plan shall include the following:

d) The types of hazardous materials or chemicals stored and/or used on site, such as petroleum fuel products, lubricants, solvents, and cleaning fluids.

e) The location of such hazardous materials.

f) An emergency response plan including employee training information

g) A plan that describes the manner in which these materials are handled, transported and disposed.

Impacts and Mitigation Measures

Retail as well as office and commercial activities at the proposed Project Site would use hazardous chemicals common in these type of settings. These chemicals would include familiar materials, such as toners, paints, lubricants, kitchen and restroom cleaners, and other maintenance materials as well as chemicals used during operations and of the roof garden water features. These common consumer products would be used for the same purposes as in any office or support setting, including residences. Retail uses can also handle hazardous materials that are stored in containers provided by manufacturer. The amounts of hazardous materials that would be stored or handled cannot be determined at this time, however assumptions can be made that the amounts of hazardous materials and waste would not significantly change from existing conditions.

Significance Criteria

A project would have a significant impact on the environment related to hazardous materials if it would:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of acutely hazardous materials into the environment;
3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
4. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment;
5. Be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would result in a safety hazard for people residing or working in the project area;
6. Be located within the vicinity of a private airstrip, and would result in a safety hazard for people residing or working in the project area;
7. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
8. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

Based on the characteristics of the Proposed Project and the existing conditions, the Proposed Project would not result in impacts related to hazardous emissions near an existing or proposed school, being located on a hazardous materials sites list, safety hazard associated with an airstrip or airport, or interfere with an adopted emergency response or evacuation plan. No impact discussion is provided for these topics for the following reasons:

- *Emissions near School.* There are a number of schools that are located within a quarter mile of the Project Site. However, the proposed Project consists of constructing two office towers that would not handle significant quantities of hazardous materials or wastes. The Project Site is located in the downtown Oakland area among many other office towers that likely handle similar quantities of hazardous materials and wastes. Therefore, the potential for hazardous emissions to affect any nearby schools is very low.
- *Hazardous Sites List.* The Project Site is not included on a hazardous materials site list according to databases maintained by the State Water Resources Control Board (Geotracker) and the Department of Toxic Substances Control (EnviroStor) (SWRCB, 2008 and DTSC, 2008). The nearest site to the Project Site found on these databases is a former Mobil auto service station located at 1975 Webster Street. The site was closed and no further action required in 1997. The Project Site itself, according to the Phase I investigation would have formerly been included on one of these databases, however, as discussed above, this site was also closed by the overseeing agency. Therefore, there is no impact to the public or environment from development at the proposed Project Site.

- *Interfere with Airstrip/Airport*. The proposed Project Site is located more than two miles from the nearest airstrip or airport and therefore would not interfere with any airport use plan or otherwise create a safety hazard related to any such facility. The Project is required to file FAA Form 7460-1, Notice of Proposed Construction or Alteration, because the Project involves construction and alterations exceeding 200 feet above ground level.
- *Emergency Response/Evacuation Plan*. Overall, the Project would not impede an emergency access route and would continue to maintain the existing city grid system. Additionally, the Project would not result in permanent road closures, and therefore, would not physically interfere with emergency response or evacuation plans. In addition, construction activities that would result in temporary road closures would include traffic control plans to ensure emergency vehicle access, as required by SCA TRANS-4 Construction Traffic and Parking (see Section IV.L, *Transportation and Circulation*), and therefore would not cause an impact.

Hazardous Materials Impacts

Construction-Related Impacts

Impact HAZ-1: Demolition of existing structures that contain hazardous building materials, such as lead-based paint, asbestos, and PCBs could expose workers, the public, or the environment to these hazardous materials and would generate hazardous waste. (Less than Significant)

Demolition of existing structures or portions thereof on the Project Site may expose construction workers, the public, or the environment to hazardous materials such as lead-based paint, asbestos, and PCBs. The level of potential impact is dependent upon the age, construction, and building materials in each area of the building. As discussed above, ACMs may be present at the site which, if disturbed, could expose workers and the public during demolition. Any remaining ACMs would need appropriate abatement of identified asbestos prior to demolition. ACMs are regulated both as a hazardous air pollutant under the Clean Air Act and as a potential worker safety hazard under the authority of Cal-OSHA. Cal-OSHA also regulates worker exposure to lead-based paint. Potential exposure to these hazardous building materials can be reduced through appropriate identification, removal and disposal according to applicable regulations.

Exposure to asbestos, and the resulting adverse health effects, is possible throughout the demolition and renovation phases if materials that contain asbestos are present. In structures slated for demolition under the Project, any asbestos-containing materials would be abated in accordance with state and federal regulations prior to the start of demolition or renovation activities.

Section 19827.5 of the California Health and Safety Code requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable federal regulations regarding hazardous air pollutants, including asbestos. The BAAQMD is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified 10 days in advance of any proposed demolition or abatement work.

Notification includes the names and addresses of operations and persons responsible; description and location of the structure to be demolished/altered including size, age, and prior use, and the approximate amount of friable asbestos; scheduled starting and completion dates of demolition or abatement; nature of planned work and methods to be employed; procedures to be employed to meet Bay Area Air Quality Management District (BAAQMD) requirements; and the name and location of the waste disposal site to be used. The BAAQMD randomly inspects asbestos removal operations and will inspect any removal operation about which a complaint has been received.

Asbestos abatement contractors must follow state regulations contained in 8 CCR 1529 and 8 CCR 341.6 through 341.14 where there is asbestos-related work involving 100 square feet or more of asbestos-containing material. Asbestos removal contractors must be certified as such by the Contractors Licensing Board of the State of California. The owner of the property where abatement is to occur must have a hazardous waste generator number assigned by and registered with the DTSC in Sacramento. The site owner or responsible party and the transporter of the waste are required to file a hazardous waste manifest that details the transportation of the material from the site and its disposal.

Both the federal OSHA and Cal/OSHA regulate worker exposure during construction activities that disturb lead-based paint. The Interim Final Rule found in 29 CFR 1926.62 covers construction work in which employees may be exposed to lead during such activities as demolition, removal, surface preparation for repainting, renovation, cleanup, and routine maintenance. The OSHA-specified compliance includes respiratory protection, protective clothing, housekeeping, special high-efficiency filtered vacuums, hygiene facilities, medical surveillance, and training. No minimum level of lead is specified to activate the provisions of this regulation.

Fluorescent lighting ballasts manufactured prior to 1978, and electrical transformers, capacitors, and generators manufactured prior to 1977, may contain PCBs. In accordance with the Toxic Substances Control Act and other federal and state regulations, the Proposed Project would be required to properly handle and dispose of electrical equipment and lighting ballasts that contain PCBs would further ensure potential impacts are less than significant.

Compliance with these regulations and procedures, as well as SCA HAZ-4, SCA HAZ-5 and SCA HAZ-7, shown above, would ensure that any potential impacts due to asbestos and lead-based paint are less-than-significant.

Mitigation: None required.

Hazardous Materials Use, Storage, and Disposal

Impact HAZ-2: The Proposed Project would involve the transportation, use, and storage of hazardous chemicals, which could present public health and/or safety risks to facility workers, patients and visitors, and the surrounding area. (Less than Significant)

Activities at the Proposed Project Site are expected to continue to involve the use of chemical compounds and products that are considered hazardous materials. Exposure to hazardous chemicals could cause acute or chronic health effects to workers and visitors.

The Project would continue to implement the regulatory guidelines and procedures that are currently in use in the existing conditions. Flammable materials stored indoors would be kept in fire safety cabinets when not in use. Other hazardous materials would be stored according to manufacturers recommendations and according to the specifications within the Hazardous Materials Management Plan or Business Plan.

Handling and use of these hazardous materials and the disposal of the resulting hazardous wastes would be required to follow the applicable laws and regulations, as described in *Regulatory Setting* above. The net result of good compliance would be the reduction of risks and hazards to workers, the public, and the environment to levels that are considered acceptable, for all hazardous materials proposed for use on the Project Site.

Hazardous materials would typically be stored in their original containers prior to use. As required, the hazardous materials would be stored in locations according to compatibility and in storage enclosures (i.e., flammable material storage cabinets and biological safety cabinets) or in areas or rooms specially designed, protected, and contained for such storage, in accordance with applicable regulations. Hazardous materials would be handled and used in accordance with applicable regulations by personnel that have been trained in the handling and use of the material and that have received proper hazard-communication training. Hazardous materials reporting (i.e., California Hazardous Materials Business Planning, California Proposition 65 notification, and Emergency Planning and Community-Right-to-Know Act reporting) would be completed as required.

Hazardous Materials

Any hazardous material that is not consumed and can no longer be used would be designated as a hazardous waste material. Overall, the Proposed Project is expected to operate without significant change with respect to existing operations although the total increase in square footage would likely result in a minor increase of total hazardous materials stored.

Hazardous Materials and Hazardous Waste Transport

All hazardous materials would be transported to the site in accordance with applicable hazardous materials shipping regulations. Hazardous materials and waste would be delivered, stored, and handled in accordance with the Hazardous Materials Management Plan (HMMP). The HMMP would also provide details on appropriate personal protective equipment, disposal procedures, and spill response measures in the case of accidental upset conditions.

Required compliance with applicable regulatory requirements and SCA HAZ-1 through HAZ-6, and SCA HAZ-8 through HAZ-11 would minimize hazards to workers, visitors, the public, and the environment from waste products.

Mitigation: None required.

Impact HAZ-3: Hazardous materials used onsite during construction activities (i.e. solvents) could be spilled through improper handling or storage, potentially increasing public health and/or safety risks to Kaiser Center workers, patients and visitors, and the surrounding area. (Less than Significant)

Construction activities would require the use of certain hazardous materials such as fuels, oils, lubricants, solvents, and glues. Inadvertent release of large quantities of these materials into the environment could adversely impact soil, surface waters, or groundwater quality. The use of construction best management practices typically implemented as part of construction would minimize the potential adverse effects to groundwater and soils.

Construction projects, such as the one that would be undertaken for the Proposed Project, would require certain hazardous materials (fuels, adhesives, solvents), that, if improperly used and inadvertently released, could result in a temporary hazard to workers or the public. However, the hazardous materials typically used on a construction site are brought onto the site packaged in consumer quantities and used in accordance with manufacturer recommendations. The overall quantities of these materials on the site at one time does not result in large bulk amounts that, if spilled, could cause a significant adverse affects to human health. Spills of hazardous materials on construction sites are typically localized and are cleaned up in a timely manner. In most cases, the individual construction contractors are responsible for their hazardous materials and are required under their contract to properly store and dispose of these materials in compliance with state and federal laws. Given the quantities of hazardous materials typically needed for large construction projects and the use of best management practices as required by the individual construction contractors, the threat of exposure to the public or contamination to soil and groundwater from construction-related hazardous materials is considered a less than significant impact.

Compliance with these regulations and procedures, as well as SCA HAZ-1 through HAZ-10, shown above, would ensure that any potential impacts due to hazards from construction activities are less than significant.

Mitigation: None required.

Cumulative Impacts

Impact HAZ-4: Hazards at the Project Site could contribute to cumulative hazards in the vicinity of the Project Site. (Less than Significant)

Geographic Context

The geographic area considered for potential public health or hazards cumulative impacts consists of an area within one-quarter-mile of the Project Site, and the area along transportation routes used during demolition and construction activities associated with projects within this radius. Hazards and hazardous materials impacts are generally site-specific and/or have limited mobility, and would not be expected to have cumulatively considerable effects beyond this distance.

Impacts

Development activities in this area could increase the exposure of persons to hazardous materials, including contaminated soil, soil gas, groundwater, hazardous construction materials, and lead and asbestos. However, the use, storage, and disposal of hazardous materials has been increasingly regulated by local, State, and federal law and regulations. The historical trend within the regulatory community has been to strengthen the standards regarding the use, handling, and transport of hazardous materials, therefore minimizing the risk to public health, safety, and welfare. Many past projects have been, all present projects are, and all future projects, including the Proposed Project, will be subject to these more rigorous controls for site remediation and development. The current and future handling of hazardous materials within the geographic area will be subject to these escalating regulations and the City's SCAs and as a result the cumulative hazardous materials risks will not be significant. Moreover, it is unlikely that any potential hazardous materials exposure from the construction activities would combine with other surrounding activities that may involve hazardous material exposure because there is no evidence that other construction activities will be occurring in the immediate area surrounding the site at the time of Project construction that could potentially combine with the Project. Additionally, compliance with the strict regulatory requirements associated with handling of hazardous materials would reduce the potential for any cumulatively considerable contribution from the Project to any potential cumulative impact. Therefore, implementation of the Proposed Project together with the impact of past, present, pending and reasonably foreseeable development would not result in any significant cumulative public health or hazards impacts.

Mitigation: None required.

References – Hazardous Materials

Department of Toxic Substances Control (DTSC), *EnviroStor Database,* http://www.envirostor.dtsc.ca.gov/public/map.asp?global_id=&x=-119.1357421875&y=37.82280243352756&zl=5&ms=640,480&mt=m&findaddress=True&city=OAKLAND&zip=94612&county=&federal_superfund=true&state_response=true&voluntary_cleanup=true&school_cleanup=true&permit_site=true&ca_site=true&permit_and_ca_site=true, accessed July 22, 2008.

EMG, *Phase I Environmental Site Assessment of Kaiser Center, Oakland CA,* June 7, 2005.

State Water Resources Control Board (SWRCB), *Geotracker Database for Webster and 20th Streets, Oakland, CA,* http://www.geotracker.swrcb.ca.gov/map/, accessed July 22, 2008.

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G. Hydrology and Water Quality

This section describes existing hydrology and water quality conditions in the Kaiser Center Project vicinity and presents applicable regulations that pertain to groundwater, surface water, flooding, and water quality. This section also discusses the changes in hydrology and water quality that could result from construction and operation of the Project and identifies potential impacts and applicable City of Oakland's SCAs and/or mitigation measures, as necessary.

Setting

Hydrology

Regional Drainage Patterns

The Project area lies in the South Bay Hydrologic Basin within the San Francisco Bay hydrologic region. San Francisco Bay provides a topographic separation between the northern and southern coastal mountain ranges. The San Francisco Bay estuarine system conveys the waters of the San Joaquin and Sacramento rivers into the Pacific Ocean. These rivers enter the San Francisco Bay at the eastern end of Suisun Bay. The Project area is part of the Oakland Super-Planning Watershed in Alameda County, within the San Francisco Bay hydrologic region (California Department of Fish and Game, 2004).

Local Drainage Patterns

The drainage at the Project Site generally flows towards Lake Merritt, from northwest to southeast. Lake Merritt flows southward into the Lake Merritt Channel, Oakland Estuary, and subsequently into San Francisco Bay. North of the Project Site is the Glen Echo Creek watershed, which drains entirely into Lake Merritt.

Surface Water

The major surface water bodies in the Project area are Glen Echo Creek, Lake Merritt, the Oakland Estuary, and San Francisco Bay. A number of other creeks flow into Lake Merritt, which subsequently drains into the Lake Merritt Channel, Oakland Estuary, and San Francisco Bay. Runoff from the Project Site flows into Lake Merritt, southward of the confluence of the nearby creeks with the lake. Lake Merritt is a 140-acre tidal estuary that was formed thousands of years ago and has been extensively modified in the past 150 years (Lake Merritt Institute, 2009). The depth of Lake Merritt ranges from approximately eight to ten feet. The lake is flushed twice daily by tides and receives freshwater from 60 storm drains. Therefore, the lake has a mixture of freshwater and saltwater.

Water Quality

The Project Site lies in a predominantly urbanized area adjacent to San Francisco Bay. Central San Francisco Bay is classified as a 303(d)-listed impaired water body due to high levels of numerous contaminants and exotic species (RWQCB, 2007a). Lake Merritt is classified as a 303(d)-listed impaired water body and Wildlife Refuge (Coastal Commission, 2006). More details about the 303(d) classification are in the *Federal Regulatory Setting* of this section. Lake Merritt is listed as an impaired water body due to organic enrichment/low dissolved oxygen and high levels of trash. The trash primarily enters the lake through urban runoff and storm sewers. In 2006, the Coastal Commission identified bacteria as another pollutant of concern (Coastal Commission, 2006). Low dissolved oxygen at Lake Merritt generally occurs due to decomposition of plant material, stratification, and restriction of tidal circulation (Lake Merritt Institute, 2003).

Flooding

Flooding is inundation of normally dry land as a result of rapid accumulation of stormwater runoff or rise in the level of surface waters (City of Oakland, 2004). Flooding becomes a hazard when the flow of water exposes people or structures to a significant risk of loss, injury, or death. Flooding generally occurs due to excess runoff due to heavy snowmelt or rainfall, but it can also result from the interaction with natural hazards, such as tsunamis, seiches, or failure of dams.

The Federal Emergency Management Agency (FEMA), through its Flood Insurance Rate Mapping (FIRM) program, designates areas where flooding could occur during a 1% annual chance or a 0.2% annual chance flood events. The Project Site is located in an area determined to be outside of the 0.2% annual chance flood, designated as Zone X on the FIRM Community-Panel Number 065048 0014 (FEMA, 1982).

Tsunamis are waves caused by an underwater earthquake, landslide, or volcanic eruption. Seiches are waves in a semi-enclosed or enclosed body of water such as a lake, reservoir, or harbor. Oakland does not have large rivers or open coastline that can result in devastating storm-induced flooding. Flooding from tsunamis would affect low-lying areas along the Oakland Estuary and San Francisco Bay, but the island of Alameda would shelter inland areas such as the Project Site. The occurrence of devastating seiches in Oakland is unlikely (City of Oakland, 2004).

Flooding could also occur due to dam failure. The California Department of Water Resources, Division of Safety of Dams (DSOD) oversees the construction of dams that are over 25 feet high and impound over 15 acre-feet of water, or those that are over 6 feet high and impound over 50 acre-feet of water. The DSOD requires dam owners to develop maps designating potential dam failure. ABAG compiled these maps into a central database for many bay area cities (ABAG, 1995). Based on these maps, the Project Site is not at risk for dam failure inundation.

Groundwater

A groundwater basin is a hydrogeologic unit containing several connected and interrelated aquifers or one large aquifer. The Project Site lies in the East Bay Plain Groundwater Basin (Basin No. 2-9-04), which extends from Richmond to Hayward. The basin is a northwest-trending alluvial plain bounded on the west by San Francisco Bay, on the north by San Pablo Bay, on the east by Franciscan Basement rock, and on the south by the Niles Cone Groundwater Basin

(DWR, 2004). The alluvial materials that extend westward from the East Bay hills to San Francisco Bay constitute the deep water-bearing strata for the groundwater basin (DWR, 2004). The basin is identified as a potential water source for agricultural, industrial, and municipal use (RWQCB, 2007b). Groundwater levels at the Project Site vary between 0 and 3 feet City of Oakland vertical datum elevation (Treadwell&Rollo, 2008). Groundwater levels should be expected to fluctuate between wet and dry seasons by approximately 1 to 2 feet, depending on the rainfall and the level of Lake Merritt (Treadwell&Rollo, 2008). Elevations at the Project Site vary between 18 feet vertical datum elevation at the northwest corner of the site to 6 feet vertical datum elevation at the southeast corner of the site.

Regulatory Setting

Federal, state, and local agencies regulate activities that could affect hydrological and water quality features in the Project area. This section describes the regulatory framework that would apply to the Proposed Project.

Federal

Clean Water Act

The CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. and gave the USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA sets water quality standards for all contaminants in surface waters. The statute employs a variety of regulatory and nonregulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The Corps has jurisdiction over all waters of the U.S. including, but not limited to, perennial and intermittent streams, lakes, and ponds, as well as wetlands in marshes, wet meadows, and side hill seeps. Under Section 401 of the CWA every applicant for a federal permit or license for any activity which may result in a discharge to a water body must obtain State Water Quality Certification that the proposed activity will comply with state water quality standards.

The National Pollutant Discharge Elimination System (NPDES) permit program under the CWA controls water pollution by regulating point and nonpoint sources that discharge pollutants into "waters of the U.S." California has an approved state NPDES program. The USEPA has delegated authority for NPDES permitting to the California State Water Resources Control Board (SWRCB), which has nine regional boards. The San Francisco Bay Regional Water Quality Control Board (RWQCB) regulates water quality in the Project area.

Section 303(d) of the CWA requires that each state identify water bodies or segments of water bodies that are "impaired" (i.e., not meeting one or more of the water quality standards established by the state). These waters are identified in the Section 303(d) list as waters that are polluted and need further attention to support their beneficial uses. Once the water body or segment is listed, the state is required to establish Total Maximum Daily Load (TMDL) for the pollutant causing the conditions of impairment. TMDL is the maximum amount of a pollutant that a water body can receive and still meet water quality standards. Generally, TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The intent of the Section 303(d) list is to identify water bodies that require future development of a TMDL to maintain water quality.

In accordance with Section 303(d), the San Francisco Bay RWQCB has identified impaired water bodies within its jurisdiction, along with the pollutant or stressor responsible for impairing the water quality (RWQCB, 2007b). In the San Francisco Bay region, the RWQCB has designated the South Basin of San Francisco Bay as an impaired water body. Pollutants that contribute to this impairment are chlordane, DDT, diazinon, dieldrin, dioxin compounds, exotic species, furan compounds, mercury, polychlorinated biphenyls, and selenium (RWQCB, 2007a). Lake Merritt is listed as an impaired water body for organic enrichment/low dissolved oxygen, bacteria, and trash (Coastal Commission, 2006).

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act, Division 7 of the California Water Code, allows the SWRCB to adopt statewide water quality control plans. The purpose of the plans is to establish water quality objectives for specific water bodies. The act also authorizes the NPDES program under the CWA, which establishes water quality requirements for discharges to waters of the state. Most of the implementation of SWRCB's responsibilities is delegated to nine regional boards. The San Francisco Bay RWQCB has established permit requirements for stormwater runoff for the Project area (see *Regional Regulatory Setting* below).

California Toxics Rule

Under the California Toxic Rule, the USEPA has proposed water quality criteria for priority toxic pollutants for inland surface waters, enclosed bays, and estuaries. These federally promulgated criteria create water quality standards for California waters. The California Toxic Rule satisfies CWA requirements and protects public health and the environment. The USEPA and the SWRCB have the authority to enforce these standards. However, the Proposed Project would not discharge toxic pollutants directly into the inland surface waters, such as Lake Merritt, or San Francisco Bay, therefore the California Toxic Rule would not apply.

Regional

Regional Water Quality Control Board

The San Francisco Bay RWQCB is responsible for the protection of beneficial uses and the water quality of water resources within the San Francisco Bay region. The San Francisco Bay RWQCB administers the NPDES stormwater permitting program and regulates stormwater in the San Francisco Bay region. The City of Oakland is a permittee under the NPDES Municipal Stormwater Permit for the Alameda Countywide Clean Water Program (see below for detailed discussion). Project Applicants are required to apply for a NPDES General Permit for discharges associated with project construction activities of greater than one acre.

General Permit

Stormwater discharges from construction activities on one acre or more are regulated by the RWQCB and are subject to the permitting requirements of the NPDES General Permit for Discharges of Stormwater Runoff Associated with Construction Activity (General Construction Permit). The Proposed Project Site includes a 2.2-acre area that will be altered. The RWQCB established the General Construction Permit program to reduce surface water impacts from construction activities. The Proposed Project would be required to comply with the current NPDES permit requirements to control stormwater discharges from the construction site. (See *Alameda County Regulations* below). The General Construction Permit requires the preparation and implementation of a stormwater pollution prevention plan (SWPPP) for construction activities. The SWPPP must be prepared before the construction begins, and in certain cases, before demolition begins. The SWPPP must include specifications for best management practices (BMPs) that would need to be implemented during project construction. BMPs are measures that are undertaken to control degradation of surface water by preventing soil erosion or the discharge of pollutants from the construction area. The SWPPP must describe measures to prevent or control runoff after construction is complete and identify procedures for inspecting and maintaining facilities or other project elements. Required elements of a SWPPP include:

1. Site description addressing the elements and characteristics specific to the site
2. Descriptions of BMPs for erosion and sediment controls;
3. BMPs for construction waste handling and disposal;
4. Implementation of approved local plans;
5. Proposed post-construction controls; and
6. Non-stormwater management.

Examples of typical construction BMPs include scheduling or limiting activities to certain times of year, installing sediment barriers such as silt fence and fiber rolls, maintaining equipment and vehicles used for construction, tracking controls such as stabilizing entrances to the construction site, and developing and implementing a spill prevention and cleanup plan. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations, vehicle and equipment washing and fueling. The California Stormwater Quality Association (CASQA) established BMPs for the State of California in the *California Storm Water Best Management Practice Handbook* (CASQA, 2003).

Dewatering Permit

Excavation and trenching activities in areas with shallow groundwater requires dewatering (the removal of groundwater by pumping), which is subject to the RWQCB construction dewatering permit requirements. Dewatering operations are regulated under state requirements for stormwater pollution prevention and control. Discharge of non-stormwater from a trench or excavation that contains sediments or other pollutants to sanitary sewer, storm drain systems, creek beds (even if dry), or receiving waters is prohibited. Discharge of uncontaminated groundwater from dewatering is a conditionally exempted discharge by the RWQCB. However, the removed water could potentially be contaminated with chemicals released from construction equipment or sediments from excavation. Therefore, disposal of dewatering discharge would require permits either from the RWQCB for discharge to surface creeks and groundwater or from local agencies for discharge to storm or sanitary sewers. The discharge of water resulting from dewatering operations would require an NPDES Permit, or a waiver (exemption) from the RWQCB, which would establish discharge limitations for any specific chemicals known to existing in the dewatering flows.

Regional Water Quality Control Plan

The San Francisco Bay RWQCB prepared the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan) for San Francisco Bay (RWQCB, 2007b). The Basin Plan contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the region and describes beneficial uses of major surface waters and their tributaries. The Basin Plan lists following beneficial uses for the South Basin of San Francisco Bay:

- Ocean, Commercial, and Sport Fishing
- Estuarine Habitat
- Industrial Service Supply
- Fish Migration
- Navigation
- Preservation of Rare and Endangered Species
- Water Contact Recreation
- Noncontact Recreation
- Shellfish Harvesting
- Wildlife Habitat

The Basin Plan identifies the following beneficial uses for Lake Merritt:

- Water Contact Recreation
- Noncontact Recreation
- Fish Spawning
- Wildlife Habitat

For this project, the RWQCB is responsible for regulating construction activities to ensure the protection of the above beneficial uses.

Alameda County Regulations

The Alameda County Flood Control & Water Conservation District (ACFCWCD) and the City of Oakland Public Works Agency share responsibility for maintaining drainage facilities in Oakland. The Project Site lies within the jurisdiction of Zone 12 of the ACFCWCD (ACFCWCD, 2009).

The project sponsor would comply with the requirements of these agencies during construction and operation of the project.

Alameda Countywide Clean Water Program

The Alameda Countywide Clean Water Program (ACCWP) includes 17 member agencies that work together to protect creeks, wetlands and San Francisco Bay (ACCWP, 2009). The City of Oakland and ACFCWCD are two of the agencies that participate in the ACCWP. The member agencies have developed performance standards to clarify the requirements of the stormwater pollution prevention program, adopted stormwater management ordinances, conducted extensive education and training programs, and reduced stormwater pollutants from industrial areas and construction sites (ACCWP, 2009). In the project area, the ACCWP administers the stormwater program to meet CWA requirements by controlling pollution in the local storm drain sewer systems.

NPDES Permit

On October 14, 2009, the San Francisco Bay Regional Water Quality Control Board adopted the Municipal Regional Stormwater Permit (MRP) (NPDES No. CAS612008; Order No. R2-2009-0074**)**. This permit includes ACCWP members (including the City of Oakland) as well as 59 other Phase 1 municipal stormwater permittees in the Bay Area.

Oakland has jurisdiction over and/or maintenance responsibility for its municipal separate storm drain systems and/or watercourses in the city. Construction activities associated with the Proposed Project would be subject to the MRP requirements for stormwater management and discharges. The permit also incorporates updated state and federal requirements related to the quantity and quality of post-construction stormwater discharges from new development and redevelopment projects.. The MRP serves as a framework for identification and implementation of control measures or BMPs.

The MRP includes Provision C.3 that governs storm drain systems and regulates post construction stormwater runoff. The provision requires new development and redevelopment projects to incorporate post-construction treatment measures and other appropriate source control and site design features to reduce the pollutant load in stormwater discharges and to manage runoff flows. “Redevelopment” is defined as a project on a previously developed site that results in the addition or replacement of impervious surface. For projects that create and/or replace 10,000 square feet or more of impervious surface and would result in an increase of, or replacement of, more than 50 percent of the impervious surface of a previously existing development, and the existing development was not subject to stormwater treatment measures, the entire project must be included in a treatment system design. Projects that meet this definition, site design must incorporate low impact development (LID) source control measures, and stormwater treatment onsite or at a joint stormwater treatment facility. Site design must minimize impervious surfaces, and incorporate means for infiltration, evapotranspiration, or biotreatment of stormwater.MRP provision C.3 also requires that projects which would create and/or replace one acre or more of impervious surface, and would increase impervious surface area over the pre-project condition must meet the Hydromodification Management Standard. In compliance with this standard, the increases in runoff flow and volume associated with a project must be managed so that post-project runoff will not exceed estimated pre-project rates and durations if the increased runoff is likely to increase erosion of creeks, increase the generation of silt, or cause other adverse impacts. The applicant shall comply with the applicable provisions of the MRP.

Local

City of Oakland's Municipal Code

The City of Oakland Municipal Code implements the following regulations to protect water quality and water resources:

Creek Protection, Stormwater Management, and Discharge Control Ordinance (part of Chapter 13 of the Oakland Municipal Code). This ordinance prohibits activities that would result in the discharge of pollutants to Oakland's waterways or in damage to creeks, creek functions, or habitat. The ordinance requires the use of standard BMPs to prevent pollution or erosion to creeks and/or storm drains. Additionally, a creek protection permit is required for any construction work on creekside properties. The ordinance establishes comprehensive guidelines for the regulation of discharges to the city's storm drain system and the protection of surface water quality. The ordinance identifies BMPs and other protective measures for development projects. Under the ordinance, the City of Oakland Public Works Agency issues permits for storm drainage facilities that would be connected to existing city drainage facilities. In 1997, the ordinance was amended to include the requirement for a creek protection permit for any construction or related activity on creekside property. The ordinance includes enforcement provisions to provide more effective methods to deter and reduce the discharge of pollutants to the storm drain system, local creeks, and San Francisco Bay. The provisions also list clear guidelines for creekside residents to protect the creek and habitat.

Grading Ordinance (part of Chapter 15 of the Oakland Municipal Code). The Grading Ordinance requires a permit for grading activities on private or public property for projects that exceed certain criteria, such as amount of proposed excavation and degree of site slope. During project construction, the volume of the excavated fill material could exceed 50 cubic yards and could result in a 20 percent slope onsite, or the depth of excavation could exceed five feet at any location. Therefore, the project sponsor would be required to apply for the grading permit and prepare a grading plan, erosion and sedimentation control plan, and drainage plan.

City of Oakland's General Plan

The following objectives, policies, and actions from City of Oakland's General Plan are applicable to the Proposed Project:

Open Space, Conservation and Recreation (OSCAR), Chapter 3-Conservation, Water Resources, Objective CO-5: Water Quality (City of Oakland, 1996): To minimize the adverse effects of urbanization on Oakland's groundwater, creeks, lakes, and nearshore waters.

Safety Element, Chapter 6-Flooding Hazards, Policy FL-1 (City of Oakland, 2004): Enforce and update local ordinance, and comply with regional orders, that would reduce the risk of storm-induced flooding

Action FL-1.4: Continue to enforce the grading, erosion, and sedimentation ordinance by prohibiting the discharge of concentrated stormwater flows by other than approved methods.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The City of Oakland's SCAs relevant to reducing hydrology and water quality impacts due to the Proposed Project are listed below. If the project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to hydrology and water quality. The SCA are incorporated and required as part of the project, so they are not listed as mitigation measures.

- **SCA HYD-1 Erosion and Sedimentation Control Plan**

  Prior to any grading activities.

  1) The project applicant shall obtain a grading permit if required by the Oakland Grading Regulations pursuant to Section 15.04.780 of the Oakland Municipal Code. The grading permit application shall include an erosion and sedimentation control plan for review and approval by the Building Services Division. The erosion and sedimentation control plan shall include all necessary measures to be taken to prevent excessive stormwater runoff or carrying by stormwater runoff of solid materials on to lands of adjacent property owners, public streets, or to creeks as a result of conditions created by grading operations. The plan shall include, but not be limited to, such measures as short-term erosion control planting, waterproof slope covering, check dams, interceptor ditches, benches, storm drains, dissipation structures, diversion dikes, retarding berms and barriers, devices to trap, store and filter out sediment, and stormwater retention basins. Off-site work by the project applicant may be necessary. The project applicant shall obtain permission or easements necessary for off-site work. There shall be a clear notation that the plan is subject to changes as changing conditions occur. Calculations of anticipated stormwater runoff and sediment volumes shall be included, if required by the Director of Development or designee. The plan shall specify that, after construction is complete, the project applicant shall ensure that the storm drain system shall be inspected and that the project applicant shall clear the system of any debris or sediment.

  Ongoing throughout grading and construction activities.

  2) The project applicant shall implement the approved erosion and sedimentation plan. No grading shall occur during the wet weather season (October 15 through April 15) unless specifically authorized in writing by the Building Services Division.

- **SCA HYD-2 Stormwater Pollution Prevention Plan**

  Prior to and ongoing throughout demolition, grading, and/or construction activities The project applicant must obtain coverage under the General Construction Activity Storm Water Permit (General Construction Permit) issued by the State Water Resources Control Board (SWRCB). The project applicant must file a notice of intent (NOI) with the

SWRCB. The project applicant will be required to prepare a stormwater pollution prevention plan (SWPPP) and submit the plan for review and approval by the Planning and Zoning Division and the Building Services Division. At a minimum, the SWPPP shall include a description of construction materials, practices, and equipment storage and maintenance; a list of pollutants likely to contact stormwater; site-specific erosion and sedimentation control practices; a list of provisions to eliminate or reduce discharge of materials to stormwater; Best Management Practices (BMPs), and an inspection and monitoring program. Prior to the issuance of any construction-related permits, the project applicant shall submit a copy of the SWPPP and evidence of approval of the SWPPP by the SWRCB to the Building Services Division. Implementation of the SWPPP shall start with the commencement of construction and continue though the completion of the project. After construction is completed, the project applicant shall submit a notice of termination to the SWRCB.

- **SCA HYD-3 Post-construction Stormwater Pollution Management Plan**

Prior to issuance of building permit (or other construction-related permit). The applicant shall comply with the requirements of Provision C.3 of the National Pollutant Discharge Elimination System (NPDES) permit issued to the Alameda Countywide Clean Water Program. The applicant shall submit with the application for a building permit (or other construction-related permit) a completed Stormwater Supplemental Form for the Building Services Division. The project drawings submitted for the building permit (or other construction-related permit) shall contain a stormwater pollution management plan, for review and approval by the City, to limit the discharge of pollutants in stormwater after construction of the project to the maximum extent practicable.

1) The post-construction stormwater pollution management plan shall include and identify the following:
    a. All proposed impervious surface on the site;
    b. Anticipated directional flows of on-site stormwater runoff; and
    c. Site design measures to reduce the amount of impervious surface area and directly connected impervious surfaces; and
    d. Source control measures to limit the potential for stormwater pollution; and
    e. Stormwater treatment measures to remove pollutants from stormwater runoff.
2) The following additional information shall be submitted with the post-construction stormwater pollution management plan:
    a. Detailed hydraulic sizing calculations for each stormwater treatment measure proposed; and
    b. Pollutant removal information demonstrating that any proposed manufactured/mechanical (i.e., non-landscape-based) stormwater treatment measure, when not used in combination with a landscape-based treatment measure, is capable or removing the range of pollutants typically removed by landscape-based treatment measures.

All proposed stormwater treatment measures shall incorporate appropriate planting materials for stormwater treatment (for landscape-based treatment measures) and shall be designed with considerations for vector/mosquito control. Proposed planting materials for all proposed landscape-based stormwater treatment measures shall be included on the landscape and irrigation plan for the project. The applicant is not required to include on-site stormwater treatment measures in the post-construction stormwater pollution management plan if he or she secures approval from Planning and Zoning of a proposal that demonstrates compliance with the requirements of the City's Alternative Compliance Program.

Prior to final permit inspection. The applicant shall implement the approved stormwater pollution management plan.

- **SCA HYD-4 Maintenance Agreement for Stormwater Treatment Measures**

  Prior to final zoning inspection. For projects incorporating stormwater treatment measures, the applicant shall enter into the "Standard City of Oakland Stormwater Treatment Measures Maintenance Agreement," in accordance with Provision C.3.e of the NPDES permit, which provides, in part, for the following:

  1) The applicant accepting responsibility for the adequate installation/construction, operation, maintenance, inspection, and reporting of any on-site stormwater treatment measures being incorporated into the project until the responsibility is legally transferred to another entity; and

  2) Legal access to the on-site stormwater treatment measures for representatives of the City, the local vector control district, and staff of the Regional Water Quality Control Board, San Francisco Region, for the purpose of verifying the implementation, operation, and maintenance of the on-site stormwater treatment measures and to take corrective action if necessary. The agreement shall be recorded at the County Recorder's Office at the applicant's expense.

Impacts and Mitigation Measures

Significance Criteria

A hydrology or water quality impact would be considered significant if it would meet any of the following significance criteria. The significance criteria are listed within the general categories used to organize the impact discussion that follows.

Water Quality

The Project would have a significant water quality impact if it would:

1. Violate any water quality standards or waste discharge requirements;
2. Result in substantial erosion or siltation onsite or offsite that would affect the quality of receiving waters;
3. Create or contribute substantial runoff that would be an additional source of polluted runoff;
4. Otherwise substantially degrade water quality;
5. Substantially alter the existing drainage pattern of the site or area (including through the alteration of the course or by increasing the rate or amount of flow of a creek, river, or stream) in a manner that would result in substantial erosion, siltation, or flooding, both on or off the site; or

Groundwater Resources

The Project would have a significant groundwater resources impact if it would:

1. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or proposed uses for which permits have been granted).

Flooding

The Project would have a significant flooding impact if it would:

1. Result in substantial flooding onsite or offsite;
2. Create or contribute substantial runoff that would exceed the capacity of existing or planned stormwater drainage systems;
3. Place housing within a 100-year flood hazard area, as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, that would impede or redirect flood flows;
4. Place within a 100-year flood hazard area structures that would impede or redirect flood flows;
5. Expose people or structures to a substantial risk of loss, injury, or death involving flooding; or
6. Result in inundation by seiche, tsunami, or mudflow.

Hydrology and Water Quality Impacts

Construction Impacts on Flooding Conditions and Water Quality

Impact HYD-1: Project construction would involve activities (excavation, soil stockpiling, and grading) that could generate loose, erodable soils that could violate water quality standards or waste discharge requirements, result in substantial erosion or siltation, create or constitute substantial polluted runoff, or otherwise substantially degrade water quality. (Less than Significant)

The construction would include excavation, soil stockpiling, and grading. These activities could result in temporary erosion and transportation of sediments into the storm drainage system, especially during flood events. The use of hazardous chemicals, such as petroleum and oil, during construction could generate chemical wastes that, if not properly managed, could flow into the storm drain system. Overall Project construction activities could induce construction-related onsite soil erosion, and cause increased sediment in surface water runoff that could accumulate in downstream drainage facilities and interfere with flow and aggravate downstream flooding conditions that may exist and potentially increase sediment in Lake Merritt and ultimately San Francisco Bay.

As would be required for all development projects in Oakland, the Project is required to comply with City of Oakland's SCAs, Municipal Code, and General Plan. The requirements of these policies include preparation of a Grading Plan, Erosion and Sedimentation Control Plan, and Drainage Plan, NPDES Permit, and SWPPP, that would reduce Impact HYD-1 to a less-than-significant level. SCA HYD-1 and SCA HYD-2 would be applicable to the Project for protecting water quality during construction. The implementation of these plans, and adherence to the Standard Conditions of Approval SCAs and General Plan Policies would reduce the impact to water quality during construction to a less than significant level.

Mitigation: None required.

Construction Impacts on Groundwater Resources

Impact HYD-2: Project excavation activities would not deplete groundwater supplies nor substantially interfere with groundwater recharge or cause contaminated groundwater discharge to surface water. (Less than Significant)

Excavation and construction of structures with subsurface foundations or open trenches, such as building foundations or pipelines, can often intercept shallow groundwater and require dewatering (removal of groundwater by pumping) to lower groundwater levels and drying the area for construction. Groundwater could flow into excavations that extend below the groundwater table. Groundwater is located 3 to 18 feet below the ground surface in the Project area. The groundwater levels fluctuate based on the season by 1 to 2 feet Construction activities will include pile driving and excavation work at the site. Onsite storage tanks will be provided as necessary to contain stormwater and groundwater. There are no groundwater supply wells at the Project Site. The groundwater beneath the Project Site is not a source for agricultural or municipal uses. Dewatering would not deplete the groundwater supplies from the deeper recharge areas. Therefore, the Project would have a less-than-significant impact on groundwater resources. The SWPPP prepared for construction would include measures to prevent contamination of groundwater that could occur from chemicals associated with construction.

In the event that subsurface groundwater is encountered during construction, common practices employed include either dewatering the excavation or shoring the sides of the excavation to reduce groundwater inflow. If dewatering methods are used, groundwater would be pumped out of the excavation to the surface and discharged, usually to either a sanitary sewer or storm drain. Water extracted during dewatering could contain contaminants, either from existing sources or construction equipment, or could become sediment laden from construction activities. The Project sponsor would comply with the groundwater discharge regulations and Standards Conditions of Approval and the RWQCB to prevent contaminated dewater groundwater into the sewer or storm drain that could contaminate Lake Merritt, Oakland Estuary, and San Francisco Bay. Therefore, the impact to groundwater resources would be less than significant.

Mitigation: None required.

Operational Impacts on Flooding Conditions and Water Quality

Impact HYD-3: The Proposed Project would result in new development that could substantially alter existing drainage pattern of the Project Site or the surrounding area (Less than Significant)

The Proposed Project would include the demolition of 74,900 square feet of existing building footprint and build 80,168 square feet of new building footprint. The additional 5,268 square feet of building would be added on existing developed and impervious surfaces. Although the new building footprint would be larger, the Project would result in no net change in the amount of impervious surfaces at the Project Site. The Proposed Project development would replace an existing building footprint and impervious area and no new storm drain or sewer main facilities would be needed (BKF, 2008).

The Proposed Project includes 127,170 square feet of roof garden area; the existing roof garden area is 122,606 square feet. The Project would relocate the northwestern portion of the existing roof garden to the southern portion of the site and create new roof garden. Therefore, the Project would result in a net increase of roof garden area of approximately 4,564 square feet. Therefore, the Project would not substantially alter the existing drainage pattern on the Project Site or surrounding area and operational impacts on drainage patterns would be less than significant.

Mitigation: None required.

Impact HYD-4: The Proposed Project would not result in a net increase in impervious surfaces and would not cause an increase in the volume of stormwater runoff. The Project would not violate any waste discharge requirements that would create substantial runoff and result in substantial flooding onsite or offsite. The Project would not exceed the capacity of the stormwater drainage system. (Less than Significant)

Runoff on the impervious surfaces of the Project Site consists primarily of sheet flow towards the sidewalk and subsequently to storm drains. The existing Project Site is primarily developed with buildings, paved areas, and 122,606 square feet of garden area. The Proposed Project would add approximately 4,564 square feet of garden area, and include the redevelopment of 80,168 square feet of buildings and paved areas, both onsite and Project-related offsite (i.e, sidewalks, etc). The garden area would provide pervious surfaces and an opportunity for storm water treatment options such as rain gardens, tree well filter type treatment structures, and flow through plants (BKF, 2008). Due to the increase in roof garden area and no net increase in impervious surfaces, the Project would result in a net increase in pervious area.

The C.3 Provision of the NPDES permit governs storm drain systems and regulates post-construction stormwater runoff (see Regulatory Setting, above). The Proposed Project, as required by NPDES permitting process, would be required to manage flows from the Project area. The Proposed Project consists of moderate density infill that maximizes the use of existing infrastructure and streets, with minimal impact to the environment. The roof garden offers opportunity for landscaped based treatment options and detention of stormwater runoff. The Project would limit the amount of connected impervious area within the Project area, including water efficient landscaping, and would treat stormwater onsite through use of the roof garden.

The Proposed Project would be required to comply with RWQCB post-construction storm water quality standards. A SWPPP, Stormwater Quality Plan, and the SCAs would be prepared for the Project. SCA HYD-3 and SCA HYD-4 would be applicable for protecting water quality and reducing stormwater runoff post-construction. The Proposed Project would have a less than-significant-impact to water quality and stormwater runoff post-construction due to the implementation of the required plans and SCAs.

Mitigation: None required.

Impact HYD-5: The Proposed Project would not result in flooding due to its proximity to a 100-year flood hazard area, or expose people or structures to other substantial risk related to flooding, seiche, tsunami, or mudflow. (Less than Significant)

The Project Site is located in an area designated as Flood Hazard Area Zone X. Flood Hazard Area Zone X designates an area determined to be outside of the 1 percent annual chance flood and the 0.2 percent annual chance flood (i.e. 100-year flood and 500-year flood) (FEMA, 1982). The chance of flooding in the Project area from tsunamis, seiches, and mudflows is low. Flood from tsunamis would likely affect low-lying areas along the Oakland Estuary and San Francisco Bay, but the island of Alameda would shelter the Project Site. In addition, the likelihood of large-scale devastation in Oakland resulting from seiches appears to be minuscule (City of Oakland, 2004). The area is not adjacent to steep slopes where mudflows are likely to occur. Additionally, based on the ABAG maps, the Project Site is not at risk for dam failure inundation (ABAG, 1995). Therefore, the Project would not expose people or structures to the risk of loss due to flooding.

Mitigation: None required.

Cumulative Impacts

Impact HYD-6: The increased construction activity and new development resulting from the Proposed Project, in conjunction with past, present, pending and reasonably foreseeable projects in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions. (Less than Significant)

Geographic Context

The geographic area considered for the hydrology and water quality cumulative analysis is the East Bay Plain of the San Francisco Bay Basin. The East Bay Plain context includes, but is not limited to, the projects listed in the City of Oakland's Active Major Development Projects list (see Section IV Introduction, Table IV-1 List of Relevant Cumulative Projects from the City's Major Project List).

Impacts

Stormwater runoff entering the storm sewers within the project's geographic area discharge to the San Francisco Bay. The stormwater contains urban-type pollutants from past, present and existing projects in the sewered area, which have contributed to impairment of the quality of the San Francisco Bay. Applicable stormwater regulations have become progressively more rigorous since the adoption of the Federal Clean Water Act in 1977, with the derivative requirements imposed and enforced by the State Water Resources Control Board and Regional Water Boards through the NPDES permitting process. Stormwater runoff from past, present and existing development is treated in accordance with NPDES requirements. These requirements have resulted in polices and regulations, incrementally strengthened by a series of amendments and adopted by Water Board Orders, mandating greater levels of protection to water quality for past, present, existing and current projects.

Recently approved, currently pending and future projects, including the Proposed Project, would continue to discharge stormwater during construction and operation of these projects. However, all future projects would be subject to current and any subsequent NPDES permitting requirements, which are periodically updated and amended to further reduce pollutant loading in the stormwater runoff. Therefore, no significant adverse impacts are expected from cumulative conditions because stormwater runoff quality would be expected to cumulatively improve.

Mitigation: None required.

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H. Land Use, Plans and Policies

This section describes the existing land uses, adopted General Plan land use classifications, and zoning designations on and around the Kaiser Center Project Site. This section also describes the applicable plans and policies that guide development in the project area and evaluates the project's consistency with these plans and policies and other existing land use regulations.

Following the discussion of the project's relationship to various plans and policies, this section identifies any potentially significant land use impacts and, if necessary, appropriate mitigation measures SCAs. Pursuant to the City's recent amendment to the Oakland General Plan (City of Oakland, 2005, as well as Section 15358(b) of the CEQA Guidelines), mitigation measures are proposed only to address physical impacts that may result for the project.

Introduction

Land Use Classifications and Zoning

The Project Site is located in the City of Oakland, less than one mile northeast of downtown (see **Figure III-1** in Section III, Project Description). The Project Site is within the Central Business District land use designation indentified in the Oakland General Plan (see Figure III-2 in Section III of this EIR), Areas to the north and east of the Project Site lie within the *Community Commercial, Urban Residential, Neighborhood Center Mixed Use,* and *Resource Conservation Area* classifications.

Figure III-2 delineates the current zoning designations that apply to the Project Site and surrounding area. The zoning on the Project Site at the time the project application was deemed complete was C-55 Central Core Commercial Zone, which is combined with the S-17 Downtown Residential Open Space Combining Zone, and the S-4 Design Review Combining Zone.

The Project Site is comprised of two three-story buildings, primarily used as commercial office space. Retail and other services occupy the ground level. A roof garden is behind the curved 29-story Kaiser Center tower that sits on the eastern portion of the project area. Landscaped walkways and sitting areas are distributed throughout the garden and three small shallow manmade pools provide additional decoration.

Setting

Site Vicinity Land Uses

The Project Site is generally near the intersection of two major transportation corridors: Grand Avenue and Broadway. Within a 1-mile radius, Broadway leads to Interstate 580 (I-580) and Highway 24 north of the Project Site, and Grand Avenue leads to I-980 and I-880 west of the Project Site. The project vicinity (generally one-half mile around the Project Site) contains a mix of commercial and urban residential uses, as well as a designated resource conservation area along Lake Merritt, which is adjacent to and east of the Project Site (see Figure III-4 in Chapter III, *Project Description*).

These major corridors provide access to a variety of commercial activities and urban residential neighborhoods that have a mix of housing types and densities. Access to and from the 19th Street Oakland BART Station is approximately one-quarter mile west at 20th Street and Broadway.

West of the Project Site

Broadway, the main north-south route, is less than one-quarter mile west of the Project Site. Uses along this major business corridor include local retail, restaurants, and commercial office buildings and apartments ranging from three stories to more than ten stories in height. Along Broadway, between Grand Avenue and 42nd Street, is Oakland's Broadway Auto Row, a two-mile stretch of used and new car dealer facilities. This stretch also includes low to high rise office buildings, commercial and retail units, multi-family residences, single-resident occupancy facilities, and institutional facilities (churches and schools). As noted above, downtown Oakland is south and southwest of the Project Site. Uses in the downtown district include movie theaters, galleries, libraries, commercial retail and museums. Outdoor venues and activities include farmers' markets, performance venues and public art.

South of the Project Site

Land uses directly south of the Project Site consist primarily of interspersed commercial office buildings, ranging in heights of two stories to more than twenty stories. Further south, uses include high-density, but largely distributed, residential complexes. Directly south of the Project Site across 20th Street is the 4.2-acre Snow Park, a manicured park which includes a putting green.

East of the Project Site

Directly east of the Project Site is the 3.4-acre Lake Merritt and surrounding Lakeside Park, an area providing open space and recreational facilities. Recreational uses around the lake include a walking promenade around the perimeter of the lake, tennis facilities, and a local boating center, where visitors can rent kayaks and other non-motorized boats. Land uses east of Lake Merritt include primarily residential neighborhoods comprised of multifamily and single-family residences.

North of the Project Site

Uses north of the Project Site include a variety of commercial and institutional services and interspersed office buildings. Northeast of the Project Site, along Grand Avenue and facing Lake Merritt, uses include a number of high-density apartment/ condominium developments, and residential neighborhoods of primarily one- and two-unit dwelling units with low-rise apartment buildings in a dense development pattern.

Directly northeast of the project across 21st Street is the Cathedral of Christ the Light, an architecturally distinguished Catholic church for the Diocese of Oakland.

Project Site Land Use

The Project Site is bound by 21st^{t} Avenue on the north, Webster Street on the east, 20th Street on the south, and Harrison Street on the east. Land uses on the existing property consist primarily of commercial office and retail space. The Project Site contains existing commercial structures that range from approximately 25 to 35 feet tall and include a retail drug store and retail bank at 20th and Webster streets (known as the "20th Street Mall") and a retail fitness center/health club at Webster and 21st streets (known as the "Webster Street Mall").

City Plans, Policies and Regulations

Applicable plans and major policies and regulations that pertain to the Kaiser Center EIR project are presented below, followed by a discussion of the project's overall consistency (or inconsistency) with each regulatory document.

As noted above, conflicts with a General Plan do not inherently result in a significant effect on the environment within the context of CEQA. As stated in Section 15358(b) of the CEQA Guidelines, "[e]ffects analyzed under CEQA must be related to a physical change." Section 15125(d) of the Guidelines states that EIRs shall discuss any inconsistencies between the Proposed Project and applicable General Plans in the Setting section of the document (not under Impacts).

Further, Appendix G of the Guidelines (Environmental Checklist Form) makes explicit the focus on *environmental* policies and plans, asking if the project would "conflict with any applicable land use plan, policy, or regulation . . . *adopted for the purpose of avoiding or mitigating an environmental effect*" (emphasis added). Even a response in the affirmative, however, does not necessarily indicate the project would have a significant effect, unless a physical change would occur. To the extent that physical impacts may result from such conflicts, such physical impacts are analyzed elsewhere in this EIR.

City of Oakland General Plan

The Oakland General Plan establishes comprehensive, long-term land use policies for the City. Consistent with state law, the General Plan includes the *Land Use and Transportation Element*; the *Estuary Policy Plan* ; the *Historic Preservation Element*; the *Open Space, Conservation, and Recreation Element*; the *Safety Element*; the *Housing Element*; the *Noise Element*; the *Bicycle Master Plan*; the *Pedestrian Master Plan*; and the *Scenic Highways Element*. Each of the General Plan elements is discussed below, except for the *Housing Element, and Estuary Policy Plan,* since the project:

- would not demolish any housing units, and
- is not located in proximity to the Oakland waterfront.

Land Use and Transportation Element

The City adopted the Land Use and Transportation Element (LUTE) of the General Plan on March 24, 1998. The LUTE identifies policies for utilizing Oakland's land as change takes place and sets forth an action program to implement the land use policy through development controls and other strategies. The LUTE shows the Project Site within the *Central Business District* classification (see **Figure III-2**). The intent and desired character of this classification are described below.

> **Central Business District:** The intent of the *Central Business District* is "to encourage, support and enhance the downtown area as a high density, mixed use urban center of regional importance and a primary hub for business, communications, office, government, high technology, retail, entertainment, and transportation…" The desired character and uses include "…a mix of large-scale offices, commercial, urban (high-rise) residential, institutional, open space, cultural, educational, arts, entertainment, service, community facilities, and visitor uses." The maximum floor-area ratio (FAR)[1] is 20.0, and the maximum allowable residential density is 300 units per gross acre. Different FARs may be encouraged for different areas. For example, for the Broadway spine, the highest FAR may be encouraged, and for areas close to Lake Merritt and Old Oakland, lower FARs may be appropriate.

LUTE objectives and policies that apply to the Project are listed and discussed below:[2]

- Existing businesses and jobs within Oakland which are consistent with the long range acceptance of this Plan should, whenever possible, be retained. *(Policy 1C1.2, Retaining Existing Buildings)*
- Adequate cultural, social and support amenities designed to serve the needs of workers in Oakland should be provided within close proximity of employment centers. *(Policy 1C1.8 Providing Support Amenities Near Employment Centers)*
- Adequate public infrastructure should be ensured within existing and proposed industrial and commercial areas to retain viable existing uses, improve marketability of existing vacant or underutilized sites, and encourage future use and development of these areas with activities consistent with the goals of this Plan. *(Policy 1C1.9 Locating Industrial and Commercial Area Infrastructure)*
- Retain and enhance clusters of similar types of commercial enterprises as the nucleus of distinctive business districts, such as the existing and new automobile sales and related uses through urban design and business retention efforts. *(Policy 1C3.2 Enhancing Business Districts)*
- New large-scale community, governmental, and institutional uses should be located outside of areas that are predominantly residential. Preferably, they should be located among major thoroughfares with easy access to freeways and public transit or in the Downtown. (*LUTE Policy N2.4, Locating Services along Major Streets)*
- The characteristics that make downtown Oakland unique, including its strong core area; proximity to destinations such as the Jack London waterfront, Lake Merritt, historic areas, cultural, arts, and entertainment activities; housing stock, should be enhanced and

1 Floor-area ratio (FAR) is gross floor area of a building divided by total site area, excluding parking.
2 The LUTE includes objectives and policies that pertain to five policy areas: Industry and Commerce (I/C), Transportation and Transit-Oriented Development (T), Downtown (D), Waterfront (W), and Neighborhoods (N). The alpha designators indicate the appropriate LUTE objectives and policies.

used to strengthen the downtown as a local and regional asset (*LUTE Policy D1.1 Defining Characteristics of Downtown*).

- The downtown should be viewed as the compilation of a series of distinct districts, including but not limited to City Center, Chinatown, Old Oakland, the Broadway Corridor, Gateway, Kaiser Center, Gold Coast, the Channel Park area south of Lake Merritt, and the Jack London Waterfront. A distinct identity for these downtown districts should be supported and enhanced. (*LUTE D1.2 Identify District Districts*)
- The Kaiser Center finance and office area should be strongly linked with the Broadway/ 19th Street office core, and sensitive to pedestrian-friendly open space amenities associated with Lake Merritt and Snow Park (*LUTE D1.6 Planning for Kaiser Center*).
- Downtown development should be visually interesting, harmonize with its surroundings, respect and enhance important views in and of the downtown, respect the character, history, and pedestrian-orientation of the downtown, and contribute to an attractive skyline (*LUTE D2.1 Enhancing the Downtown*).
- Pedestrian-friendly commercial areas should be promoted. (*LUTE D.3.1 Promoting Pedestrians*)
- Development activities should be supported through infrastructure improvements in the downtown. (*LUTE D4.1 Supporting Development*)
- A positive business climate which encourages attraction of new businesses and retention and expansion of existing businesses in downtown Oakland should be fostered, promoting Oakland's locational (transportation) advantages and other amenities. (*LUTE D4.2 Fostering a Positive Business Climate*)
- Economic sectors that promote employment, are likely to grow, or will diversify the economic base should be attracted to the downtown. (*LUTE D4.3 Attracting Employment to the Downtown*)
- Downtown Oakland's advantages for regional office development, including its position as the hub for regional transportation, should be advocated at State and regional planning levels. (*LUTE D7.1 Advocating for Downtown)*
- New large-scale office development should be located primarily along the Broadway corridor south of Grand Avenue, with concentrations at the 12th Street and 19th Street BART stations. The height of office development should respect the Lake Merritt edge. Small-scale offices should be allowed throughout the downtown, including in the downtown neighborhoods, when compatible with the character of surrounding development (*LUTE D8.1 Locating Office Development*).
- While office development should be allowed in commercial areas in the neighborhoods, the City should encourage major office development to locate in the downtown. (*LUTE N1.9 Locating Major Office Development*)
- Identify locations of interest and historic significance by markers, signs, public art, landscape, installations, or by other means. (*LUTE N9.5 Making Significant Sites*)
- The City will require new development, rebuilding, or retrofit to incorporate design features in their projects that encourage use of alternative modes of transportation such as transit, bicycling, and walking. *(Policy T4.1, Incorporating Design Features for Alternative Travel*)

- The City should make efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian oriented, including lighting, directional signs, trees, benches, and other support facilities. (*LUTE Policy T6.2, Improving Streetscapes)*

- New large-scale office development should be primarily located along the Broadway corridor south of Grand Avenue, with concentrations at the 12th Street and 19th Street BART stations. The height of office development should respect the Lake Merritt edge. Small-scale offices should be allowed throughout the downtown, including in the downtown neighborhoods, when compatible with the character of surrounding development. *(Policy D8.1 Locating Office Development)*

- Future office development on Harrison Street opposite Lakeside Park and Snow Park should provide ground level landscaped open space to soften the edge between public parkland and the office core. This space should be clearly accessible to office workers and the public.*(Policy D8.2 Respecting Public Parks)*

- New parking facilities for cars and bicycles should be incorporated into the design of any project in a manner that encourages and promotes safe pedestrian activity. *(LUTE PolicyD3.2, Incorporating Parking Facilities)*

Project Consistency with LUTE Policies. The Project would be consistent with the various LUTE policies that support the continued existence and expansion of the Kaiser Center business complex and seek to promote the City's overarching LUTE policies.

The Project would redevelop the retail areas of the Project Site along 20th and Webster Streets, and construct two new office towers. The Project would enhance the current Kaiser Center commercial properties with approximately 1.47million square feet (msf) of new and well-designed office, commercial, ground-floor retail, parking, and enhanced open space, which is in support of the City's policies to strengthen and preserve the vitality of existing community commercial areas.

The Project would relocate the northwest portion of an existing roof garden to the southern portion of the site, which would result in a net increase of public open space by approximately 4,500 square feet. A new "grand stairway" would provide access to the roof garden from 20th Street. Although the garden is not currently ground level, public access would be clearly accessible to office workers and visitors to the Kaiser Center, which is consistent with LUTE policies for downtown projects and public access to public open spaces.

Historic Preservation Element (HPE)

The City adopted the Historic Preservation Element (HPE) on March 8, 1994, and amended it on July 21, 1998. The Preservation Element provides a strategy for preserving historically significant resources throughout the city. HPE objectives and policies that apply to the Project are listed and discussed below:

- *Avoid or Minimize Adverse Historic Preservation Impacts Related to Discretionary City Actions.* The City will make all reasonable efforts to avoid or minimize adverse effects on the Character-Defining Elements of existing or Potential Designated Historic Properties, which could result from private or public projects requiring discretionary City actions. *(HPE Policy 3.1)*
- *Historic Preservation and Discretionary Permit Approvals.* For additions or alterations to Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design matches or is compatible with, but not necessarily identical, to the property's existing or historical design; or (2) the proposed design comprehensively modifies and is at least equal in quality to the existing design and is compatible with the character of the neighborhood; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood.
    - For any project involving complete demolition of Heritage Properties or Potential Designated Historic Properties requiring discretionary City permits, the City will make a finding that: (1) the design quality of the proposed project is at least equal to that of the original structure and is compatible with the character of the neighborhood; or (2) the public benefits of the proposed project outweigh the benefit of retaining the original structure; or (3) the existing design is undistinguished and does not warrant retention and the proposed design is compatible with the character of the neighborhood. *(HPE Policy 3.5)*
- *Property Relocation Rather than Demolition*. As a condition of approval for all discretionary projects involving demolition of existing or Potential Designated Historic Properties, the City will normally require that reasonable efforts be made to relocate the properties to an acceptable site. *(HPE Policy 3.7)*

Project Consistency with HPE Policies. The above policies from the Historic Preservation Element generally encourage, but do not mandate, the preservation of Oakland's historic resources, within the context of and consistent with other General Plan goals, objectives, and policies. So, for example, the admonition in HPE Historic Preservation Goal 2 against "the unnecessary destruction" of historic buildings and HPE Policy 3.1's direction to employ "all reasonable efforts to avoid or minimize adverse effects" on historic resources are reviewed against the Proposed Project's provision of additional office space in Downtown Oakland. Although this Draft EIR conservatively deems demolition of the mall buildings and new construction to be a significant and unavoidable impact (see Section IV.D, *Cultural Resources*), the Proposed Project is generally consistent with HPE policies.

Open Space, Conservation and Recreation Element (OSCAR)

The City adopted the Open Space, Conservation and Recreation Element (OSCAR) on June 11, 1996. The OSCAR addresses the management of open land, natural resources, and parks in Oakland. Many of the policies directly relate to significance criteria, and where applicable, the Project's consistency with those policies are summarized here and referenced to the appropriate impact analysis section in this EIR. OSCAR policies that apply to the Project are listed and discussed below[3]:

- Conserve privately owned areas with important natural resource values through a combination of land acquisition and development controls. *(Policy OS-1.2)*
- Particular attention should be paid to (a) views of the Oakland Hills from the flatlands; (b) views of downtown and Lake Merritt; (c) views of the shoreline; and (d) panoramic views from Skyline Boulevard. *(Policy OS-10.1)*
- New development should minimize adverse visual impacts and take advantage of opportunities for new vistas and scenic enhancement. *(Policy OS-10.2)*
- Discourage the removal of large trees on already developed sites unless removal is required for biological, public safety, or public works reasons. *(Policy CO-7.4, Tree Removal)*
- Regulate new development in a manner that protects soil from degradation and misuse or other activities, which significantly reduce its ability to support plant and animal life. Design all construction activities to ensure that soil is well secured so that unnecessary erosion, siltation of streams, and sedimentation of water bodies does not occur. *(Policy CO-1.1, Soil Loss in New Development.)*
- Minimize hazards associated with soil contamination through the appropriate storage and disposal of toxic substances, monitoring of dredging activities, and clean up of contaminated soils. In this regard, require soil testing for development of any site (or dedication of any parkland or community garden) where contamination is suspected due to prior activities on the site. *(Policy CO-1.2, Soil Contamination Hazards)*
- Emphasize water conservation and recycling strategies in efforts to meet future demand. *(Policy CO-4.1, Water Conservation)*
- Require use of drought-tolerant plants to the greatest extent possible and encourage the use of irrigation systems, which minimize water consumption. *(Policy CO-4.2, Drought-Tolerant Landscaping)*
- Encourage groundwater recharge by protecting large open space areas, maintaining setbacks along creeks and other recharge features, limiting impervious surface where appropriate, and retaining natural drainage patterns within newly developing areas. *(Policy CO-5.1, Protection of Groundwater Recharge)*
- Employ a broad range of strategies, compatible with the ACCWP, to: (a) reduce water pollution associated with stormwater runoff; (b) reduce water pollution associated with hazardous spills, runoff from hazardous material areas, improper disposal of household hazardous wastes, illicit dumping, and marina “live-aboards”; and (c) improve water quality in Lake Merritt to enhance the lake’s aesthetic, recreational, and ecological functions. Actions are pretreatment of runoff, storm drain maintenance, litter and debris removal, street sweeping improvements, mitigation of road construction and dredging impacts, hazardous spills prevention, cleanup of estuary hot spots, litter law enforcement, public education of urban runoff hazards, Lake Merritt catch basins and trash receptacles, improved sewage collection and treatment, and intergovernmental coordination. *(Policy CO-5.3, Control of Urban Runoff)*

3 The OSCAR policies that pertain to the project address Open Space (OS) and Conservation C), and are indicated by these alpha designators.

- Promote land use patterns and densities which help improve regional air quality conditions by: a) minimizing dependence on single passenger autos; (b) promoting projects which minimize quick auto starts and stops, such as live-work development, and office development with ground-floor retail space; (c) separating land uses which are sensitive to pollution from the sources of air pollution; and (d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis. *(Policy CO-12.1, Land Use Patterns which Promote Air Quality)*
- Require that development projects be designed in a manner that reduces potential adverse air quality impacts. This may include: a) the use of vegetation and landscaping to absorb carbon monoxide and to buffer sensitive receptors; b) the use of low –polluting energy sources and energy conservation measures; c) designs which encourage transit use and facilitate bicycle and pedestrian travel. *(Policy CO-12.4, Design of Development to Minimize Air Quality Impacts)*
- Encourage the use of energy-efficient construction and building materials. Encourage site plans for new development that maximize energy efficiency *(Policy CO-13.3, Construction Methods and Materials*).

Project Consistency with OSCAR Element Policies. The Kaiser Center property is an approximately 7.2-acre developed area, with buildings that accommodate retail and office uses. As discussed previously, the Proposed Project would redevelop approximately 2.2 acres of the 7.2-acre Kaiser Center Project Site, resulting in the construction of two towers, 34 and 42 stories that would be primarily for office uses. This new construction would result in about 1.47 million square feet (msf) of additional office, commercial, ground-floor retail, and parking space. In addition, the Project would relocate the northwest portion of the existing roof garden to the southern portion of the site, which would result in a net increase of open space on the site by approximately 4,500 square feet. Access to the enhanced roof garden by visitors to the Kaiser Center will also be improved from entrances on 20th Street, Webster Street, along the inner drive, through the parking garage, and through the Amenity Floors of the two new towers.

The roof garden provides habitat for migrating birds and supports natural stormwater management with landscaped vegetation and surrounding ponds. The relocation and enhancement of the roof garden would be consistent with the OSCAR policies that encourage groundwater recharge, water and conservation strategies, and reduce water pollution associated with stormwater runoff.

Oakland Safety Element

The City adopted the Safety Element of the Oakland General Plan in November 2004. The Safety Element includes goals that address the effects that safety hazards can pose to the health and safety of Oakland's populations, Oakland's economic welfare, and Oakland's natural resources. Specific policies and detailed actions are identified to address public safety, geologic hazards, fire hazards, hazardous materials, and flooding hazards. Given the topics that are addressed in the Safety Element, most of its policies generally apply citywide. However, Safety Element policies that apply to the Project are listed and discussed below:

- Continue, enhance or develop regulations and programs designed to minimize seismically related structural hazards from new and existing buildings. (*Policy GE-3*)

- Continue, enhance or implement programs that seek to reduce the risk of structural fires. *(Policy FI-2)*
- Maintain and enhance the city's capacity to prepare for, mitigate, respond to, and recover from disasters and emergencies. *(Policy PS-1)*
- Minimize the potential risk to human and environmental health and safety associated with the past and present use, handling, storage and disposal of hazardous materials. (*Policy HM-1*)
- Reduce the public's exposure to toxic air contaminants through appropriate land use and transportation strategies. *(Policy HM-2)*
- Continue to strengthen city programs that seek to minimize the storm-induced flooding hazards. *(Policy FL-2)*

Project Consistency with Safety Element Policies. The Project would not conflict with any of the above Safety Element policies. The EIR addresses the Project's specific effects regarding subjecting people and property to hazardous conditions (Section IV.F, *Hazardous Materials*; Section IV.G, *Hydrology and Water Quality*), all of which are less than significant or reduced to less than significant after implementation of mitigation measures or SCAs.

Noise Element

The City adopted Oakland's Noise Element on June 21, 2005. The Noise Element analyzes and quantifies current and projected noise levels from various sources that contribute to the community noise environment. These noise levels are depicted on noise contour maps that are used to guide land use decisions to reduce noise impacts, especially on sensitive receptors. The Noise Element also includes a land use-noise compatibility matrix that illustrates the degree of acceptability of exposing various sensitive land uses to noise. The Noise Element contains policies and actions that direct the City's (or other appropriate agencies') efforts to carry out the noise policies. However, the overall Noise Element policy that applies to the Project is the following:

- Ensure the compatibility of existing and, especially, of proposed development projects, not only with neighboring land uses, but also with their surrounding noise environment. *(Policy 1)*

Project Consistency with Noise Element Policies. The Project Site is generally located in a noise environment along major transportation corridors, including Interstate 580 (I-580), Interstate 880 (I-880), Interstate 980 (I-980) and State Route 24 (SR 24). The noise analysis provided in Section IV.I, *Noise,* of this EIR finds that increased noise resulting from the Project (traffic related and operational) would result in a less-than-significant impact. Consistent with the City's Noise Ordinance and the Oakland Noise Element, SCAs and Project mitigation measures that would be implemented to the extent feasible, and that would reduce temporary construction impacts to less than significant levels.

Bicycle Master Plan and Pedestrian Master Plan

In December 2007, the City Council adopted the Oakland Bicycle Master Plan (BMP) and in November 2002, the City Council adopted the Pedestrian Master Plan as part of the LUTE. The City of Oakland Bicycle Master Plan (December 2007) calls for the implementation of the following bikeway network improvements (Figure IV.L-8):

- Class 2 / 3 facilities on Lakeside Drive / Harrison Street, extending south of I-880 and north of Grand Avenue;
- Class 2 / 3 facilities on 20th Street between Lakeside Drive and San Pablo Avenue;
- Class 2 / 3 facilities on Webster Street / Franklin Street between 8th Street and Broadway;
- Class 2 / 3 facilities on 14th Street extending east and west from Downtown Oakland;
- Class 2 / 3 facilities on 8th Street / 9th Street between Lakeside Drive and Martin Luther King, Jr. Way; and,
- Class 2 / 3 facilities on 27th Street between Grand Avenue and San Pablo Avenue.

The Pedestrian Master Plan identifies policies and implementation measures for achieving LUTE policies that promote a walkable city. The Plan designates a Pedestrian Route Network throughout Oakland and identifies a “City Route” on Broadway north of MacArthur Boulevard, and a “District Route” on Piedmont Avenue.

The Proposed Project would be consistent with the Bicycle Master Plan and Pedestrian Master Plan, as it will comply with City of Oakland’s SCAs that ensures the submittal, approval and implementation of plans to the City to impermanent bicycle storage and parking facilities to accommodate the bicycle parking spaces required for the Project and implement measures and SCA to ensure pedestrian safety, as discussed in detail in Section IV. L, *Transportation and Circulation*.

Scenic Highways Element

In September 1974, the City adopted the Scenic Highways Element, which sets a framework for designated and potential scenic highways and routes throughout the City and policies for establishing and preserving such routes.

Project Consistency with Scenic Highways Policies. The Project Site is not located within a scenic corridor, nor does it obstruct panoramic vistas or interesting views currently available to a motorist. The nearest designated scenic highway is the Oakland segment of I-580, located approximately 1 mile east-northeast of the Project Site. Therefore, the Project would be consistent with the City’s Scenic Highways Element.

Oakland "Transit First" Policy

The "Transit First" resolution, passed by the City Council on October 29, 1996, recognizes the importance of striking a balance between economic development opportunities and the mobility needs of those who travel by means other than the private automobile. The policy favors modes that have the potential to provide the greatest mobility for people, rather than vehicles.

Project Consistency with Oakland's "Transit First" Policy. New employees and visitors of the redeveloped Kaiser Center property generated by the Project would increase the demand for transit service in the area. As discussed in Section IV.L, *Traffic and Circulation*, the Project will at enhance existing pedestrian and bicycle access facilities such as improved access to the public roof garden, widening of sidewalks, and increased access to BART and public transit, ultimately resulting in a transit oriented development.

Oakland Zoning Code

The zoning on the Project Site at the time the Project application was deemed complete was C-55, Central Core Commercial Zone, which is combined with the S-17, Downtown Residential Open Space Combining Zone and the S-4, Design Review Combining Zone. Effective July 21, 2009, the zoning on the Project Site was changed to CBD-C, Central Business District Commercial. The Proposed Project, pursuant to Section 6 of the rezoning ordinance, is "grandfathered" under the C-55, S-17 and S-4 zones. Relevant land use and development standards of the prior (grandfathered) zoning and the current zoning are shown below, as is the Proposed Project's consistency with each (although consistency with the CBD-C Zone is not required).

Project Consistency with Oakland Zoning. The proposed land uses are consistent with both zoning in existence at the time the Project application was deemed complete (C-55, S-17 and S-4 zones) and new zoning (CBD-C zone). The Project is also consistent with the zoning in existence at the time the Project application was deemed complete, and generally consistent with the new zoning.

The Project Site is also located within the Lake Merritt Historic District (see Section IV.D Cultural Resources, for more detail).

TABLE IV.H-1
PROJECT CONSISTENCY WITH BASIC ZONING REGULATIONS REGARDING USE AND BUILDING DEVELOPMENT

	Previous C-55 Zone (Grandfathered Project)	Project Compliance (Y/N)	Current CBD-C Zone	Project Compliance (Y/N)
Maximum Building Base Height	NA	NA	120 feet	No Base
Maximum Total Height	NA	NA	No Limit	Y
Minimum Total Height of Principal Buildings	NA	NA	45 feet	Y
Maximum Setbacks	No minimum	NA	0 to 5 feet	N
Maximum FAR	No minimum	NA	20.0	Y 17.7 [a]
Maximum Average Floor Plate Area	NA	NA	No Limit	Y
Maximum Building Length	NA	NA	No Limit	Y
Minimum Distance Between Towers on Same Lot	NA	NA	No Limit	Y
Ground floor commercial facade transparency	NA	NA	60 percent	[b]
Minimum Height of the Ground Floor	NA	NA	15 feet	Y
Commercial General Retail Use [a, b]	Permitted	Permitted	Permitted	Permitted
Commercial Administrative Use [a, b]	Permitted	Permitted	Permitted	Permitted

a Total building area without parking and usable roof area (1,698,542 square feet) divided by site area (2.2 acres or 95,832 square feet).
b No detailed design drawings developed at time of DEIR publication.
c Requires Conditional Use Permit if exceeds 7,500 square feet.
d These activities may only be located on or below the ground floor of a building with the following exceptions:
1) If the floor area devoted to the activity is less than 2,000 square feet or less and the activity takes place in a Local Register property then the activity is permitted above the ground floor upon the granting of a Conditional Use Permit (see Chapter 17.134 for the CUP process).
2) An activity located on the ground floor may extend to the second floor of a building if each: 1) the floor area devoted to nonresidential activities in the building is less than the floor area devoted to residential activities; 2) the activity on the second floor is the same as, or accessory to, the ground floor activity and part of the same business or establishment; and 3) there is a direct internal connection between the ground floor and the second story activities.

SOURCE: Oakland Planning Code, Section 17.58 (CBD-C Zone) and Section 17.62 (C-55 Zone), June 9, 2009

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

There are no City of Oakland SCAs specific to land use.

Impacts and Mitigation Measures

Significance Criteria

The Project would result in a significant impact related to land use and plans if it would:

1. Physically divide an established community;
2. Fundamentally conflict with any applicable land use plan, policy or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect and result in a physical change in the environment; or
3. Fundamentally conflict with any applicable habitat conservation plan or natural community conservation plan

As previously indicated (under *OSCAR Policies*), the Project is not located in or near an area guided by a Habitat Conservation Plan or Natural Community Conservation Plan.

Approach to Analysis

This EIR analysis evaluates the Project's compatibility with applicable plans and policies in order to determine the potential for significant environmental impacts. As discussed in the *Setting* section of this chapter, the General Plan has determined that the "the fact that a specific project does not meet all General Plan goals, policies, and objectives does not inherently result in a significant effect on the environment within the context of [CEQA]" (City of Oakland, 2005a). In addition, the Project Site and its proposed uses were evaluated in terms of their compatibility with existing land uses adjacent and in proximity to the Project Site.

Physical Division of an Established Community

Impact LU-1: The Proposed Project would redevelop buildings at the Kaiser Center property on the northwest corner of Webster and 20th Streets in Downtown Oakland, but would not result in the physical division of an existing community. (Less than Significant)

The Project would create two new office towers, which would replace the existing "20th Street Mall" and "Webster Mall" retail/office facilities. The sites where the new office towers would be located are currently occupied with commercial and office uses that would be demolished for the Project. The Project Site is in proximity to existing neighborhoods, primarily northeast of the Project Site, north of Grand Avenue. Some multi-story residential units are also distributed south of the Project Site and surrounding Lake Merritt.

Overall, the Project would result in substantially taller and larger structures than currently exists on the Project Site and would include various additional commercial uses on the east side of Broadway between Grand Avenue and 20th Street. The Pproject area respects the existing "edges" of their respective adjacent neighborhoods and the implementation of the Proposed Project would not result in their division. Further, the Project specifically proposes publicly accessible gathering spaces (like the roof garden) and pathways intended partly to facilitate pedestrian access to the Lake Merritt and Snow Park recreational areas, east and south of the Project Site, respectively.

Because the Lake Merritt area is an established community, as are several subareas of smaller neighborhoods within this region of Oakland, no aspect of the Proposed Project would result in a physical division, physically or perceptually.

Mitigation: None required.

Land Use Compatibility / Change in Environment

Impact LU-2: The Proposed Project would not conflict with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effects. (Less than Significant)

Conflicts between a Project and applicable policies do not constitute significant physical environmental impacts in and of themselves. A policy inconsistency is considered a significant adverse environmental impact only when it is related to a policy adopted for the purpose of avoiding or mitigating an environmental effect and it is anticipated that the inconsistency would result in a significant adverse physical impact based on the established significance criteria. The Proposed Project would not conflict with any land use policies adopted for the purpose of avoiding or mitigating an environmental effect. As a result, no significant land use impacts related to the Project's consistency with land use policies would occur.

The land uses proposed by the Project are consistent with the General Plan designations and applicable zoning on the Project Site. Moreover, the existing maximum development intensity allowed by the existing General Plan classifications would accommodate that proposed by the Project. Actual development would be restricted by the limits, standards, and guidelines (building height, setbacks, etc.) prescribed by the current applicable zoning designation and at the discretion of the City through the discretionary review of the Project.

Mitigation: None required.

Habitat and Natural Community Conservation Plans

Impact LU-3: The Proposed Project would not result in a fundamental conflict between adjacent and nearby land uses, particularly with respect to any applicable habitat conservation plan or natural community conservation plan. (Less than Significant)

The proposed development of two office towers and ground floor retail is consistent with the existing land uses on the Kaiser Center site and in the surrounding high-rise commercial buildings in the area. Further, the Project Site is not located within or near an area guided by a Habitat Conservation Plan or Natural Community Conservation Plan (as determined in the analysis in Section IV.C, *Biological Resources,* of this EIR, specifically Impact BIO-5). Therefore, the

Project would not conflict with nearby land uses, and no conservation land use addressed by a plan exists in the immediate vicinity.

Mitigation: None required.

Cumulative Impacts

Impact LU-4: The Proposed Project would not result in a significant cumulative land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect from past, present, pending and reasonably foreseeable development. (Less than Significant)

Geographic Context

The geographic area considered for the land use cumulative analysis includes the area in close proximity to the Project Site including Downtown/Oakland Central, Lake Merritt, Broadway corridor, and south of I-580 to Grand Avenue. This area was defined because it includes the Project Site, the immediately surrounding neighborhoods, and the larger City context for the Project. This area encompasses the cumulative major projects identified in **Table IV-1**, List of Relevant Cumulative Projects from the City's Major Project List.

Impacts

As analyzed throughout this section, the Proposed Project would not result in a significant land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect. The Project is not located in or near an area guided by a habitat conservation plan or natural community conservation plan. The Proposed Project is consistent with the City's General Plan Land Use designation for the site. Thus, the Proposed Project would not, combined with, or add to, any potential adverse land use impacts that may be associated with other cumulative development. A review of cumulative development in the defined geographic area, including past, present, existing, pending and reasonably foreseeable future development does not reveal any significant adverse cumulative impacts in the area. Cumulative development in the area consists of residential, commercial, transit and other typical urban uses.

Cumulative development, in combination with the Proposed Project, has and would continue to result in the development and redevelopment of infill or vacant sites throughout the area. Infill projects in urban areas allow for the capitalization of existing transit system and infrastructure, and minimize impacts to sensitive resources that would likely be degraded in a development on a greenfield site. Additionally, the Project's location near transit and a mix of urban uses reduce vehicle miles traveled. The Proposed Project would contribute to a higher density in the area, which is anticipated by the General Plan and Redevelopment Plan. The Project is generally consistent with adopted plans and the overall vision for the area. Based on the information in this land use section and for the reasons summarized above, the Project would not contribute to any significant adverse cumulative land use impacts when considered together with past, present, pending and reasonably foreseeable development.

Mitigation: None required.

References – Land Use, Plans and Policies

City of Oakland, *Scenic Highways, An Element of the Oakland Comprehensive (General) Plan,* adopted September, 1974.

City of Oakland, *Open Space, Conservation and Recreation (OSCAR), An Element of the Oakland General Plan*, adopted June 11, 1996.

City of Oakland, *Historic Preservation: An Element of the Oakland General Plan*, adopted March 8, 1994 as amended July 21, 1998a.

City of Oakland, *Envision Oakland, City of Oakland General Plan, Land Use and Transportation Element* (LUTE), March 24, 1998b.

City of Oakland, Pedestrian Master Plan, *Part of the Land Use and Transportation Element of the City of Oakland's General Plan,* Adopted November 2003.

City of Oakland, *Protect Oakland, City of Oakland General Plan, Safety Element*, adopted November 2004.

City of Oakland, *Noise Element, City of Oakland Oakland General Plan*, adopted June, 2005.

City of Oakland, *Bicycle Master Plan, Part of the Land Use and Transportation Element of the Oakland General Plan,* adopted December 2007.

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I. Noise

This section analyzes potential impacts on the ambient noise environment caused by construction and operation of the proposed Kaiser Center Office Project. It also analyzes the compatibility of proposed noise-sensitive uses, such as public open spaces and commercial areas, with the existing noise environment. The section describes the environmental and regulatory setting of the Project as well as basics of environmental acoustics, including definitions of terms commonly used in noise analysis. Potential impacts are discussed and evaluated, and appropriate SCAs and/or mitigation measures are identified, as necessary.

Setting

Technical Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the "loudness" of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of decibels (dBA).[1] Frequency A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements.

Some representative noise sources and their corresponding A-weighted noise levels are shown in **Table IV.I-1**.

1 All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

TABLE IV.I-1
TYPICAL NOISE LEVELS

Noise Level (dBA)	Outdoor Activity	Indoor Activity
90+	Gas lawn mower at 3 feet, jet flyover at 1,000 feet	Rock Band
80-90	Diesel truck at 50 feet	Loud television at 3 feet
70-80	Gas lawn mower at 100 feet, noisy urban area	Garbage disposal at 3 feet, vacuum cleaner at 10 feet
60-70	Commercial area	Normal speech at 3 feet
40-60	Quiet urban daytime, traffic at 300 feet	Large business office, dishwasher next room
20-40	Quiet rural, suburban nighttime	Concert hall (background), library, bedroom at night
10-20		Broadcast / recording studio
0	Lowest threshold of human hearing	Lowest threshold of human hearing

SOURCE: Modified from Caltrans, 1998a

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Table IV.I-1 represent noise measured at a given instant in time; however, noise levels rarely persist consistently over a long period of time. Rather, community noise varies continuously over time because of the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and wind. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens), which are readily identifiable to the individual.

These successive additions of sound to the community noise environment varies the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to accurately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

Leq: The equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level, which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

Lmax**:** The instantaneous maximum noise level for a specified period of time.

L50: The noise level that is equaled or exceeded 50 percent of the specified time. This is the median noise level during the specified time.

L90: The noise level that is equaled or exceeded 90 percent of the specified time. The L90 is often considered the background noise level averaged over the specified time.

DNL: The Day/Night Average Sound Level is the 24-hour day and night A-weighed noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night. Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance from nighttime noise. (Also referred to as "Ldn.")

CNEL: Similar to the DNL, the Community Noise Equivalent Level (CNEL) adds a 5-dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants generally experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA;
- Outside these controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise;
- It is widely accepted that the average healthy ear, however, can barely perceive changes in the noise level of 3 dBA;
- A change in level of 5 dBA is a readily perceptible increase in noise level; and
- A 10 dBA change is recognized as twice as loud as the original source (Caltrans, 1998b).

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (i.e., atmospheric conditions and noise barriers, either vegetative or manufactured, etc.). Widely distributed noise, such as a large industrial facility spread over many acres or a street with moving vehicles (known as a “line” source), would typically attenuate at a lower rate, approximately 3 to 4.5 dBA each time the distance doubles from the source, which also depends on environmental conditions (Caltrans, 1998b). Noise from large construction sites will exhibit characteristics of both “point” and “line” sources, and attenuation will therefore generally range between 4.5 and 7.5 dBA each time the distance doubles.

Existing Noise Sources and Levels

Transportation sources, such as automobiles, trucks, trains, and aircraft, are the principal sources of noise in the urban environment. Along major transportation corridors, noise levels can reach 80 DNL, while along arterial streets, noise levels typically range from 65 to 70 DNL. However, noise levels on roadways, like all areas, can be affected by intervening development, topography, or landscaping. Industrial and commercial equipment and operations also contribute to the ambient noise environment in their vicinities.

Primary noise sources in the Project Site vicinity include traffic on the network of streets surrounding the Project Site. No major stationary or industrial noise sources are located in close proximity.

Two long-term (48-hour) and three short-term (5-minute) noise measurements were collected to characterize ambient noise conditions in the Project vicinity. The noise measurement locations are described in **Table IV.I-2**. Metrosonics Model db308 sound level meters were used to measure current ambient noise levels. The meters were calibrated before the measurements to ensure their accuracy. The meters were programmed to record the maximum (Lmax), average (Leq), L10, and L90 noise levels.

Figures IV.I-1 through **IV.I-4** show the hour-by-hour noise measurements over the 2-day period of October 23 to 24, 2008 (Thursday through Friday) for Long-Term Measurements #1 (roof garden, corner of building at 21st and Webster Streets) and #2 (21st and Harrison Streets). These figures show over the 2-day period, the lowest ambient sound levels occurred at night (between 12 a.m. and 4 a.m.) and the highest levels occurred during typical working hours (between 7 a.m. and 7 p.m.).

For Long-Term Measurement #1, the 24-hour Ldn over the 2-day period ranged from 56 to 57 dBA, and the hourly average noise levels (Leqs) ranged from 47 to 55 dBA. For Long-Term Measurement #2, the 24-hour Ldn over the 2-day period ranged from 67 to 68 dBA, and the

TABLE IV.I-2
EXISTING NOISE ENVIRONMENTS AT PROJECT LOCATION

Location	Time Period	Leq (dBA)	Noise Sources
Long-term Measurement 1: roof garden, corner of building at 21st and Webster Streets.	10/23/08 – 10/25/08 24-hour Ldn measurements were: Thursday: 56 dBA Friday: 57 dBA	Hourly Leq's ranged from: 47 – 55 Lmax: 84	Unattended noise measurements do not specifically identify noise sources.
Long-term Measurement 2: 21st and Harrison Streets, 50 feet from Harrison, attached to a tree.	10/23/08 – 10/25/08 24-hour Ldn measurements were: Thursday: 67 dBA Friday: 68 dBA	Hourly Leq's ranged from: 58 – 70 Lmax: 103	Unattended noise measurements do not specifically identify noise sources.
Short-term Measurement 1: roof garden, corner of building at 21st and Webster.	10/22/08 5:33 – 5:38 PM	5-minute Leq 57 dBA Lmax: 66	HVAC approximately 300 feet away. Traffic
Short-term Measurement 2: 20th and Webster Streets, 20 feet from the center of the roadway.	10/22/08 6:07 – 6:12 PM	5-minute Leq 70 dBA Lmax: 84	Motorcycle: 83 dBA Traffic: 58 – 67 dBA Pedestrian: 73 dBA
Short-term Measurement 3: 21st and Harrison Streets, 50 feet from intersection by jogging path.	10/22/08 6:24 – 6:29 PM	5-minute Leq 62 dBA Lmax: 70	Traffic: 53 – 66 dBA

SOURCE: ESA, 2008.

hourly average noise levels (Leqs) ranged from 58 to 70 dBA. By comparison, the City of Oakland's normally acceptable maximum community noise exposure for neighborhood parks and office buildings is 70 Ldn (see section discussing Regulatory Context below).

Sensitive Receptors

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure, in terms of both duration and insulation from noise, and the types of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks and other outdoor recreation areas generally are more sensitive to noise than are commercial and industrial land uses. The Proposed Project consists of retail, office, and open space accessible to occupants and visitors of Kaiser Center.

A residential senior community facility is located approximately 700 feet southeast of the Project Site. Lake Merritt Lakeside Park is located approximately 500 feet east of the Project Site. Snow Park is approximately 250 feet east of Phase 1 and approximately 500 feet southeast of Phase 2. A church is located 600 feet to the northeast at the corner of Harrison and 21st Streets. The Kaiser Center outdoor roof garden is located within the Project Site (6th Floor).

(See **Figure IV.I-5**). The other land uses surrounding the Project Site are commercial businesses.

Figure IV.I-1
Roof Garden
Corner of Building at 21st and Webster Streets
Thursday October 23, 2008

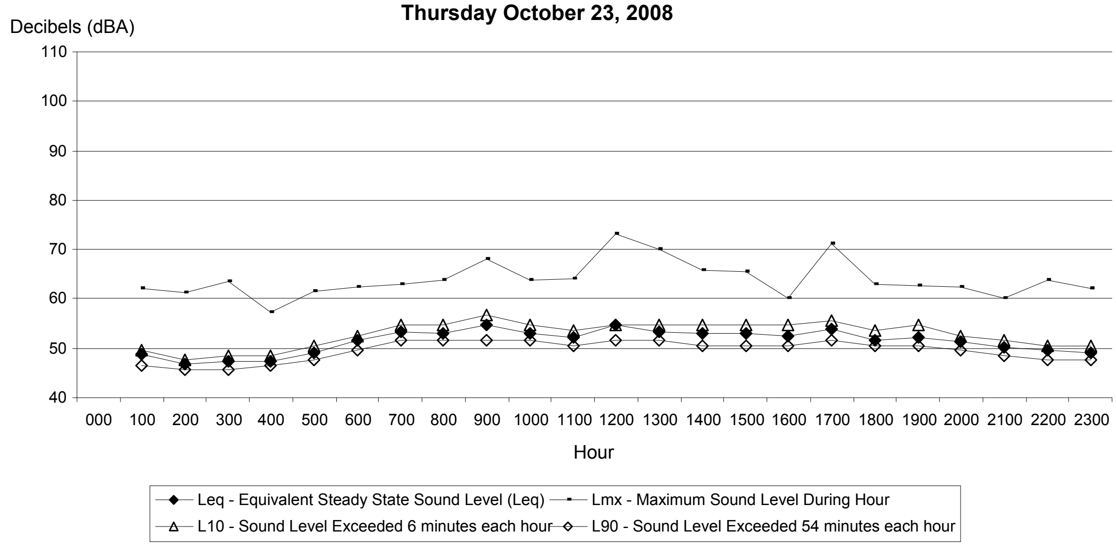


Figure IV.I-2
Roof Garden
Corner of Building at 21st and Webster Streets
Friday October 24, 2008

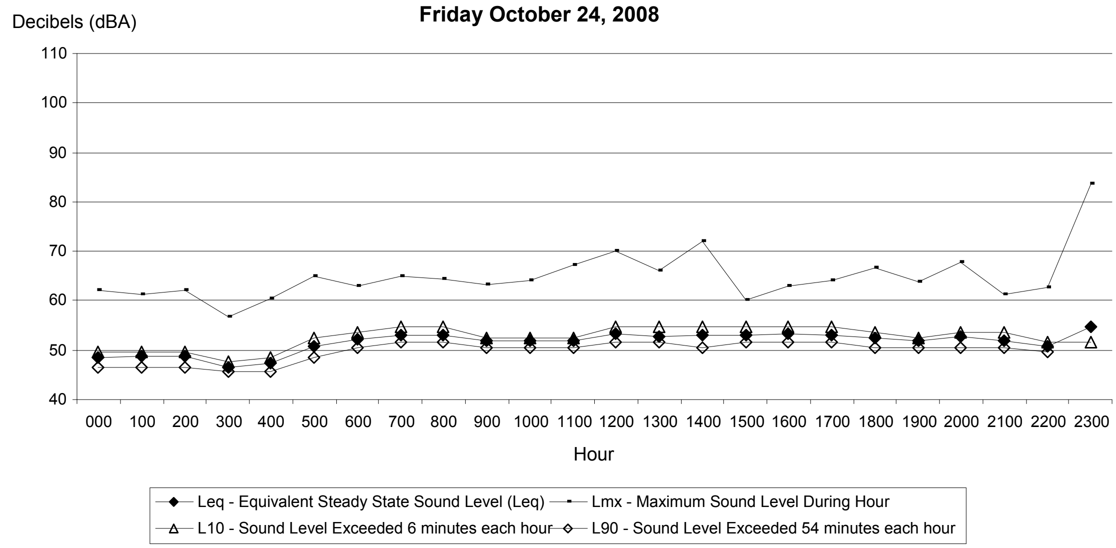


Figure IV.I-3
21st and Harrison Streets
50 feet from Harrison
Thursday October 23, 2008

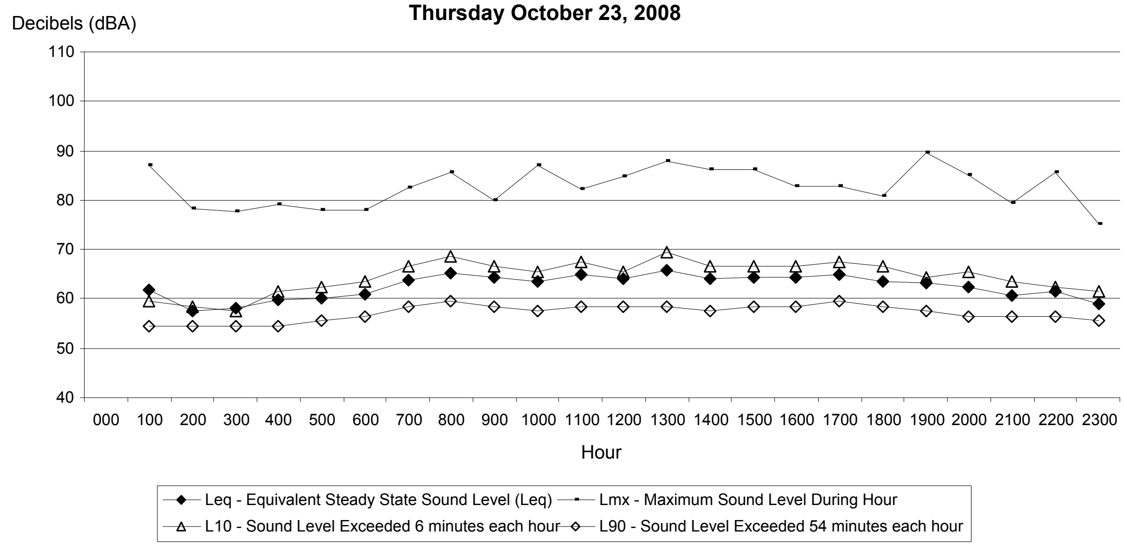
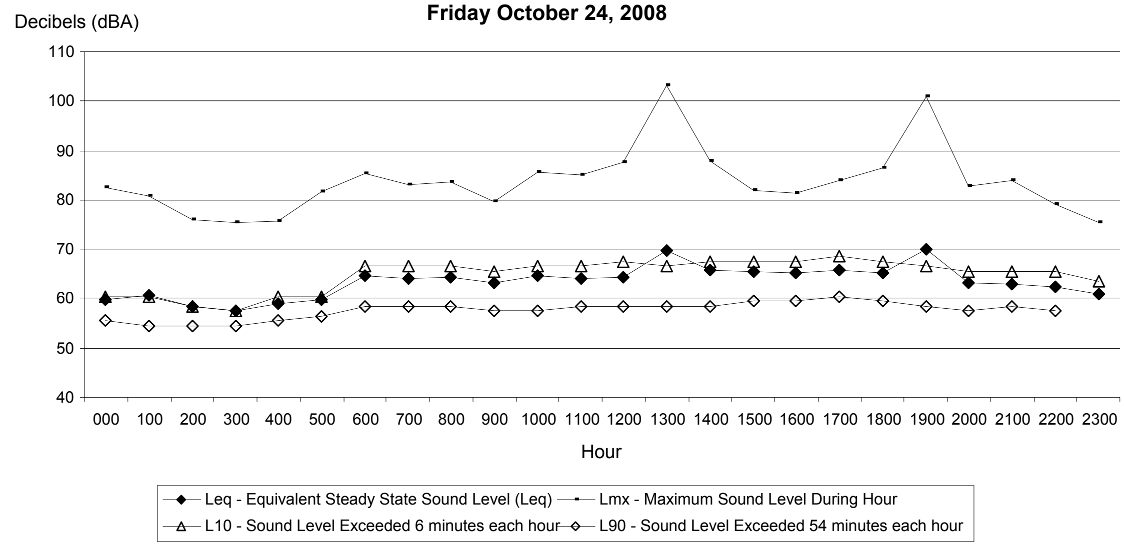
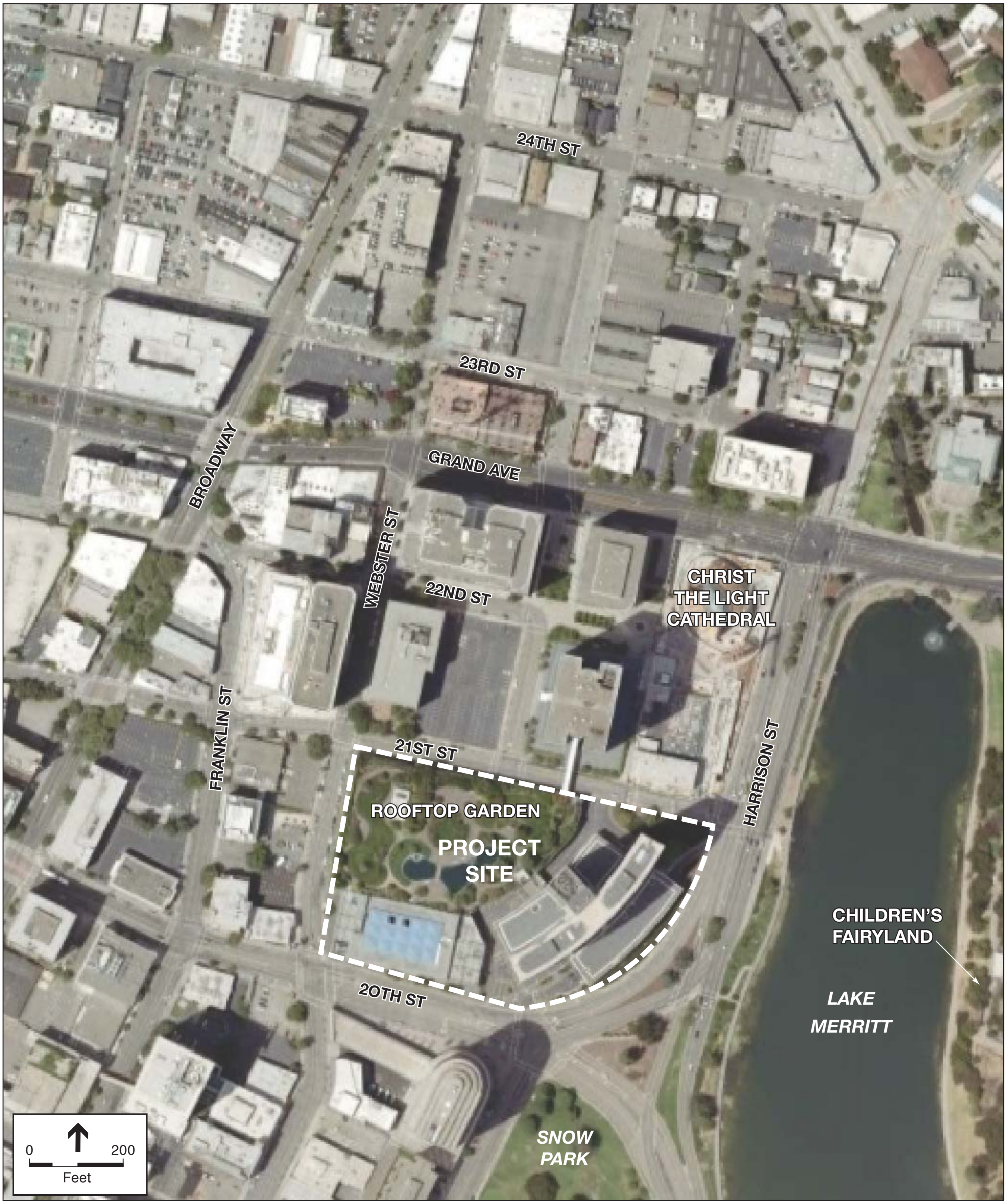


Figure IV.I-4
21st and Harrison Streets
50 feet from Harrison
Friday October 24, 2008



SOURCE: ESA, 2008



SOURCE: ESA

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Figure IV.I-5
Sensitive Noise Receptors in the Project Area

Regulatory Context

Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

Federal

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under Title 40 Code of Federal Regulations (CFR) Part 205, Subpart B. The federal truck pass-by noise standard is 80 dB at 15 meters from the centerline of the vehicle pathway. These standards are implemented through regulatory controls on truck manufacturers.

State of California

The State of California establishes noise limits for vehicles licensed to operate on public roads. The pass-by standard for heavy trucks is consistent with the federal limit of 80 dB. The pass-by standard for light trucks and passenger cars (less than 4.5 tons, gross vehicle rating) is also 80 dB at 15 meters from the centerline. These standards are implemented through controls on vehicle manufacturers and by legal sanctions on vehicle operators by state and local law enforcement officials.

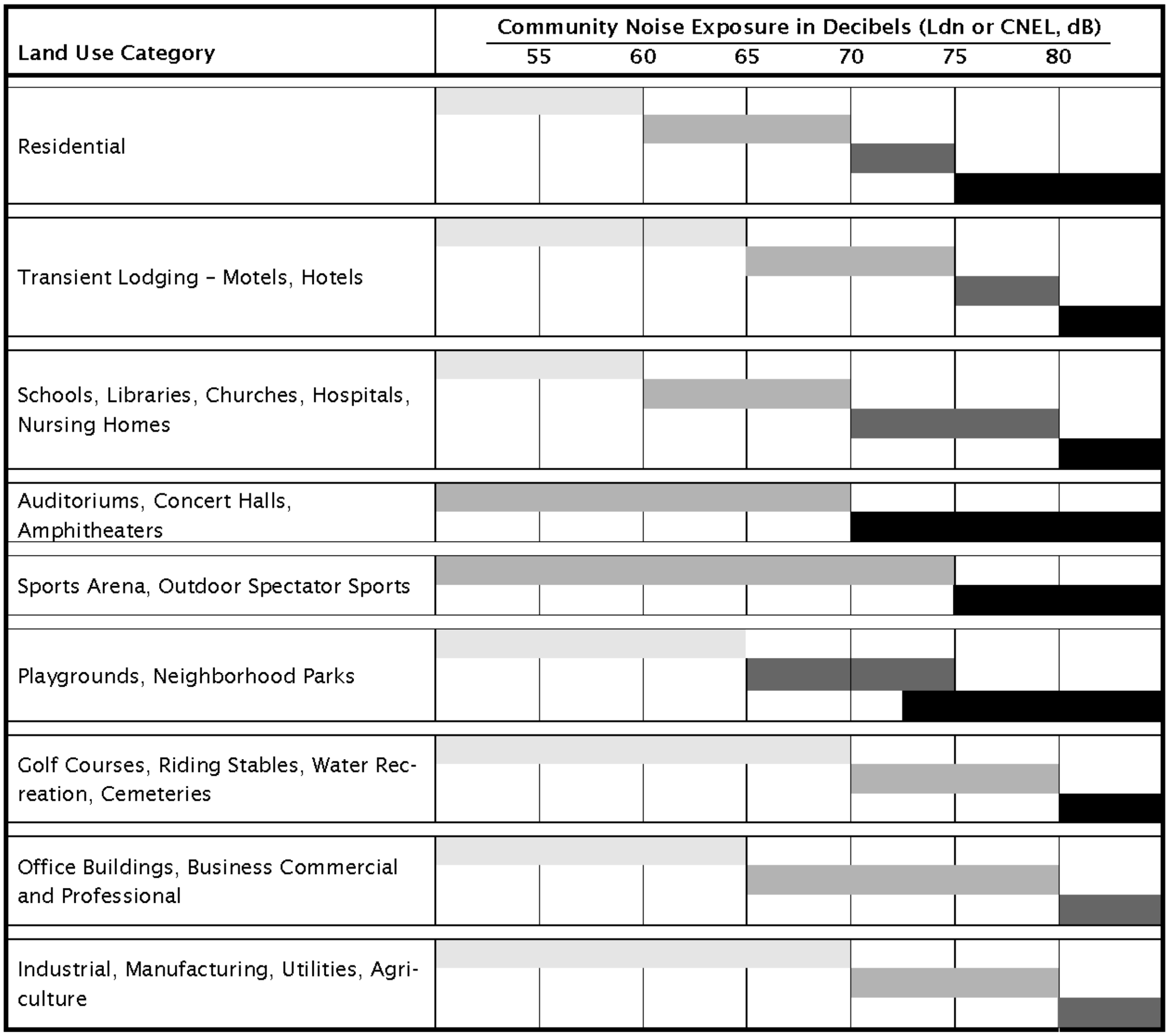
City of Oakland Local Plans, Policies and Regulations

General Plan Noise Element

The Oakland General Plan contains guidelines for determining the compatibility of various land uses with different outdoor noise environments (City of Oakland, 2005). The Noise Element recognizes that some land uses are more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. The City uses state noise guidelines for judging the compatibility between various land uses and their noise environments, which are summarized in **Table IV.I-3** for various common land uses.

The Oakland General Plan Noise Element also identifies maximum interior noise levels generally considered acceptable for various common land uses (with windows closed). Relevant to the Proposed Project, 50 dB is the maximum level acceptable for professional offices, research and development, auditoria, meeting halls, and 55 dB is the maximum level acceptable for retail, banks, restaurants, and sports clubs. The Noise Element contains the following applicable goals and policies:

- **Goal 1:** To protect Oakland's quality of life and the physical and mental well-being of residents and others in the City by reducing the community's exposure to noise; and



NORMALLY ACCEPTABLE
Development may occur without an analysis of potential noise impacts *to the proposed development* (though it might still be necessary to analyze noise impacts that the project might have *on its surroundings*).

CONDITIONALLY ACCEPTABLE
Development should be undertaken only after an analysis of noise-reduction requirements is conducted, and if necessary noise-mitigating features are included in the design. Conventional construction will usually suffice as long as it incorporates air conditioning or forced-air-supply systems, though it will likely require that project occupants maintain their windows closed.

NORMALLY UNACCEPTABLE
Development should generally de discouraged; it may be undertaken only if a detailed analysis of the noise-reduction requirements is conducted, and if highly effective noise insulation, mitigation or abatement features are included in the design.

CLEARLY UNACCEPTABLE
Development should not be undertaken.

SOURCE: Oakland, City of, 2005. City of Oakland General Plan, Noise Element, Figure 6. June.

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Table IV.I-3
Noise Land Use Compatibility Matrix

- **Goal 2:** To safeguard Oakland's economic welfare by mitigating noise incompatibilities among commercial, industrial and residential land uses.
- *Policy 1*: Ensure the compatibility of existing and, especially, of proposed development projects not only with neighboring land uses but also with their surrounding noise environment.
- *Policy 2*: Protect the noise environment by controlling the generation of noise by both stationary and mobile noise sources.
- *Policy 3*: Reduce the community's exposure to noise by minimizing the noise levels that are *received* by Oakland residents and others in the City. (This policy addresses the *reception* of noise whereas Policy 2 addresses the *generation* of noise.)

Oakland Noise Ordinance

The City of Oakland also regulates noise through enforcement of its noise ordinance, which is found in Sections 8.18 and 17.120 of the Oakland Municipal Code. Per Chapter 8.18.020, the persistent maintenance or emission of any noise or sound produced by human, animal or mechanical means, between the hours of 9:00 p.m. and 7:00 a.m. which shall disturb the peace or comfort, or be injurious to the health of any person shall constitute a nuisance. Failure to comply with the following provisions shall constitute a nuisance.

A. All construction equipment powered by internal combustion engines shall be properly muffled and maintained.

B. Unnecessary idling of internal combustion engines is prohibited.

C. All stationery noise-generating construction equipment such as tree grinders and air compressors are to be located as far as is practical from existing residences.

D. Quiet construction equipment, particularly air compressors, are to be selected whenever possible.

E. Use of pile drivers and jack hammers shall be prohibited on Sundays and holidays, except for emergencies and as approved in advance by the Building Official.

Whenever the existence of any such nuisance shall come to the attention of the Health Officer, it shall be his or her duty to notify in writing the occupant of the premises upon which such nuisance exists, specifying the measures necessary to abate such nuisance, and unless the same is abated within forty-eight (48) hours thereafter, the occupant so notified shall be guilty of an infraction, and the Health Officer shall summarily abate such nuisance. (Prior code § 3-1.02)

Chapter 17.120.050 of the Oakland Planning Code regulates only operational noise from stationary sources, as cities and counties do not have regulatory authority over noise from mobile sources (transportation noise). As mentioned above, transportation noise is regulated at the state and federal level by noise limits placed on vehicle manufacturers. **Table IV.I-4** (Table 1 of the City of Oakland's CEQA Thresholds/Criteria of Significance Guidelines) presents maximum allowable receiving noise standards applicable to long-term exposure for residential

TABLE IV.I-4
CITY OF OAKLAND OPERATIONAL NOISE STANDARDS AT RECEIVING PROPERTY LINE, DBA[1]
(from stationary sources)

Receiving Land Use	Cumulative Number of Minutes in a 1-Hour Time Period[2]	Maximum Allowable Noise Level Standards (dBA)	
		Daytime 7:00 a.m. to 10:00 p.m.	Nighttime 10:00 p.m. to 7:00 a.m.
Residential and Civic[3]	20 (L_{33})	60	45
	10 ($L_{16.7}$)	65	50
	5 ($L_{8.3}$)	70	55
	1 ($L_{1.7}$)	75	60
	0 (L_{max})	80	65
		Anytime	
Commercial	20 (L_{33})	65	
	10 ($L_{16.7}$)	70	
	5 ($L_{8.3}$)	75	
	1 ($L_{1.7}$)	80	
	0 (L_{max})	85	
		Anytime	
Manufacturing, Mining, and Quarrying	20 (L_{33})	70	
	10 ($L_{16.7}$)	75	
	5 ($L_{8.3}$)	80	
	1 ($L_{1.7}$)	85	
	0 (L_{max})	90	

1 These standards are reduced 5 dBA for simple tone noise, noise consisting primarily of speech or music, or recurring impact noise. If the ambient noise level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.
2 Lx represents the noise level that is exceeded X percent of a given period. Lmax is the maximum instantaneous noise level.
3 Legal residences, schools and childcare facilities, health care or nursing home, public open space, or similarly sensitive land uses

SOURCE: City of Oakland, 2008

and civic land uses, for noise from stationary noise sources (not transportation noise). Once constructed, noise from a stationary source would be limited by the standards in Table IV.I-4. For example, between 7:00 a.m. and 10:00 p.m., residential and civic land uses, including public open spaces, may only be exposed to noises up to 60 dBA for a period of 20 cumulative minutes in a one-hour time period and a maximum of 80 dBA. The noise ordinance states that if the measured ambient noise level exceeds the applicable noise level standard in any category, then the stated applicable noise level shall be adjusted so as to equal the ambient noise level. In other words, if existing noise is measured to be louder than the maximum allowed (i.e., the "applicable noise level standard"), the existing noise level shall be considered the maximum allowed. Based on the noise measurements shown in Table IV.I-2, noise levels (hourly Leq's) at the roof garden ranged from 49-53 dBA, well within the City's operational noise standards for public open space. Commercial uses, between 7:00 a.m. and 10:00 p.m., may only be exposed to noises up to 65dBA for a period of 20 cumulative minutes in a one-hour time period and a maximum of 85 dBA. Based on the noise measurements shown in Table IV.I-2, noise levels (hourly Leq's) at 21st and Harrison Streets ranged from 60-67 dBA, also within the City's operation noise standards for commercial land uses.

Table IV.I-5 (Table 2 of the City of Oakland's CEQA Thresholds/Criteria of Significance Guidelines) presents noise level standards from the noise ordinance that applies to temporary exposure to short- and long-term construction noise. In this context, short-term refers to construction activity lasting less than 10 days at a time while long-term refers to construction activities lasting greater than 10 days at a time.

TABLE IV.I-5
CITY OF OAKLAND CONSTRUCTION NOISE STANDARDS AT RECEIVING PROPERTY LINE, DBA

Receiving Land Use	Daily 7:00 a.m. to 7:00 p.m.	Weekends 9:00 a.m. to 8:00 p.m.
Short-Term Operation (less than 10 days)		
Residential	80	65
Commercial, Industrial	85	70
Long-Term Operation (more than 10 days)		
Residential	65	55
Commercial, Industrial	70	60

During the hours of 7 p.m. to 7 a.m. on weekdays and 8 p.m. to 9 a.m. on weekends and federal holidays, noise levels received by any land use from construction or demolition shall not exceed the applicable nighttime operational noise level standard (see Table IV.D-4)

If the ambient noise level exceeds these standards, the standard shall be adjusted to equal the ambient noise level.

SOURCE: City of Oakland, 2008

Per Chapter 17.120.060 of the Oakland Planning Code, all activities, except those located within the M-40 zone, or in the M-30 zone more than four hundred (400) feet from any legal residentially occupied property, shall be so operated as not to create a vibration which is perceptible without instruments by the average person at or beyond any lot line of the lot containing such activities. Ground vibration caused by motor vehicles, trains, and temporary construction or demolition work is exempted from this standard. (Ord. 11895 § 8, 1996: prior planning code § 7711).

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

The City of Oakland's SCAs relevant to reducing noise and vibration impacts due to the Proposed Project are listed below. If the Project is approved by the City, then all applicable SCA would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts from noise and vibration. The SCA are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA NOI-1. Days/Hours of Construction Operation**

  Ongoing throughout demolition, grading, and/or construction. The project applicant shall require construction contractors to limit standard construction activities as follows:

  a) Construction activities are limited to between 7:00 AM and 7:00 PM Monday through Friday, except that pile driving and/or other extreme noise generating activities greater than 90 dBA shall be limited to between 8:00 a.m. and 4:00 p.m. Monday through Friday.

b) Any construction activity proposed to occur outside of the standard hours of 7:00 am to 7:00 pm Monday through Friday for special activities (such as concrete pouring which may require more continuous amounts of time) shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened and such construction activities shall only be allowed with the prior written authorization of the Building Services Division.

c) Construction activity shall not occur on Saturdays, with the following possible exceptions:

   i. Prior to the building being enclosed, requests for Saturday construction for special activities (such as concrete pouring which may require more continuous amounts of time), shall be evaluated on a case by case basis, with criteria including the proximity of residential uses and a consideration of resident's preferences for whether the activity is acceptable if the overall duration of construction is shortened. Such construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division.

   ii. After the building is enclosed, requests for Saturday construction activities shall only be allowed on Saturdays with the prior written authorization of the Building Services Division, and only then within the interior of the building with the doors and windows closed.

d) No extreme noise generating activities (greater than 90 dBA) shall be allowed on Saturdays, with no exceptions.

e) No construction activity shall take place on Sundays or Federal holidays.

f) Construction activities include but are not limited to: truck idling, moving equipment (including trucks, elevators, etc) or materials, deliveries, and construction meetings held on-site in a non-enclosed area.

g) Applicant shall use temporary power poles instead of generators where feasible.

- **SCA NOI-2. Noise Control**

  Ongoing throughout demolition, grading, and/or construction. To reduce noise impacts due to construction, the project applicant shall require construction contractors to implement a site-specific noise reduction program, subject to the Planning and Zoning Division and the Building Services Division review and approval, which includes the following measures:

  a) Equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).

  b) Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools.

However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.

c) Stationary noise sources shall be located as far from adjacent receptors as possible, and they shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible.

d) If feasible, the noisiest phases of construction shall be limited to less than 10 days at a time.

- **SCA NOI-3. Noise Complaint Procedures**

Ongoing throughout demolition, grading, and/or construction. Prior to the issuance of each building permit, along with the submission of construction documents, the project applicant shall submit to the Building Services Division a list of measures to respond to and track complaints pertaining to construction noise. These measures shall include:

a) A procedure and phone numbers for notifying the Building Services Division staff and Oakland Police Department; (during regular construction hours and off-hours);

b) A sign posted on-site pertaining with permitted construction days and hours and complaint procedures and who to notify in the event of a problem. The sign shall also include a listing of both the City and construction contractor's telephone numbers (during regular construction hours and off-hours);

c) The designation of an on-site construction complaint and enforcement manager for the project;

d) Notification of neighbors and occupants within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities about the estimated duration of the activity; and

e) A preconstruction meeting shall be held with the job inspectors and the general contractor/on-site project manager to confirm that noise measures and practices (including construction hours, neighborhood notification, posted signs, etc.) are completed.

- **SCA NOI-4. Interior Noise**

Prior to issuance of a building permit. If necessary to comply with the interior noise requirements of the City of Oakland's General Plan Noise Element and achieve an acceptable interior noise level, noise reduction in the form of sound-rated assemblies (i.e., windows, exterior doors, and walls) shall be incorporated into project building design, based upon recommendations of a qualified acoustical engineer and submitted to the Building Services Division for review and approval. Final recommendations for sound-rated assemblies will depend on the specific building designs and layout of buildings on the site and shall be determined during the design phase.

- **SCA NOI-5. Pile Driving and Other Extreme Noise Generators**

  Ongoing throughout demolition, grading, and/or construction. To further reduce potential pier drilling, pile driving and/or other extreme noise generating construction impacts greater than 90dBA, a set of site-specific noise attenuation measures shall be completed under the supervision of a qualified acoustical consultant. Prior to commencing construction, a plan for such measures shall be submitted for review and approval by the Planning and Zoning Division and the Building Services Division to ensure that maximum feasible noise attenuation will be achieved. This plan shall be based on the final design of the project. A third-party peer review, paid for by the project applicant, may be required to assist the City in evaluating the feasibility and effectiveness of the noise reduction plan submitted by the project applicant. A special inspection deposit is required to ensure compliance with the noise reduction plan. The amount of the deposit shall be determined by the Building Official, and the deposit shall be submitted by the project applicant concurrent with submittal of the noise reduction plan. The noise reduction plan shall include, but not be limited to, an evaluation of the following measures. These attenuation measures shall include as many of the following control strategies as feasible:

  a) Erect temporary plywood noise barriers around the construction site, particularly along on sites adjacent to residential buildings;

  b) Implement “quiet” pile driving technology (such as pre-drilling of piles, the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions;

  c) Utilize noise control blankets on the building structure as the building is erected to reduce noise emission from the site;

  d) Evaluate the feasibility of noise control at the receivers by temporarily improving the noise reduction capability of adjacent buildings by the use of sound blankets for example; and

  e) Monitor the effectiveness of noise attenuation measures by taking noise measurements.

- **SCA NOI-6 (same as SCA GEO-2 and SCA CUL-5): Vibrations Adjacent Historic Structures**

  Prior to issuance of a demolition, grading or building permit. The project applicant shall retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could damage the Kaiser Center Tower building or other nearby historic structures (as described in Section IV.D *Cultural Resources*), and design means and methods of construction that shall be utilized to not exceed the thresholds. The engineer’s analysis shall be submitted to the City of Oakland for review and approval. The applicant shall implement the approved plan.

Impacts and Mitigation Measures

Significance Criteria

The Proposed Project would have a significant noise impact if it would:

1. Expose persons to or generate noise levels in excess of standards established in the Oakland General Plan or applicable standards of other agencies (e.g., OSHA);
2. Violate the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding operational noise per Table IV.I-4;
3. Violate the City of Oakland Noise Ordinance (Oakland Planning Code Section 17.120.050) regarding construction noise per **Table IV.I-5**, except if an acoustical analysis is performed;
4. Violate the City of Oakland Noise Ordinance (Oakland Municipal Code Section 8.18.020) regarding nuisance of persistent construction-related noise;
5. Create a vibration not associated with motor vehicles, trains, or temporary construction or demolition work which is perceptible without instruments by the average person at or beyond any lot line containing the vibration-causing activity, except vibration-causing activities located in the M-40 zone or in the M-30 zone more than 400 feet from any legally occupied residential property (Oakland Planning Code Section 17.120.060) (See criterion 6 for the threshold for rail-related vibration);
6. Expose persons to or generate rail-related groundborne vibration in excess of standards established by the Federal Transit Administration (FTA):
7. Generate interior Ldn or CNEL greater than 45 dBA for multi-family dwellings, hotels, motels, dormitories and long-term care facilities (and may be extended by local legislative action to include single family dwellings) per California Noise Insulation Standards (CCR Part 2, Title 24);
8. Result in a 5dBA permanent increase in ambient noise levels in the project vicinity above levels existing without the project. If the cumulative increase in noise results in a 5 dBA permanent increase in ambient noise levels in the project vicinity above existing levels without the project (i.e., cumulative conditions including the proposed project compared to existing conditions), the project's contribution to the cumulative increase would be cumulative considerable and significant if it results in a 3dBA permanent increase attributable to the project (i.e., cumulative conditions including the proposed project compared to cumulative conditions without the proposed project).
9. Conflict with land use compatibility guidelines for all specified land uses for determination of acceptability of noise (see Table IV.I-3) after incorporation of all applicable Standard Conditions of Approval;
10. Be located within an airport land use plan and would expose people residing or working in the project area to excessive noise levels; or
11. Be located within the vicinity of a private airstrip, and would expose people residing or working in the project area to excessive noise levels.

Since the Proposed Project would not include any vibration-causing activity aside from that associated with construction and motor vehicles, it can be assumed that no impact would occur with regard to criterion 6. Also, the Proposed Project is not located within the vicinity of a private airstrip nor is it located within the land use plan area for Oakland Airport or any other airport. Therefore, impacts associated with criteria 10 and 11 are not discussed further in this EIR.

Impacts and Mitigation Measures

Impact NOI-1: Construction activities associated with the Proposed Project would temporarily generate noise levels that could conflict with standards established in the City noise ordinance. (Less than Significant)

Construction Equipment, Activities and Noise Levels

Project construction would occur over two phases and is estimated to last for approximately seven years (site work and interior building work). Each phase would last for approximately 3.5 to four years.

Construction activity noise levels at and near the Project area would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. **Table IV.I-6** shows typical noise levels produced by various types of construction equipment.

TABLE IV.I-6
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA Leq at 50 ft)
Dump Truck	88
Portable Air Compressor	81
Concrete Mixer (Truck)	85
Scraper	88
Jack Hammer	88
Dozer	87
Roller	74
Paver	89
Generator	76
Crane, Mobile	83
Pile Driver	101
Compactor	82
Backhoe	85

dBA = A-weighted decibel; Leq = equivalent sound level

SOURCE: FTA, 2006, Layne Christiansen 2004.

Construction of the Project would generate an amount of noise corresponding to the appropriate phase of building construction and the noise generating equipment used during construction. **Table IV.I-7** presents a preliminary summary of proposed construction activity.

TABLE IV.I-7
PRELIMINARY CONSTRUCTION ACTIVITY SUMMARY

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Construction Vehicle Type/Number of Trips		
Off Haul Trucks (excavation materials)	3,100 truck loads	100 truck loads
Debris Box Trucking	260 truck loads	300 truck loads
Delivery Trucks	5,500 truck loads	6,000 truck loads
Passenger Vehicles (incl. construction employees)	140 cars per day average, 250 cars peak	140 cars per day average, 250 cars peak
Mobile Cranes	Intermittent use	Intermittent use
Construction Traffic Routes		
Interstate 580	To Harrison St to job site	To Harrison St to job site
Interstate 880	To Harrison St job site	To Harrison St job site
Interstate 980	To 27th St to Harrison St to job site	To 27th St to Harrison St to job site
Staging Areas/Lane or Street Closures		
Street	Close one lane (no parking) of 20th St and one lane (parking) of Webster St.	Close one lane (parking) of Webster St and one lane (parking) of 21st St
Sidewalk	Close 20th St and Webster St sidewalks (adjacent to Project Site)	Close sidewalks on Webster and 21st streets (adjacent to Project Site)
Construction Workers/Day		
Average number of workers	212	212
Peak	380	380
Parking	Existing onsite garage or surface lots in the vicinity	Existing onsite garage or surface lots in the vicinity
Estimated Cut/Fill; Mass Excavation	31,000 cubic yards	Minimal (existing building demolition)
Number of Truck Trips (Off Haul) (subset of *Construction Vehicle Type/Number of Trips,* above)		
Demolition Debris	800 truck loads	1,000 truck loads
Excavated Material	3,100 truck loads	100 truck loads
Pile Driving		
Number, location, duration	525 piles; 20 piles per day = approx. 6 weeks.	525 piles; 20 piles per day = approx. 6 weeks.
Solider pile shoring	28,000 sq ft; approx. 6 weeks duration	28,000 sq ft; approx. 6 weeks duration

SOURCE: Turner Construction, 2009.

Noise from Demolition Phase

Although a detailed construction schedule by phase has not been developed for the Project (which is only conceptually designed), approximately four to six months of demolition activity is estimated to occur prior to the construction of each tower in each phase. Demolition activities would involve operation of backhoes and/or bulldozers, jackhammers, loaders and trucks. Noise levels at 50 feet from the Project Site could vary widely depending on the combination and duration of equipment uses. Noise would be intermittent over the demolition period and involve noise levels associated with these equipment, shown in Table IV.I-6.

Noise from Pile Driving

Duration of noise from pile driving depends on the duration of this phase of construction which cannot be precisely estimated at this time. Construction of the entirety of the substructure for each phase would likely occur over a 12 week period: 6 weeks for shoring and 6 weeks for driving. Approximately 20 piles would be handled per day over the 6 weeks, and an estimated 525 piles are needed for each phase..

Construction Activity (non-pile driving)

Noise from general construction activities would be more intermittent and less intensive as those described above for demolition and drilling. It would include a myriad of equipment shown in Table IV.I-6.

Noise from Construction Trucks

Noise would also be generated by temporary and intermittent construction truck trips and, to a lesser degree, construction worker vehicle trips to and from the Project Site. Trucks would primarily use Harrison and 27th Streets to access Interstates 580, 880 and 980 to and from the Project Site, as shown in Table IV.I-7. Based on the estimated truck trips for each phase shown in the table, an average of approximately 7 daily truck trips would occur during Phase 1, and an average of approximately 5 daily truck trips would occur during Phase 2.[2] Existing high daily volumes on Harrison and 27th Streets are shown in Figures IV.L-4a through IV.L-d, Existing Traffic Volumes AM(PM) Peak Hour (in Section IV.L, Transportation and Circulation). It is reasonable to estimate that the increased noise that would result from the addition of 7 daily truck trips to these primary roadways would not result in an substantial or noticeable increase in roadway noise levels and not be considered a significant contribution to local noise levels.

Surrounding Land Uses and Sensitive Land Uses

No sensitive land uses are located within 200 feet of the Project Site property line, except the existing Kaiser Center roof garden proposed for expansion on the 6th level of the Proposed Project towers. (All distances measured perpendicular from edge of Project Site.) The closest land uses are commercial and retail uses to the north, south and west, including the existing Kaiser Building at the easternmost end of the Project Site. As previously discussed under *Sensitive Receptors*, noise sensitive land uses would include Snow Park approximately 250 southeast and Lakeside Park around Lake Merritt approximately 500 feet east

Other uses that may be noise sensitive include a hotel and residential senior community facility located approximately 700 feet southeast and high-density apartments located approximately 600 feet north, at Grand Avenue, the recreational area of Lake Merritt/Children's Fairyland located approximately 1,200 feet east, and a church located approximately 600 feet northeast. Other land uses in the Project vicinity located at further distances from the Project Site would be exposed to construction noise at incrementally lower levels. Access and use of the roof garden during demolition and construction activities would be restricted and prohibited for safety reasons during

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2 This assumes truck trips would occur for the duration of each Phase. Truck activity would vary depending on the specific construction activity.

earthwork and building erection when the majority of high-noise generating equipment would be operating

Effects of Extreme Noise Activities and Vibration

Noise from construction activities generally attenuates at a rate of 6.0 to 7.5 dBA per doubling of distance. As discussed above, the nearest sensitive uses would be the public open space at Snow Park and around Lake Merritt, approximately 200 feet from the Project Site (the open space around Lake Merritt is approximately 500 feet the actual construction area of the Project Site.

Conservatively assuming an attenuation rate of 6.0 dBA per doubling of distance, these areas would temporarily and intermittently experience maximum noise levels of up to 89 dBA with pile driving, typically the loudest source of construction noise.[3] Impacts from pile driving can result from both elevated single-event or "impact" noise levels and from vibration. Pile driving could produce elevated noise levels, even when feasible noise reduction methods are used.

Implementation of SCAs NOI-1 Days/Hours of Construction Operation, NOI-2 Noise Control, NOI-3 Noise Complaint Procedures, and NOI-5, Pile Driving and Other Extreme Noise Generators, would reduce construction noise levels by limiting hours of construction activities, requiring best available noise control technology, and by requiring the Project applicant and/or its contractors notify any local residents (if any) of construction activities and to track and respond to noise complaints. To specifically address impacts from pile drilling and other extreme noise generating construction activities that may expose sensitive receptors to noise levels greater than 90 dBA, Lmax, part of SCA NOI-5, requires the Project applicant to develop and submit for review and approval by the City a Site-specific Construction Noise Reduction Plan that would ensure that maximum feasible noise attenuation will be achieved. The applicant will submit this plan for review and approval The estimated noise level associated with pile driving for the Project would not exceed the 90 dBA, Lmax, threshold given the distance of Snow Park from the Project Site.

Depending on the construction equipment used, groundborne vibrations can be perceptible within 30 to 100 feet of a source. Structural damage from pile driving typically does not occur in buildings more than 50 feet from the location of the activity (Caltrans, 2004). However, these vibrations could result in cosmetic or structural damage to within 50 feet of the Project Site and construction area, which would include the existing roof garden and Kaiser Center Building. The Project incorporates SCA NOI-6, Vibrations Adjacent Historic Structures, to address the potentially effects of groundborne vibration effects. SCA NOI-6 requires that the Project applicant retain a structural engineer or other appropriate professional to determine threshold levels of vibration and cracking that could affect portions of Kaiser Center that are not proposed to be demolished as part of the Project and design means and methods of construction that shall be utilized to avoid potential impacts.

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3 Pile driving 101 dBA at 50 feet from construction activity, per Table IV.I-7, reduced 6.0 dBA at 100 feet, and 6.0 dBA at 200 feet

Implementation of SCAs NOI-1 NOI-2, NOI-3, NOI-5 and NOI-6 would reduce impacts from construction noise and vibration. These measures would reduce temporary noise and vibration impacts associated with construction to a less-than-significant level.

Mitigation Measures: None required.

Impact NOI-2: Project operations would increase noise levels in the Project vicinity that could result in the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant)

Chapter 17.120.050 of the City of Oakland Planning Code specifies the maximum sound level received at public open spaces and commercial land uses. The maximum sound level (Lmax) received by public open spaces cannot exceed 80 dBA and commercial land uses cannot exceed 85 dBA. Per Table IV.D-4, public open spaces must not exceed 60 dBA and commercial land uses cannot exceed 65 dBA during daytime hours as measured at the property line over a 20 minutes in a one-hour time period. However, per the City of Oakland, if existing noise is measured to be louder than the applicable noise level standard, the existing noise level shall be considered the maximum allowed, which in this case is 67 dBA at 21st and Harrison Streets (**Table IV.I-2**).

The office towers would generate some noise from heating, ventilating, and air conditioning mechanical equipment. Since the mechanical equipment would be typical for office buildings, the equipment's noise generation would not be expected to exceed 56 dBA at a distance of 50 feet. This amount may increase the average noise level of 49 to 53 dBA Leq on the roof garden but would not exceed the City's established threshold of 60 dBA for public open space. Noise from the mechanical equipment would not increase the average noise level of 60 to 67 dBA Leq at the street level of the Project Site nor would it exceed the City's established threshold of 67 dBA. Therefore, noise impacts from the Project related stationary sources would be less than significant.

Mitigation: None required.

Impact NOI-3: Project traffic could substantially increase traffic noise levels in the Project area. (Less than Significant)

After construction is complete and the office towers begin its operations, the additional vehicles traveling to the site would increase noise levels adjacent to nearby roads. Based on the City of Oakland's CEQA Thresholds, a project would be considered to generate a significant impact if it resulted in a 5 dBA permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project. Noise levels were determined using the Federal Highway

Administration (FHWA) Traffic Noise Prediction Model and the turning movements in the traffic section for Existing (2007), Existing Plus Project, Near Term (2015), and Near Term Plus Project (2015) conditions (see Appendix F). The Near Term Plus Project scenario includes Project traffic plus traffic from other approved or pending projects for the year 2015 (assumed build-out year of all projects).

As reported in the traffic section of this EIR, the Project would generate a net increase of 1,187 morning peak hour vehicle trips and 1,144 late afternoon peak hour vehicle trips. These trips would be distributed over the local street network and would affect roadside noise levels. Peak hour (morning) intersection turning data from the traffic study were analyzed to evaluate Project increases and resulting traffic-generated noise increases on roadway links most affected by Project-related traffic and nearest the Project Site. Noise levels at other times would be lower. The segments analyzed and the results of the noise increases resulting from modeling are shown in **Table IV.I-8**.

The increase in traffic noise from the Existing Plus Project (2007) scenario compared to the Existing (2007) scenario would increase peak hour noise levels by less than 5 dBA at all studied roadway segments. The increase in traffic noise from the Near Term Plus Project (2015) scenario compared to the Existing (2007) scenario would increase peak hour noise levels by less than 5 dBA at most roadway segments, except at the roadway segment 21st Street west of Webster Street, where the increase is 5.0 dBA. This is a significant impact. However, the Project's contribution to the 2015 roadway noise increase along the impacted roadway segment is estimated by comparing Near Term Plus Project (2015) with Near Term Without Project, which Table IV.I-8 shows is 4.1 dBA. Because this exceeds the significance threshold of 3dBA (to determine Project contribution), this is still considered a significant Project impact in 2015.

SCA TRANS-1 Transportation Demand Management, discussed in Section IV.L Transportation and Circulation, would apply to Impact NOI-3 and reduce the Project's contribution to 2015 roadway noise along all roadways by reducing vehicle trips associated with the Project. Although the specific TDM Program has not yet been developed, assuming a preliminary 10 percent reduction in Project traffic (consistent with the preliminary TDM assumption applied in the greenhouse gases [GHG] analysis in Section IV.B), a 0.3 dBA reduction would result at 21st Street west of Webster Street, which would reduce the 2015 roadway noise impacts to less than 5.0 dBA, which is a less than significant level.

Mitigation: None required.

TABLE IV.I-8
PEAK-HOUR TRAFFIC NOISE LEVELS IN THE PROJECT VICINITY
EXISTING (2007) VERSUS NEAR TERM PLUS PROJECT (2015)

	A.M. Peak Hour Noise Levels, dBA, Leq[a]						
Roadway Segment	**(A) Existing**	**(B) Existing Plus Project**	**(B-A) Difference between Existing Plus Project and Existing**	**(C) Near Term Without Project (2015)**	**(D) Near Term Plus Project (2015)**	**(D-A) Difference between Near Term Plus Project and Existing[d]**	**(D-C) Difference between Near Term Plus Project and Near Term Without Project (2015)[e]**
Harrison Street north of Grand Avenue[b,c]	65.0	65.8	0.8	65.8	66.5	1.5	NA
Harrison Street south of Grand Avenue[b,c]	66.4	67.0	0.6	67.2	67.7	1.3	NA
Grand Avenue east of Harrison Street[b,c]	64.7	64.7	0.0	65.5	65.5	0.8	NA
Grand Avenue west of Harrison Street[b,c]	62.8	62.8	0.0	63.9	63.9	1.1	NA
Harrison Street north of 21st Street[b,c]	66.5	67.1	0.6	67.2	67.7	1.2	NA
Harrison Street south of 21st Street[b,c]	66.0	66.4	0.4	66.7	67.1	1.1	NA
21st Street east of Harrison Street[b,c]	NA			NA	NA	NA	NA
21st Street west of Harrison Street[b,c]	59.7	62.9	3.2	60.4	63.3	3.6	NA
Webster Street north of 21st Street[b,c]	60.1	61.2	1.1	61.0	61.9	1.8	NA
Webster Street south of 21st Street[b,c]	59.4	59.6	0.2	60.4	60.5	1.1	NA
21st Street east of Webster Street[b,c]	58.9	63.4	4.6	59.8	63.8	4.9	NA
21st Street west of Webster Street[b,c]	57.6	62.3	4.7	58.5	62.6	**5.0**	**4.1**
Franklin Street north of 20th Street[b,c]	57.2	60.1	2.9	58.2	60.7	3.5	NA
Franklin Street south of 20th Street[b,c]	57.4	60.0	2.6	58.3	60.5	3.1	NA
20th Street east of Franklin Street[b,c]	60.9	61.3	0.4	61.9	62.2	1.3	NA
20th Street west of Franklin Street[b,c]	60.1	60.8	0.6	61.1	62.3	2.2	NA

[a] Considered significant if the incremental increase in noise from traffic is greater than the existing ambient noise level by 5 dBA Leq, per City of Oakland, CEQA Thresholds/Criteria of Significance Guidelines. Violations are in **bolded** text.
[b] Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model.
[c] The analysis considered the vehicle mix based on – cars 97 percent, medium trucks 2 percent, and heavy trucks 1 percent. Traffic speeds for all vehicle classes were set at 25 mph.
[d] Considered significant if the incremental increase in noise is greater than 5 dBA.
[e] If Near Term Project related noise increase is considered significant (greater than 5 dBA), the impact is considered significant if the incremental increase in roadway noise from the Near Term With Project compared to Near Term Without Project is greater than 3 dBA.

SOURCE: ESA, 2009

Cumulative Noise Impacts

Impact NOI-4: Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. (Potentially Significant)

Geographic Context

The geographic area considered for cumulative noise analysis includes areas within close proximity to the Project Site and roadways examined in the transportation analysis in Section IV.L, *Transportation and Circulation*. These include areas of Oakland that encompass the projects included in the City of Oakland's Major Projects List, as well as area projects incorporated into the regional travel demand model.

Impacts

Longer-term noise from cumulative development, which is the Proposed Project combined with past, present, pending, and reasonably foreseeable development in the area, would primarily occur from motor vehicle traffic. When considered alone, the Proposed Project would generate noise mainly by adding more traffic to the area. Other anticipated projects would contribute to noise in the area due to increased traffic volumes. Notably, any project that would individually have a significant project level noise impact would also be considered to have a significant cumulative noise impact.

As noted in Impact NOI-3 and based on the City of Oakland's CEQA Thresholds, a project would be considered to generate a significant impact if it resulted in a 5 dBA permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project. As for Impact NOI-3, noise levels were determined for using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model and the turning movements in the traffic section for, Cumulative Without Project (2030), and Cumulative Plus Project (2030) conditions (see Appendix F). The segments analyzed and the results of the noise increases resulting from modeling are shown in **Table IV.I-9** for Cumulative Plus Project traffic, which includes Project traffic combined with traffic from other approved or pending projects for the year 2030 (assumed build-out year of all projects).

Table IV.I-9 shows the increase in traffic from between the Cumulative Plus Project (2030) scenario and Existing (2007) would increase peak hour noise levels by less than 5 dBA at most roadway segments, except at the roadway segments 21st Street west of Webster Street, where the increase is 5.3 dBA, and 21st Street east of Webster Street, where the increase is 5.2 dBA. The Project's contribution to the 2030 cumulative roadway noise increase (Existing compared to Cumulative Plus Project) is 3.6 dBA along 21st Street west of Webster Street, and 3.5 dBA along 21st Street east of Webster Street, and because these exceed the significance threshold of 3dBA, this is still considered a considerable contribution to the cumulative impact in 2030 and significant.

**TABLE IV.I-9
PEAK-HOUR TRAFFIC NOISE LEVELS IN THE PROJECT VICINITY
EXISTING (2007) VERSUS CUMULATIVE PLUS PROJECT (2030)**

Roadway Segment	(A) Existing	(B) Cumulative Without Project (2030)	(C) Cumulative Plus Project (2030)	(C-A) Difference between Cumulative Plus Project and Existing[d] (2030)	(C-B) Difference between Cumulative Plus Project and Cumulative Without Project[e] (2030)
Harrison Street north of Grand Avenue[b,c]	65.0	67.8	68.3	3.3	NA
Harrison Street south of Grand Avenue[b,c]	66.4	68.9	69.2	2.8	NA
Grand Avenue east of Harrison Street[b,c]	64.7	66.9	66.9	2.2	NA
Grand Avenue west of Harrison Street[b,c]	62.8	66.1	66.1	3.3	NA
Harrison Street north of 21st Street[b,c]	66.5	67.8	68.2	1.7	NA
Harrison Street south of 21st Street[b,c]	66.0	67.3	67.6	1.6	NA
21st Street east of Harrison Street[b,c]	NA	NA	NA	1.6	NA
21st Street west of Harrison Street[b,c]	59.7	61.0	63.6	3.9	NA
Webster Street north of 21st Street[b,c]	60.1	61.8	62.6	2.5	NA
Webster Street south of 21st Street[b,c]	59.4	61.2	61.2	1.8	NA
21st Street east of Webster Street[b,c]	58.9	60.6	64.1	**5.2**	**3.5**
21st Street west of Webster Street[b,c]	57.6	59.3	62.9	**5.3**	**3.6**
Franklin Street north of 20th Street[b,c]	57.2	58.9	61.1	3.9	NA
Franklin Street south of 20th Street[b,c]	57.4	59.1	61.0	3.6	NA
20th Street east of Franklin Street[b,c]	60.9	62.6	62.9	2.0	NA
20th Street west of Franklin Street[b,c]	60.1	61.8	62.3	2.2	NA

[a] Considered significant if the incremental increase in noise from traffic is greater than the existing ambient noise level by 5 dBA Leq, per City of Oakland, CEQA Thresholds/Criteria of Significance Guidelines. Violations are in **bolded** text.
[b] Road center to receptor distance is 15 meters (approximately 50 feet) for all roadway segments. Noise levels were determined using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model.
[c] The analysis considered the vehicle mix based on – cars 97 percent, medium trucks 2 percent, and heavy trucks 1 percent. Traffic speeds for all vehicle classes were set at 25 mph.
[d] Considered significant if the incremental increase in noise is greater than 5 dBA.
[e] If Near Term Project related noise increase is considered significant (greater than 5 dBA), the impact is considered significant if the incremental increase in roadway noise from the Near Term With Project compared to Near Term Without Project is greater than 3 dBA.

SOURCE: ESA, 2008

As discussed for NOI-3, SCA TRANS-1 Transportation Demand Management, would apply to Impact NOI-4 and reduce the Project's contribution to 2030 roadway noise along all roadways by reducing vehicle trips associated with the Project.

Even assuming a preliminary 10 percent reduction in Project-generated traffic volumes associated with the TDM (consistent with the preliminary TDM assumption applied in the greenhouse gases [GHG] analysis in Section IV.B), roadway noise would be reduced by 0.2 dBA. Cumulative noise impacts would remain significant along 21st Street. Thus, the impact would be significant and unavoidable.

Mitigation: Not feasible because none is available.

Significance after Implementation of Standard Conditions: Significant and Unavoidable.

References – Noise

California Department of Transportation (Caltrans), *Technical Noise Supplement: A Technical Supplement to the Traffic Noise Analysis Protocol*, October 1998a.

California Department of Transportation (Caltrans), *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects*, October 1998b.

California Department of Transportation (Caltrans), *Transportation- and Construction-Induced Vibration Guidance Manual*, June 2004.

City of Oakland, *Noise Element, City of Oakland General Plan,* June 21, 2005.

City of Oakland, "CEQA Thresholds/Criteria of Significance Guidelines," 2010.

Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment (FTA-VA-90-1003-06)*, May 2006.

Layne-Christiansen, Safety and Environmental Health Sciences Department, *Noise Evaluation: Ingersoll-Rand TH-75EReverse Circulation Air Rotary Drilling Rig*, 2004.

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J. Population, Employment and Housing

This section addresses existing conditions, trends, and impacts of the Proposed Project related to population, business activity, employment, and housing. Project employment is quantified and described along with the Project's contributions to citywide growth, providing the context for considering and understanding potential physical environmental impacts analyzed in this and other sections of the EIR. The impact assessment focuses on displacement of housing, people, businesses, and jobs, and on the inducement of population growth. The discussion also addresses potential effects of the Proposed Project on housing demand and the relationship between jobs and housing.

Setting

The following setting identifies existing conditions and trends for the Project Site and the City of Oakland. The citywide and regional context for population, employment, and housing is also presented, along with identification of the relationship between jobs and housing.

Project Site

Business Activity and Employment

The Project Site is currently occupied by a three story parking structure with 1,340 parking stalls and numerous retail and other service businesses. There are approximately 38,190 square feet of retail uses currently operating along Webster Street ("Webster Street Mall"). Current businesses leasing space within the Webster Street Mall areas include a fitness center, drugstore, bank and several restaurants. All these businesses primarily serve the neighboring offices within the Kaiser Center Complex. The Kaiser roof garden covers most of the parking facility.

Table IV.J-1 presents the estimates of existing employment at the Project Site at the various retail and service tenants.

The majority of employees within the mall buildings are office and retail/commercial workers.

Population and Housing

There are no housing units or residential population currently living on the Project Site.

City of Oakland and the Region

Oakland is the third largest city in the Bay Area region and the largest city in the East Bay. Housing, population, and employment growth are occurring in Oakland and projected to continue in the future, bolstering Oakland's role as a centrally-located place of residence and employment center within the large Bay Area region.

TABLE IV.J-1
EXISTING EMPLOYMENT ON THE KAISER CENTER PROJECT SITE, 2008

	Size / Square Footage		Employment Density Factor Estimate
Proposed Project			
20th Street Mall			
Retail / Commercial Services	21,275	350 sq.ft. / employee[a]	61
Restaurant	12,500	350 sq.ft. / employee[a]	36
Office	64,955	400 sq.ft. / employee[b]	81
Total – 20th Street Mall	98,730		178
Webster Street Mall			
Fitness Center	30,000	reported	25
Parking Facility	1,340	reported	8
Total – Webster Mall	30,000		33
Total Project	**128,730**		**211**

The employment figures shown reflect setting conditions as of late 2008 when the EIR employment and population analysis was performed.

a Employment estimates based on Bay Area average employment densities estimated by Keyser Marston.
b Currently approximately 50% of the office space is untenanted and consequently employment estimates adjusted accordingly.

SOURCE: Keyser Marston, 2006; McCray, 2008; Lam, 2008.

Business Activity and Employment

The greater Downtown/Oakland CBD area is approximately bounded by I-980 to the west, I-580 to the north, Lake Merritt and the Channel to the east, and the Oakland Estuary to the south. It includes the central parts of downtown (Uptown District, Kaiser Center area, City Center area, Old Oakland, Chinatown) as well as the auto-related, medical/hospital, and residential areas north of Grand Avenue, and the Jack London District to the south of I-880. Downtown Oakland is the major employment center in Oakland and second only to downtown San Francisco, it has the largest concentration of business activity and employment in the Bay Area.

The Oakland CBD includes a mix of uses predominantly consisting of offices and supporting commercial uses such as medical offices, banks, health clubs as well as restaurant and retail establishments. There are also several older apartment buildings and numerous larger new residential projects interspersed throughout many areas of Downtown Oakland.

The Upper Broadway neighborhood is located north of the Project Site and the Oakland CBD. The neighborhood includes a mix of low-, mid-, and high-rise buildings interspersed with multi-level parking structures and surface parking. Land uses within the Upper Broadway neighborhood include offices with limited ground floor retail, industrial uses (such as auto repair shops), civic facilities (such as churches, schools and senior centers). The Upper Broadway area has a high concentration of low-rise automotive-related and other businesses along with residential areas mostly located in the southern areas off of Broadway's central commercial corridor. There are also major clusters of medical facilities and businesses within the Alta Bates Summit Hill and Kaiser Permanente areas near Broadway's intersection with MacArthur Boulevard.

The Lake Merritt area is located east of the Project Site. Lake Merritt is an important residential and recreational area for Oakland. The area include Lakeside Park which besides providing open space and jogging routes for local residents offers numerous other recreational amenities including Garden Center, Children's Fairyland, Sailboat Club and Rotary Science Center. In the hills above Lakeside Park, the Adam's Point neighborhood is a major residential neighborhood with mid-rise apartment buildings and two- or three-story single family homes. In addition, Grand Avenue is an important neighborhood serving commercial corridor with extensive retail and other commercial businesses to the east of Lake Merritt.

Employment in Oakland was estimated at 199,470 in 2000, representing about five percent of all employment in the Bay Area region (see **Table IV.J-2**). Business activity and employment had grown substantially in Oakland in the late 1990s, reflecting strong economic trends throughout the region and an enhanced market position for Oakland, particularly within the region's office market. While regional trends favored growth in the suburbs in prior decades, recent trends "back to the center" are now recognizing the value of Oakland's central location, its good transportation/transit accessibility, and its relative affordability as a business location. These factors are anticipated to become increasingly important in the future, enabling Oakland to retain and enhance its competitive position as a business center for the region.

Since 2000, employment in Oakland has remained relatively stable with job growth occurring locally in some sectors despite the subsequent downturn in the region's economy. During this period, employment declined substantially in other parts of the region, particularly in the South Bay and in San Francisco, due primarily to declines in the region's high technology industries. The diversity of Oakland's economy has lessened the effects of the region's economic downturn and helped maintain relatively high occupancy rates for the city's office, commercial, and industrial space markets.

As the region's economy rebounds from its recent slowdown, economic growth is forecast for the future. Projections for Oakland show growth of about 71,000 jobs from 2005 to 2030 (see Table IV.J-2). That growth represents about a 31 percent increase in employment in Oakland, and a rate of growth relatively similar to those forecast for the Inner East Bay and the region overall. Downtown Oakland is anticipated to remain strong and to grow as a major office business center. Growth is anticipated in the transportation-related sectors centered on the city's growing airport and seaport, and in medical and health services, in retail, restaurant, and entertainment activities, and in professional and personal services. Activities in existing and new neighborhood commercial districts are anticipated to grow, supported by the growth of housing and population in the city.

TABLE IV.J-2
EMPLOYMENT, HOUSEHOLDS, AND POPULATION FOR OAKLAND, THE EAST BAY, AND BAY AREA REGION: 1990, 2000, 2005 AND 2030

					1990 – 2005		2005 – 2030		
	1990	2000	2005	2030	Change	Annual Rate	Change	Percent	Annual Rate
Employment									
Oakland	173,270	199,470	202,570	273,600	29,300	1.05%	71,030	31%	1.21%
Inner East Bay[a]	353,640	376,710	373,650	499,210	20,010	0.37%	125,560	30%	1.17%
Total East Bay[b]	953,580	1,121,470	1,109,030	1,589,260	155,450	1.01%	479,960	36%	1.45%
Total Bay Area	3,201,010	3,753,460	3,449,640	4,921,680	248,630	0.50%	1,472,040	32%	1.43%
Households									
Oakland	144,520	150,790	154,580	197,390	10,060	0.45%	42,810	22%	0.98%
Inner East Bay[a]	260,350	271,400	278,100	338,300	17,750	0.44%	60,200	18%	0.79%
Total East Bay[b]	779,810	867,500	912,100	1,138,130	132,290	1.05%	226,030	20%	0.89%
Total Bay Area	2,245,870	2,466,020	2,583,080	3,177,440	337,210	0.94%	594,360	19%	0.83%
Total Population									
Oakland	372,240	399,480	410,600	517,300	38,360	0.66%	106,700	21%	0.93%
Inner East Bay[a]	649,840	688,220	706,800	858,100	56,960	0.56%	151,300	18%	0.78%
Total East Bay[b]	2,080,430	2,392,560	2,528,700	3,114,100	448,270	1.31%	585,400	19%	0.84%
Total Bay Area	6,020,150	6,783,760	7,096,100	8,712,800	763,610	1.10%	1,616,700	19%	0.82%

[a] Inner East Bay includes Oakland and nearby cities of Albany, Berkeley, Emeryville, Piedmont, Alameda, and San Leandro.
[b] Total East Bay includes all of Alameda and Contra Costa counties, and total Bay Area includes all nine Bay Area counties.

SOURCES: U.S. Census; ABAG *Projections 2007*.

Population and Housing

Existing Conditions and Trends

The 2000 Census identified 399,480 people living in Oakland which represents about six percent of the Bay Area's total population (see Table IV.J-2). In 2005, the total Oakland population was estimated to be 410,600. There were 154,580 households in Oakland in 2005 and an average household size of 2.66 persons per household. The 2000 census also identified 157,508 housing units in Oakland (see **Table IV.J-3**). Of the occupied housing units (150,790), 59 percent were renter-occupied and 41 percent owner-occupied. From 1990 to 2000, Oakland's housing stock increased by 2,771 units. However, the number of households in the city grew by 6,270 during the 1990s, reflecting increased occupancy of the existing housing stock, as the overall housing vacancy rate declined from 6.6 percent in 1990 to 4.3 percent in 2000 (see Table IV.J-3). The city's population increased by 27,240 residents during that period as a result of housing production, occupancy of vacant units, and an increase in the population in existing households.

TABLE IV.J-3
CHANGES IN HOUSING STOCK IN OAKLAND, 1990-2000

	1990		2000		Change
Total Housing Units	154,737		157,508		2,771
Occupied Housing Units	144,521	93.4%	150,790	95.7%	6,269
Vacant Housing Units	10,216	6.6%	6,718	4.3%	(3,498)
Owner-occupied Housing	60,153	41.6%	62,489	41.4%	2,336
Renter-occupied Housing	84,368	58.4%	88,301	58.6%	3,933

SOURCE: U.S. Census, 1990 and 2000.

New Housing Development in Oakland

In the 1970s and 1980s, housing development bypassed Oakland and other inner city areas in favor of the suburbs. However, in the 1990s, regional trends began to change. Household and population growth occurred in Oakland existing housing stock as the vacancy rate declined and average persons per household increased. Most of the 2,771 units added in Oakland during the 1990s were built in the latter part of the decade as the region's housing market began to rediscover Oakland. Strong regional housing demand, fewer remaining locations for development in the suburbs, renewed interest in center city living particularly in proximity to employment centers, and a relatively affordable land supply for such a central Bay Area location were all factors favoring renewed housing development in Oakland.

In addition, new housing development has been encouraged in Oakland by regional and local Smart Growth land use policies and by other local efforts such as Mayor Jerry Brown's 10K Initiative to attract new housing development to downtown Oakland and bring 10,000 additional residents downtown. Since 2000, the city's housing supply has increased substantially. The most recent Oakland Housing element (2007-2014) anticipated the development of over 14,000 new housing units within Oakland by the end of 2014 in order to meet its fair share of the State's housing need (see **Table IV.J-4**).

TABLE IV.J-4
HOUSING GROWTH IN OAKLAND

	Additional Housing Units	Annual Average
1990 – 2000[a]	2,771	277
2000 – 2005[b]	5,000	1,000
2006 – 2025[c]	21,360	1,068
2007-2014[d]	14,629	1,951

a 2000 Census.
b Housing units in projects anticipated to be completed by the end of 2005.
c Housing in approved projects, in projects in pre-development and planning, and housing on housing opportunity sites and other sites considered likely to be developed by 2025.
D Housing units identified in City of Oakland 2007-2014 Housing Element to be completed by 2014.

SOURCE: City of Oakland, 2004; 2009.

As of April 2009, the 10K Downtown Housing initiative has resulted in the start and partial completion of 96 residential projects with 10,765 units. Forty projects (4,057 units) have been completed and eight projects (535 units) are currently under construction. In addition, 25 projects (2,236 units) have received planning approvals and 23 projects (3,928 units) are in the planning process. Altogether these projects will be able to house more than twice the 10K Housing Downtown initiative's original goal to build new housing for 10,000 new Oakland residents (City of Oakland, 2009).

As identified in Oakland's Housing Element, new housing is being built in downtown Oakland and also in many other parts of the city, including West Oakland, East Oakland, North Oakland, and along the Estuary waterfront. Most of the new housing is multi-family housing. New housing development is mostly focused around the city's BART stations, along transit corridors, in the downtown area, and in mixed-use neighborhoods. Lofts and other new housing are also being built in older industrial areas of the City. New housing in Oakland includes units covering a range of prices and rents, reflecting Oakland's land use policies encouraging higher-density development and the investment of substantial public funding for affordable housing.

The most recent Oakland Housing Element (2007-2014) identified the current status of the City's compliance with the Housing Element:

Units Constructed 2007-2008	1,128
Units with Planning Approvals	5,005
Units Planned (Site Acquisition or Pre-development	7,070
Total	**13,203**
Remaining Units to be Accommodated by 2014	***1,426***

The market success of recent housing developments in Oakland and the continuing demand for housing have increased developer interest in building additional new housing in Oakland in recent years. Although in the interim some housing development has occurred (or is currently planned) at many of these identified opportunity sites, between 7,000 and 8,000 new units could be built over the next five years (2008 to 2013) in projects already approved, in projects in the pre-development and planning process, or on sites considered likely to be developed in this timeframe.

Beyond 2013, continued housing development is anticipated that could add considerable additional housing units through 2030. By 2030, the projections include development of the housing opportunity sites identified in Oakland's Housing Element as well as new housing on other sites. In total, based on ABAG's household population projections, nearly 43,000 new units are expected to be added to Oakland between 2005 and 2030. Such housing growth would represent a more than a 25 percent increase to Oakland's housing supply over the housing stock identified in the 2000 census (shown in Table IV.J-3).

Population and Household Projections

Population projections for Oakland indicate growth of approximately 42,810 households and 106,700 residents from 2005 to 2030 (see Table IV.J-2). This growth reflects the continuing development of new housing in Oakland (described above) and projected demographic trends. In both the city and the region, average household size is projected to decline over time, reflecting the aging of the population, particularly the increase in the proportion of the population over age 55. In Oakland, the development of higher-density housing in the downtown area and other locations also is anticipated to attract households with fewer people and smaller than average household sizes. Thus, population is projected to increase by 21 percent through 2030, while households and housing units are projected to grow by 22 percent.

Regional Market Context for Housing Prices and Rents

Recent Trends

Throughout the state and the region, housing production has not kept pace with the demand for housing associated with employment growth, in-migration, and household formation. Between 1990 and 2000, an estimated 220,000 housing units were added in the nine Bay Area counties (a ten percent increase). During the same period, the number of employed residents increased by 304,500 (10 percent) while the number of jobs increased by 552,500 (17 percent) as shown in **Table IV.J-5**. Housing prices and rents also increased, reflecting this imbalance.

Since 2000, housing production levels have increased at the same time that employment opportunities have fallen off. Nevertheless, historically low mortgage rates and other economic factors have contributed to maintaining for-sale housing demand, price levels, and price increases, in spite of the significant slowdown in economic activity in the region. Apartment rents, however, leveled off in 2001 and declined in most parts of the Bay Area until they began to stabilize in mid-2004, as a result of the slow economy and the ability of some renters to become homebuyers because of low interest rates. Rental unit vacancy rates also increased over this period, and have just recently stabilized and begun to decline in some parts of the region as rental housing demand increased as the mortgage crisis has reduced home sales.

TABLE IV.J-5
TRENDS IN JOBS AND EMPLOYED RESIDENTS: 1990-2030

	1990	2000	2005	2030	1990-2005 Change	1990-2005 Annual Rate	2005-2030 Change	2005-2030 Annual Rate
Total Jobs								
Oakland	173,270	199,470	202,570	273,600	29,300	1.05%	71,030	1.21%
Inner East Bay[a]	353,640	376,710	373,650	499,210	20,010	0.37%	125,560	1.16%
Total East Bay[b]	953,580	1,121,470	1,109,030	1,589,260	155,450	1.01%	479,960	1.45%
Total Bay Area	3,201,010	3,753,460	3,449,640	4,921,680	248,630	0.50%	1,472,040	1.43%
Employed Residents								
Oakland	162,490	178,716	174,740	233,960	12,250	0.49%	59,220	1.17%
Inner East Bay[a]	312,070	332,135	320,020	416,060	7,950	0.17%	96,040	1.05%
Total East Bay[b]	1,053,430	1,171,549	1,187,470	1,640,530	134,040	0.80%	453,060	1.30%
Total Bay Area	3,147,610	3,452,117	3,225,100	4,655,500	77,490	0.16%	1,430,400	1.48%
Ratio Jobs-to-Employed Residents								
Oakland	1.07:1	1.12:1	1.16:1	1.17:1				
Inner East Bay[a]	1.13:1	1.13:1	1.17:1	1.20:1				
Total East Bay[b]	0.91:1	0.96:1	0.93:1	0.97:1				
Total Bay Area	1.02:1	1.09:1	1.07:1	1.06:1				
Employed Residents as Percent of Population								
Oakland	44%	45%	43%	45%				
Inner East Bay[a]	48%	48%	45%	48%				
Total East Bay[b]	51%	49%	47%	53%				
Total Bay Area	52%	51%	45%	53%				

[a] Inner East Bay includes Oakland and nearby cities of Albany, Berkeley, Emeryville, Piedmont, Alameda, and San Leandro. Data and projections from ABAG, *Projections 2007*.
[b] Total East Bay includes all of Alameda and Contra Costa counties, and total Bay Area includes all nine Bay Area counties. Totals are from ABAG, *Projections 2007*.

SOURCES: U.S. Census; ABAG *Projections 2007*.

Housing Prices and Rents

Housing prices in the Bay Area are among the highest in the country. In December 2004, the median sale price for new and existing homes in the Bay Area was $533,000. Between 1994 and 2004, house prices in the region increased by 136 percent. Home prices in Oakland and Alameda County were below those in the higher-priced markets – the median sale prices for new and existing homes averaging $497,000 for Alameda County in December 2004. However, the appreciation in home values within Alameda County was even greater than the regional trends, with prices increasing by 155 percent from 1994 through 2004 (Dataquick, 2009). In recent years, home price increases in Oakland have these exceeded regional trends as relatively lower-priced housing in Oakland was "discovered" and became more desirable *vis-à-vis* higher-priced housing in surrounding areas. For example, in January 2002 the median prices for Oakland homes was $254,000 – approximately 74 percent of the comparable value for Alameda County as a whole. In June 2006, at the market peak, Oakland home prices were $540,000 and almost 90 percent of the comparable value for Alameda County as a whole.

In recent years following the mortgage crisis and economic downturn, home prices have decreased significantly from their peak values in mid 2006 throughout most of California. Within most of the Bay Area, the home value losses have been less severe except for the more suburban areas of the East Bay. Home values in the more affluent areas of the Bay Area (such as San Francisco, San Mateo and Marin) nonetheless remain very high and relatively stable. In 2008, prices for new and existing homes in the Bay Area averaged $704,580 and were $755,000 in San Francisco. By contrast, Alameda County's median home price was $493,500. In 2008, Oakland median home price was $407,000 – approximately 14.4 percent lower than its previous median home price of $475,000 in 2005 (City of Oakland, 2008).

Information for larger rental apartment complexes show average apartment rents for the Bay Area at $1,290 per month as of mid-2005, and average rents for apartments in Alameda County at $1,200 per month, just below the regional average (Real Estate Research Council of Northern California, 2005). In both cases, rents peaked in early 2001, and then declined thereafter through mid-2004, as rental vacancy rates also increased. However, with the onset of the Mortgage crisis there has been greater demand for rental housing resulting in increases in both their occupancy and rental rates. In 2008, the average apartment rent in Oakland is $1,410 per month, and the apartment vacancy rate is 4.5 percent (City of Oakland, 2008).

Oakland's Housing Market Reflects Regional Context

Housing market conditions in Oakland reflect the broader regional housing market context. While housing prices and rents in Oakland have generally been below those in many other parts of the Bay Area, regional housing demand and higher prices and rents in other areas have been increasing demand for housing in Oakland and putting upward pressure on Oakland's housing prices and rents. Increasing interest in higher-density urban living and in housing in closer-in locations with access to employment centers also supports demand for housing in Oakland and contributes to the market for new housing now under development in Oakland.

Employed Residents and Jobs/Housing Relationship

Employed Residents and Where Oakland Residents Work

In 2000, 178,716 people living in Oakland were employed according to the U.S. Census, representing 56 percent of the working age population (the population 16 years of age and older) and 92 percent of the civilian labor force (those 16 years of age and older working or looking for work). In the future, the number of employed residents is anticipated to increase at a faster rate than the growth of population, due to the growth of higher-density new housing in Oakland with proportionally more adult residents in their working years and to regional demographic trends related to the overall aging of the population and higher labor force participation rates.

Census data indicate that in 2000, about 39 percent of the employed residents of Oakland held jobs in Oakland. Another 16 percent worked in nearby cities of the Inner East Bay, indicating that the majority (55 percent) of Oakland's employed residents work close to home, in Oakland and adjacent cities. Another 18 percent worked in San Francisco, and about 19 percent worked elsewhere in Alameda County outside the Inner East Bay and in Contra Costa County. The remaining eight (8) percent worked in other locations, most in other Bay Area counties (U.S. Census [2000], 2008).

Oakland Jobs and Where People Working in Oakland Live

About 36 percent of the jobs in Oakland in 2000 were held by people who also lived in the city. Another 15 percent of jobs were held by residents of nearby cities in the Inner East Bay, indicating that over half (51 percent) of Oakland's jobs are held by residents of Oakland and its adjacent cities. Residents of other parts of Alameda County and Contra Costa County held another 31 percent of Oakland's jobs, San Francisco residents held about five (5) percent, with the remaining 13 percent of jobs held by residents of other counties in the Bay Area, adjacent areas, and beyond.

Overall Relationship of Jobs and Housing

As described above, Oakland is both a place of residence and a place of employment. The total number of jobs in the city (202,570 in 2005) is roughly comparable to the total number of employed residents (174,716 in 2005) (see Table IV.J-5). The overall relationship between jobs and employed residents in an area identifies the extent to which a community enjoys a balanced mix of land uses thereby offering job opportunities to local residents and housing opportunities for workers employed in local jobs. The resultant mix of who lives in Oakland and who works in Oakland and the extent to which these are the same individuals results from a complex set of interactions and decision factors that determine where people choose to live and work, how much they spend for housing, and their travel patterns. Jobs/housing balance evolves over time and reflects the role and location of particular areas within the larger regional context. Regional planning efforts in the Bay Area seek to "balance" the number of jobs and the number of employed residents, or to improve existing imbalances, for purposes of achieving goals related to improving housing availability and affordability, commute distances, congestion, and air quality.

Data and projections for Oakland indicate that Oakland has a good balance of jobs and housing as it continues to have a relatively similar number of jobs and employed residents. In the future, similar amounts of growth for employed residents and jobs are anticipated to maintain this "balance" over time, as shown in Table IV.J-5. The relationship of jobs to employed residents in Oakland is similar to that for the nine-county Bay Area overall. Data for the Inner East Bay, including Oakland and its nearby cities, show that this larger surrounding area has a somewhat higher ratio of jobs to employed residents than Oakland alone. Overall, data for the East Bay in total (all of Alameda and Contra Costa counties including the Inner East Bay) show more employed residents than jobs, indicating the important role of the East Bay as a place of residence for people employed in the East Bay and other parts of the region.

Local Plans and Policies

Oakland General Plan policies and other applicable plans and policies that pertain to housing, jobs, and related effects, and that apply to the Project, are identified and discussed in Section IV.A. *Land Use, Plans, and Policies*. General Plan and Housing Element policies also are addressed in that section, as relevant to the significance criteria identified above.

City of Oakland Standard Conditions of Approval and Uniformly Applied Development Standards

There are no *City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards* (SCAs) that are specific to Population, Employment, and Housing.

Impacts and Mitigation Measures

Significance Criteria

Although a project's social and economic effects, *per se*, are not considered to be significant environmental effects under CEQA, those aspects of a project might affect other conditions in an area that are evaluated for physical environmental impacts under CEQA. Thus, this section also addresses the potential effects of the Project on housing demand, jobs/housing balance, and implications for housing availability and affordability. Such effects can have indirect implications for employee residence and commute patterns and related transportation and air quality impacts.

A project would have a significant effect on the environment if it would:

1. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere, in excess of that contained in the City's Housing Element.
2. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere, in excess of that contained in the City's Housing Element.
3. Displace substantial numbers of businesses and jobs, necessitating the construction of replacement facilities elsewhere, in excess of that contemplated in the City's General Plan.

4. Induce substantial population growth in a manner not contemplated in the General Plan, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads and other infrastructure) such that additional infrastructure is required but the impacts of such were not previously considered or analyzed.

The Proposed Project is evaluated relevant to the above criteria in the rest of this section. Not all the criteria above apply to the Proposed Project. No residential population exists that would be displaced by the development of the proposed new office development. Because there is no residential development on the Project Site, the Proposed Project would not result in any either the loss of any housing units or the displacement of any current residents.

Project and Cumulative Impacts

Future Project Employment

This section quantifies and describes the employment impacts associated with the Kaiser Center Project. Employment and population changes in and of themselves, are not normally considered to be significant environmental effects under CEQA. However, these changes and effects can be indicators of other impacts, and they can have influence on the significance of those impacts. Thus, the description of employment and population changes that follows is included to provide context for considering and understanding potential physical environmental impacts associated with changes in employment and population that are analyzed later in this section and in other sections of this EIR (*e.g.*, traffic, public services, and air quality). In addition, the description also identifies beneficial aspects of the Proposed Project in terms of employment opportunities and support for increased business activity in nearby areas.

Overall, the Proposed Project would redevelop existing buildings at the westernmost area of the Project Site to construct two office towers with a total of 1,320,240 square feet of new office space development as well as 22,300 of street level retail and 23,900 square feet of new commercial development on the 6th floor level area. Consequently the Proposed Project would result in a total of approximately 1,366,240 square feet of office and commercial development. The Proposed Project would also replace 155 of the existing parking spaces and add 697 new additional spaces resulting in future total parking capacity of 2,037 parking spaces.

Office Business Development

The Proposed Project would greatly expand the office employment at the Kaiser Center Complex. All of the approximately 65,400 square feet of existing office space within the two mall buildings would also be removed for the site redevelopment. Currently, these offices are only 50 percent occupied. Consequently there are only an estimated 81 office workers currently employed within the 20th Street Mall that would be displaced by the proposed redevelopment.

The Proposed Project would construct two office towers with a total of 1,320,240 square feet of new office space. The employment density for the future office use at the site is estimated to average approximately 400 square foot per employee. Consequently, it is estimated that the future office businesses at the completed Project would employ approximately 3,300 people.

Commercial and Retail Business Development

The Proposed Project would maintain comparable levels of commercial business activity on the Project Site better supported by the increased office employees working on-site. The Project would replace all of 63,775 square feet of existing commercial retail use at the Project site. The commercial businesses currently operating at the Webster and 20th Street Malls include a fitness center, restaurants, retail and service business. As shown in Table IV.J-1, these businesses currently employ approximately 122 people. During the Project's future construction these businesses will have to seek temporary new locations, which could be nearby or elsewhere in Oakland.

The current parking facility would also be affected by the Proposed Project. During Project construction, the parking facilities' capacity will decrease from 1,340 to 1,185 spaces – a reduction of approximately 12 percent. The temporary parking capacity loss could result in a corresponding employment decrease from its current 8 to 7 parking attendants.

The Proposed Project would demolish all 63,775 square feet of the existing commercial/retail spaces, and construct 46,200 square feet of new commercial/retail space. This results in a total net decrease of 17,575 square feet of commercial use.

The expected future employment associated with the Proposed Project is show in **Table IV.J-6.** It is conservatively assumed that the employment density for the future commercial and retail uses at the site will average approximately 350 square foot per employee. As a result, it is estimated that approximately 132 people will be employed by the Proposed Project's future commercial and retail tenants. Expansion of the site's parking facilities will add four employees resulting in a total of twelve parking facility employees.

TABLE IV.J-6
FUTURE EMPLOYMENT ON THE PROPOSED PROJECT SITE, 2008

	Future Size/Square Footage[a]		Employment Density Factor Estimate	Existing Employment	Net Change
Retail	22,300 Sq Ft	350 Sq Ft/Employee[b]	64	61	+3
Commercial Services	23,900 Sq Ft	350 Sq Ft/Employee[b]	68	61	+7
Office	1,320,040 Sq Ft	400 Sq Ft/Employee[b]	3,300	81	+3,219
Parking	2,037 Spaces	170 Spaces/Employee[c]	12	8	+4
Total	1,366,240 Sq Ft	--	3,444	211	+3,233

[a] Square footages shown here are net measurements. Gross square footage does not distinguish between uses.
[b] Future employment estimates based on Bay Area average employment densities estimated by Keyser Marston.
[c] Based on current employment levels.

SOURCE: Keyser Marston, 2006; McCray, 2008; Lamb, 2008.

Net Changes in Project Site Employment Related to the Proposed Project

Overall, the Proposed Project is expected to employ a total of 3,444 employees.[1] After accounting for both the growth of employment from the Project's planned office development and the change in employment its commercial square footage, future employment at build-out would representing a net increase of 3,233 jobs to the estimated 211 jobs currently at the Project Site (see Table IV.J-6).

Population and Housing

No housing development is proposed.

Displacement of Substantial Housing, Population, Businesses, or Jobs

Impact POP-1: The Project would displace existing businesses and jobs, but not in substantial numbers necessitating construction of replacement facilities elsewhere, in excess of that anticipated in the City's General Plan. (Less than Significant)

Development of the Proposed Project would require that existing commercial businesses located in the mall buildings on the Project Site find new locations for their business operations. The buildings in which they are now located would be demolished for the construction of the two new office towers. However, new construction will add 46,200 square feet of ground floor retail and six floor new commercial development for a net decrease of 17,575 square feet.

During the Project's construction, the parking facility would be reduced in capacity by an estimated 155 spaces thereby leaving 1,185 spaces in operation – equivalent to an 11.5 percent short term decrease in the facility's parking capacity. However after completion, these lost spaces would be replaced along with an additional 697 parking spaces resulting in a total future parking capacity of 2,037 spaces – equivalent to an overall 52 percent parking capacity.

Relocation Implications for Businesses

The EIR analysis identifies 63,775 square feet of existing commercial businesses employing about 130 people in the 20th and Webster Street Malls and associated parking facility development (see earlier Table IV.J-1). As discussed earlier, the current on-site commercial uses retail stores, personal service businesses (e.g., dry cleaners and banking) and restaurants. As proposed, the Project would include approximately a total of 46,200 square feet of ground-floor and 6th floor commercial space within the two new office developments. The future business uses for the new and expanded commercial space could be very similar to those currently at the 20th Street Mall.[2] It is likely that existing tenants would find other suitable business space within the City or vicinity, and could eventually decide to return to the Proposed Project Site when construction is complete. However, these are matters of private negotiation between the business

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1 Total employment for the Proposed Project only; does not include existing Kaiser Center office tower.
2 Excluding the current fitness center at Webster Mall which would not be replaced at the new Kaiser Center.

and property management/leasing specialists and no assurances to return to the Project Site can be presumed.

The relocation issues facing these businesses are likely to focus on locating comparable space at comparable rents, and covering the costs of relocation which can include expenses associated with searching for a new location, moving costs, and costs associated with getting re-established at a new location. Such costs can be particularly difficult for small businesses. However, while there could be adverse short-term economic implications of relocation for some businesses and business owners, the proposed additional office space and the upgrade/expansion of the commercial area available for lease at the site would likely improve the commercial potential for the facilities' future tenants. As shown in Table IV.J-6, overall, the Proposed Project would employ up to 3,444 workers in the Proposed Project. This would represent a major increase in employment at the site as an estimated 3,233 new jobs would be created by the Proposed Project. Full tenancy of the expanded office space is expected to employ up to 3,300 workers which would add approximately 3,220 new office employees. The approximately 50 percent increase in the parking facility's capacity is expected to create four additional parking attendant jobs. The future Proposed Project's total commercial area will be reduced by an estimated 17,575 square feet from that currently at the Webster and 20th Street Malls. However due to the greater employment associated with the new non-fitness center businesses, overall the Proposed Project's future commercial businesses would employ a total of 132 employees – representing a net future increase of 10 jobs. Thus, the Proposed Project would not result in the permanent displacement of existing businesses and jobs from the Project Site that would necessitate construction of any new replacement facilities.

Mitigation: None required.

Inducement of Substantial Population Growth

Impact POP-2: The Project would not induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)

Project Growth

The Proposed Project would add approximately 1,320,000 square feet of new office space on the Project Site. As shown in **Table IV.J-7**, the employment at the Project Site would increase from 211 to an estimated total of 3,444 at build-out of the Proposed Project, resulting in a net increase of 3,233 new jobs. This increase in employment at the Project Site would contribute to employment growth expected in Oakland over the next 25 years. The amount of employment growth anticipated for the Proposed Project would account for about 4.8 percent of total employment growth projected for Oakland between 2005 and 2030.

TABLE IV.J-7
PROPOSED PROJECT EMPLOYMENT COMPARED TO EXISTING AND PROJECTED FUTURE EMPLOYMENT IN OAKLAND

	Existing Employment	Future Employment	Employment Growth
Webster and 20th Street Malls (2008)	211	--	--
City of Oakland, 2005	202,570		
Proposed Project	--	3,444	+3,233
Proposed Project (future) as Percent of City (2005)		1.7%	
City of Oakland, 2030[a]	273,600		+71,030
Proposed Project (future) as Percent of City (2030)		1.3%	4.8%

[a] Association of Bay Area Governments, *Projections 2007*.

SOURCE: ABAG, 2007.

For comparison, the Proposed Project employment would represent about 1.7 percent of the total 2005 employment in Oakland and only 1.3 percent of the City's future total employment as projected by ABAG's projections for Oakland in 2030. Consequently, the Proposed Project would not directly result in substantial business/employment growth over and above that which is anticipated for Oakland in the future.

The Proposed Project will bring additional employees and visitors to the Project Site. The Proposed Project will also locate new customers for local retail and commercial business activities, particularly for nearby locations and neighborhood commercial districts and the Oakland CBD. The additional customer demand would bring additional spending for eating and drinking, grocery store and specialty food purchases, drug store and other convenience items, retail shopping goods, local services (such as banking, hair care, and dry cleaning) and auto-related services in the surrounding area.

Redevelopment of the Kaiser Center has long been included in Oakland's future employment projections. Major new office expansion at the site has been planned for since the early 1980s. The Oakland General Plan and Housing Element's planning for future growth anticipated comparable levels of new office development of the site. As such, the Proposed Project would have a positive contribution to the continued revitalization and economic health of the Oakland CBD.

Infrastructure-induced Growth

The Proposed Project is an example of urban infill and intensification of activity and development at a central location well-served by existing transportation systems (including transit), and other infrastructure and utilities. Unlike an office development at an alternative location on vacant land in an outlying part of the region, the Proposed Project would not require construction of new roads, sewer and water lines, and other infrastructure that might stimulate population growth in previously undeveloped areas.

Therefore due to the Proposed Project's long planned development, its comparable magnitude of new employment and its location within Oakland's CBD, the Proposed Project would have a less than significant impact in inducing substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements.

Mitigation: None required.

Other Potential Indirect and Cumulative Project Effects on Housing

Impact POP-3: In combination with other past, present, pending and reasonably foreseeable projects, the Proposed Project would not cumulatively induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)

Cumulative and other indirect potential effects of the Proposed Project and other cumulative development on the local and region's housing market is expected to be limited due to the greater influence of other underlying population and market factors and comparable minor magnitude of the Project-related job growth within the context of the city and region's longer term economy. The key underlying factors related to the potential for Project-related indirect and cumulative impacts are discussed below.

Project Effects on Housing Demand and the Jobs and Housing Balance

As shown in Table IV.J-5, similar trends to Oakland's are also anticipated for the rest of the East Bay in the future. While future job growth is projected to exceed the growth of employed residents in nearby cities of the Inner East Bay (increasing the ratio of jobs-to-employed residents over time), those effects would be mostly offset by the growth of housing and employed residents in the rest of the East Bay which is projected to exceed employment growth in those areas (reducing the ratio of jobs-to-employed residents). When combined, growth of employed residents in all of the East Bay outside of Oakland is projected to exceed the anticipated job growth and to maintain and potentially improve the balance of jobs and housing over time, similar to the trends for Oakland.

Role of Employment in the Housing Market in Oakland and the East Bay Is Unlikely To Change

Cumulative employment growth in Oakland and the East Bay that is accompanied by corresponding growth of housing and employed residents would not increase overall competition for housing and put upward pressures on housing prices and rents. Thus, while employment growth in the Proposed Project and other cumulative projects would increase the demand for housing, housing market conditions in Oakland and the East Bay are not anticipated to change substantially as a result. That is because, on-going and future housing construction is anticipated to increase the housing supply and offset the effects of increased demand. In addition, demographic trends are projected to increase the employed population accommodated within the housing stock, thereby reducing the amount of housing otherwise needed.

Employee Residence and Commute Patterns Unlikely To Be Affected

The limited effects of cumulative employment growth on housing demand and jobs/housing balance in Oakland and the East Bay and on housing availability as described above are unlikely to trigger shifts in housing demand to other parts of the region. For the most part, the increases in housing supply and the growth of employed residents in Oakland and the East Bay are anticipated to be able to accommodate the additional demand associated with employment growth. Thus, employee residence and commute patterns are unlikely to be noticeably affected by employment growth in Oakland.

Small Role of the Project Within the Cumulative Context

Within the cumulative context, the housing demand effects of the Proposed Project would represent a very small part of the bigger picture of cumulative employment and housing growth and other factors influencing housing market conditions. Comparisons summarized in **Table IV.J-8** show that the increases in Proposed Project employees likely to reside in Oakland, other parts of the East Bay, and elsewhere in the region would represent a small percentage of the growth of employed residents in each area.

TABLE IV.J-8
INCREASE IN PROPOSED PROJECT EMPLOYMENT COMPARED TO PROJECTED GROWTH OF EMPLOYED RESIDENTS, BY PLACE OF RESIDENCE

Place of Residence	Increase in Proposed Project Employees[a]	Growth of Employed Residents 2005-2030[b]	Proposed Project Employees as Percent of Employed Resident Growth
Oakland	1,164 (36%)	59,220	2.0%
Rest of Inner East Bay[c]	485 (15%)	36,820	1.3%
Rest of East Bay[d]	1,002 (31%)	357,020	0.3%
Rest of Bay Area[e]	582 (18%)	997,400	0.06%
Total	3,233 (100%)		
Total East Bay	2,651 (82%)	453,060	0.5%
Total Bay Area	3,233 (100%)	1,430,400	0.23%

[a] Future Proposed Project employment as summarized in Table IV.J-6, distributed to places of residence similarly to current Oakland employment as estimated by Census 2000.
[b] Projections shown are from Table IV.J-5 adjustments to represent excluded cities. The growth covers 2005-2030.
[c] Rest of Inner East Bay outside of Oakland, including nearby cities of Albany, Berkeley, Emeryville, Piedmont, Alameda, and San Leandro.
[d] Rest of Alameda County outside of Oakland and other Inner East Bay cities plus all of Contra Costa County.
[e] Rest of nine-county Bay Area beyond Alameda and Contra Costa counties. It is conservatively assumed that all Kaiser Center employees live within the Bay Area region.

SOURCE: U.S. Census (2000), 2008.

In Oakland, the new Proposed Project employees likely to reside in the city could represent about 2 percent of the anticipated growth of employed residents in the city. Similarly, additional Kaiser Center employees are likely to reside in nearby cities of the Inner East Bay could represent a little more than one percent of the growth of employed residents anticipated in those cities. Beyond the immediate Inner East Bay, the additional Proposed Project employees would represent even smaller shares (much less than one percent) of the anticipated growth of employed residents elsewhere in the East Bay and in the rest of the region. Thus, any effects of the Proposed Project on overall housing demand and affordable housing demand would be small in the much larger context of employment and housing growth and other factors influencing housing market conditions.

Overall, due to the greater influence of other underlying population and market factors and comparable minor magnitude of the Project-related job growth within the context of the city and region's longer term economy, the Project's cumulative effects on the local and region's housing market are expected to be less than significant.

Mitigation: None required.

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K. Public Services and Recreation Facilities

This section describes existing public services and facilities at the Kaiser Center Oakland Redevelopment Project Site and vicinity. It also evaluates the potential impact of the Proposed Project on the delivery of public services, and possible adverse physical impacts on the environment that could result from a need to provide new or physically altered facilities. As necessary, appropriate SCAs and/or mitigation measures are identified. The analysis reviews police services, fire protection and emergency medical response, public schools, and parks and recreational facilities.

Setting

Police Services

Facilities and Staffing

The Oakland Police Department provides police protection services throughout the city. The Police Department is headquartered at 455 7th Street in downtown Oakland, approximately one mile from the Project Site, and there is one sub-station located in the Eastmont Mall Shopping Center at 2651 73rd Avenue, approximately seven miles from the Project Site.

As of August 2008, the Police Department had 778 sworn police officers and a civilian staff of about 339. The Department anticipated an increase of 25 police officers by the end of 2008, for a total of 803 officers (OPD, 2008a). The current ratio of police officers to residents is approximately one officer to 510 residents, based on the city's population of 420,183(State of California, 2008).

The City is geographically divided into 35 patrol beats. Each neighborhood services coordinator handles multiple patrol beats. Neighborhood service coordinators are civilian employees who serve as a liaison between the community and the Police Department, and work with residents, businesses, schools, and other institutions to set priorities and develop strategies to improve public safety and reduce crime. In November 2004, Oakland voters approved Measure Y, the Violence Prevention and Public Safety Act of 2004. Measure Y proposed a new parcel tax and parking surcharge (on parking in commercial parking lots) in order to fund violence, crime, and fire prevention programs. One of the permitted purposes of the tax revenues from Measure Y is the hiring and maintaining 63 new sworn police officers, including at least one officer for each existing community policing beat, for community and neighborhood policing efforts and targeting truancy, crime reduction, domestic violence, and child abuse intervention.

The Project Site is located within patrol beat 4X. Beat 4X is generally bounded by 23rd Street to the north, 14th Street to the south, Lakeside Drive to the east, and Castro Street to the west. Patrol beats have one officer assigned 24 hours a day. Officers generally work ten-hour shifts four times each week. At any one time, citywide, there are 35 officers, a watch commander, and up to six supervising sergeants on duty, all of whom are sworn personnel. The Traffic Operations Unit generally staffs about 18 officers throughout the day, with additional staff available for special events and periods of special staffing needs (OPD, 2008b).

Service Demand

All emergency (911) and non-emergency calls for police services are received through the Police Department's communications center located at 1701 Edgewater Drive. Calls for fire and medical services are routed to the Oakland Fire Department for dispatching. Priorities for responding to police calls are set by a computer-aided dispatch system that may be overridden by dispatchers. Police officers are dispatched from the police communications center by radio and/or laptop computers mounted in police vehicles.

The Police Department's response times to calls for police services are recorded for the City of Oakland as a whole; the department does not track response times for individual service areas. Response times generally reflect the perceived seriousness of the call. The department ranks incoming calls for police services as follows: Priority 1 means imminent danger of death or serious injury, felonies in progress, or serious public health hazards; Priority 2 refers to disputes with potential for violence, misdemeanor crimes in progress, stolen vehicle reports, and similar matters; and Priority 3 calls are reports of incidents that do not present danger to life or property.

Table IV.K-1 summarizes reported crimes within the Project area in 2008.

TABLE IV.K-1
REPORTED CRIMES IN THE CITY OF OAKLAND 2008

Crime	Project Area[a]
Robbery[a]	3,323
Felony Assault	4,129
Burglary[b]	4,488
Stolen Vehicles	8,085
Forcible Rape	338
Murder	116

[a] Includes armed robbery, attempted robbery, and residential robbery.
[b] Includes commercial, residential, and locked auto burglary.

SOURCE: City of Oakland, 2010.
City of Oakland Police Department Disclaimer: These numbers do not match the official monthly crime totals reported to the FBI through the Uniform Crime Reporting (UCR) program. Crime totals can be affected by late reporting, the reclassification or unfounding of crimes, or the geocoding process. The only certified crime numbers are those contained in the UCR.

Kaiser Center Onsite Security

Under the management of The Swig Company, the Kaiser Center complex currently has round-the-clock on-site security services. The Kaiser Center's Security staff currently consists of six full-time equivalent security officers and one security director during the business day, two officers during the swing shift and two officers during the graveyard period, providing 24 hour security, seven days a week (The Swig Company, 2009).

Other Security

The Kaiser Center is part of the Lake Merritt/Uptown District Association, a newly formed non-profit corporation whose primary functions are to administer the newly established Lake Merritt/Uptown Community Benefit District (District), a voter-mandated assessment district levied on the benefiting property owners to augment existing municipal services. The Lake Merritt/Uptown Community Benefit District encompasses a 20-block area generally bounded by Telegraph Avenue on the west, 25th Street on the north, Harrison Street/Lake Merritt on the east, and 17th Street on the south (The Swig Company, 2009).

The services funded by Lake Merritt/Uptown District include providing additional security throughout the District, maintaining cleanliness and order in the public rights of way, improving district identity and advocating on behalf of the area property owners, business owners and residents. Security tasks are conducted by a total of six security "ambassadors" who patrol the District on foot and bicycle. A security director manages the ambassadors. There are four ambassadors (including the security director) on hand during the business day and three ambassadors in the evening. The District security ambassadors coordinate with the City of Oakland Police Department and the onsite Kaiser Center Building security force (The Swig Company, 2009).

Fire Protection and Emergency Medical Services

Facilities and Staffing

The Oakland Fire Department provides fire protection services and emergency medical services throughout the city. The Fire Department operates 25 fire stations, including the Airport. The Department maintains 24 engine companies with approximately four personnel per engine, four truck companies with four personnel per truck, and three truck companies with five personnel per truck. Total Fire Department staffing consists of 500 uniformed personnel. The actual number of assigned personnel per station depends on the needs of that station. All personnel are trained as Paramedics or Emergency Medical Technicians.

There are four fire stations servicing the Project area. Fire Station 15 is closest to the Project area and would be the first station to respond to calls within the Project vicinity. The exact station locations and approximation to the Project area are listed below:

- Fire Station 1 at 1605 Martin Luther King Jr. Way, approximately one mile from the Project Site;
- Fire Station 10 at 172 Santa Clara Avenue, approximately one mile from the Project Site;
- Fire Station 12 at 822 Alice Street, approximately one mile from the Project Site; and
- Fire Station 15 at 455 27th Street, approximately one mile from the Project Site.

In addition to firefighting and emergency medical response capabilities, the Fire Department also has a hazardous materials unit that operates from Station 3 at 1445 14th Street and responds citywide to emergencies involving hazardous materials.

Water supply and fire flow for fire suppression purposes are discussed in Section IV.M, Utilities and Service Systems.

Service Demand

The Oakland Fire Department Dispatch Center (FDDC) is located in downtown Oakland and is responsible for fire and medical emergency coordination and response. The FDDC receives approximately 60,000 calls for response annually, of which 80 percent are medical emergencies. Fire Station 15, which serves the Project area, responded to approximately 4,543 calls in 2007.

The Fire Department's response time goal is seven minutes or less, 90 percent of the time. In most cases, Fire Station 15 responds to calls in four to six minutes or less (OFD, 2008).

Public Schools

School Facilities and Attendance

The Oakland Unified School District (OUSD) operates the public school system in the city of Oakland. The OUSD administers 70 elementary schools, 24 middle schools, one junior high school and 31 high schools. It is also responsible for three alternative schools, two special education schools, two continuation schools, two community day schools, and three opportunity schools. Total school enrollment for elementary and secondary students for the 2006/2007 academic year was 47,012, showing a decline in enrollment from 48,135 students in 2005/2006 and 49,214 students in 2004/2005 (Ed-Data, 2008).

Project Area Schools

The Project area is located within the service areas of Lakeview Elementary School, Westlake Middle School, and Oakland Tech and Far West high schools. Lakeview Elementary School is located at 746 Grand Avenue, approximately 1.6 miles east of the Project Site. Total enrollment at Lakeview was 322 students during the 2007-2008 school year. Westlake Middle School is located at 2629 Harrison Street, less than one mile north of the Project Site. Total enrollment at Westlake Middle School was 611 students during the 2007-2008 school year. Oakland Tech High School is located at 4351 Broadway, approximately 2 miles northeast of the Project Site, and Far West High School is located at 5263 Broadway Terrace, approximately 2.5 miles northeast of the Project Site. Total enrollment at Tech High School was 1,705 students during the 2007-2008 school year and total enrollment for Far West High School was 195 students during the same school year.

Senate Bill 50

The Leroy F. Greene School Facilities Act of 1998, or Senate Bill 50 (SB 50), authorizes school districts to levy developer fees to finance the construction or reconstruction of school facilities. On January 30, 2008, the State Allocation Board (SAB) raised Level 1 Fees from $0.42 to $0.47 per square foot of enclosed and covered space in any commercial or industrial development (SAB, 2008). These fees are intended to address the increased educational demands on the school district resulting from new development. Public school districts can, however, impose higher fees than those established by the SAB, provided they meet the conditions outlined in the act. Private schools are not eligible for fees collected pursuant to SB 50.[1]

Parks and Recreational Facilities

The City of Oakland's Office of Parks and Recreation manages the City's parks and recreation centers within the city boundaries. Oakland's Public Works Agency maintains the parks and park facilities. Including parkland within the East Bay Regional Parks District (EBRPD), Oakland has approximately 5,219 acres of parkland,, which is around 12.9 acres of parkland per 1,000 residents (Trust for Public Land, 2010).

Oakland's parks are categorized by size and intended service area. Generally, local-serving parks "meet the active recreational needs of the community" surrounding the park, rather than the city as a whole. Snow Park, located on the corner of 19th and Harrison Streets and adjacent to Lakeside Street, is closest to the Project Site. Amenities at Snow Park include a putting green and an open grassy area with shade trees. Lakeside Park, primarily known for Lake Merritt, is a regional park directly across the Project Site. Lakeside Park offers visitors paved trails for biking, walking or running and several specialty gardens including the Japanese Bonsai and Suiseki Gardens and other vegetable and fruit demonstration gardens. The Park is home to the 1876 historical House Museum.

The EBRPD, although responsible primarily for acquiring and developing regional parks, open spaces, and regional trails throughout the East Bay, also provides open space and recreational facilities within Oakland's city limits. EBRPD parks in Oakland include the 271-acre Leona Canyon Regional Open Space Preserve, the 1,220-acre Martin Luther King, Jr. Regional Shoreline Park, the 660-acre Robert Sibley Volcanic Regional Preserve, and the 100-acre Roberts Regional Recreational Area.

The City's Department of Parks and Recreation also operates several community-based centers located throughout city. The centers offer various public programs, including recreation, sports, arts and culture, computers, general learning, and after-school activities. In close proximity to the Project Site are the Lincoln Square Recreation Center at 250 10th Street, the Mosswood Recreation Center at 3612 Webster Street, and the Rotary Nature Center at 600 Bellevue Avenue.

Measure DD

In November 2002, the Oakland voters approved Measure DD, a bond measure to finance the preservation and acquisition of open space, parks renovation, Estuary waterfront parks and trails, water quality improvements related to Lake Merritt, restoration of Oakland's creeks, renovation

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1 The SAB is authorized by Government Code Section 65995(b) (3) to increase the base fee every two years. The Government Code establishes three types of school fees: Level 1, Level 2, and Level 3. Level 1 requires school districts to prepare a "nexus" analysis demonstrating why fees are required and how they will be used. Level 2 requires the school district to submit a timely application and show that it satisfies at least two of the four requirements set forth in the Government Code. Level 3 allows the school district to impose a developer fee up to 100% of the School Facility Program new construction project costs (Section 65995.7).

and creation of new youth and public recreation facilities, rehabilitation of open space and other safety and maintenance facilities, and provision of safe public access to Lake Merritt, Lake Merritt Channel, and the estuary. These projects involve facilities near the Project Site.

Libraries

Library Facilities

The City of Oakland's Public Library system operates a Main Library plus 15 branch libraries, a Second Start Adult Literacy Program, the Bookmobile, the Tool Lending Library, and an African-American Museum and Library. The Project Site is equidistant from the Main Library (125 14th Street) and the Asian Branch Library (388 9th Street), both about 1.2 miles southwest of the Project Site. The Main Library serves residents from all of Oakland, with heavy use by residents around Lake Merritt and in the downtown area. The Main Library is one of the largest public library facilities in the Bay Area, including collections of non-fiction and fiction books, magazines and newspapers, sheet music, maps, government publications and compact discs, videocassettes, DVDs and audiobooks. The Main Library houses the Oakland History Room, the Children's Room, the Teen Zone, and a meeting room that can accommodate up to 121 persons. The Main Library also provides 33 computers with internet access, basic internet classes, and adaptive technology to assist persons who are blind or have low vision or learning disabilities. The Asian Branch Library houses eight Asian languages (Chinese, Japanese, Korean, Vietnamese, Thai, Cambodian, Tagalog and Laotian) in major reference titles and general subject titles, an Asian Studies collection and an Asian American collection in English. The Asian Branch Library also includes computers and a computer lab with multilingual interface for instructional purposes (Oakland Public Library, 2008).

Local Plans and Policies

Relevant policies and conditions from the City's General Plan and Standard Conditions of Approval are described below.

City of Oakland General Plan

Policies contained in the LUTE elements of the Oakland General Plan pertain to the various public services and related topics. Discussion of the Project's overall consistency with the Oakland General Plan is provided in Section IV.H, *Land Use, Plans and Policies,* of this EIR. General Plan policies that are also significance criteria or contain a regulatory threshold which the Project must meet are addressed in this section.

- *Policy D8.2*: Future office development on Harrison Street opposite Lakeside Park and Snow Park should provide ground level landscaped open space to soften the edge between public park land and office core. This space should be clearly accessible to office workers and the public.
- *Policy N.12.1*: The development of public facilities and staffing of safety-related services, such as fire stations, should be sequenced and timed to provide a balance between land use and population growth, and public services at all times.

- *Policy N.12.2*: Adequate public school capacity should be available to meet the needs of Oakland's growing community. The City and the Oakland Unified School District (OUSD) should work together to establish a continuing procedure for coordinating residential and commercial development and exploring the imposition of mutually agreed upon reasonable and feasible strategies to provide for adequate school capacity. The City and OUSD should jointly consider, where feasible and appropriate, funding mechanisms such as assessment districts, redevelopment Agency funding (AB1290), uses of surplus City-owned land, bond issues, and adjacent or shared use of land or school facilities with recreation, libraries, child care and other public uses.
- *Policy N12.3*: High quality day care should be available throughout Oakland, appropriately sited and designed based on its capacity and attributes. The City should, when appropriate and feasible, require major development projects to provide on- or off-site facilities or other means to address potential child care inadequacies and encourage the inclusion of child care centers in major residential and commercial developments near transit centers, community centers and schools.
- *Policy N12.4*: Electrical, telephone, and related distribution lines should be undergrounded in commercial and residential areas, except where special local conditions such as limited visibility of the poles and wires make this unneeded.
- *Policy F1-1*: Maintain and enhance the City's capacity for emergency response, fire prevention and fire fighting.
- *Action F1-1.2*: Strive to meet a goal of responding to fires and other emergencies within seven minutes of notification 90 percent of the time.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The City of Oakland's SCA relevant to reducing impacts on public services due to the Proposed Project are listed below. If the Project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to public services. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA PUB-1: Conformance with other Requirements**

  Prior to issuance of a demolition, grading, P-job, or other construction related permit

  a. The project applicant shall comply with all other applicable federal, state, regional and/or local laws/codes, requirements, regulations, and guidelines, including but not limited to those imposed by the City's Building Services Division, the City's Fire Marshal, and the City's Public Works Agency.

  b. The applicant shall submit approved building plans for project-specific needs related to fire protection to the Fire Services Division for review and approval, including, but not limited to automatic extinguishing systems, water supply improvements and hydrants, fire department access, and vegetation management for preventing fires and soil erosion.

- **SCA PUB-2: Fire Safety Phasing Plan**

  Prior to issuance of a demolition, grading, and/or construction and concurrent with any p-job submittal permit. The project applicant shall submit a separate fire safety phasing plan to the Planning and Zoning Division and Fire Services Division for their review and approval. The fire safety plan shall include all of the fire safety features incorporated into the project and the schedule for implementation of the features. Fire Services Division may require changes to the plan or may reject the plan if it does not adequately address fire hazards associated with the project as a whole or the individual phase.

To further implement SCA PUB-2, the Project shall implement the following Project-specific Conditions of Approval: The Project will incorporate building design elements to enhance fire-fighting and rescue capabilities beyond basic code requirements. Elements would include, but are not limited to, one elevator designed for fire-fighter use and rescue air stations at every fifth floor.

Impacts and Mitigation Measures

Significance Criteria

The Project would have a significant impact related to public services or recreation if it would:

1. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:
   - Police protection;
   - Fire protection;
   - Schools; or
   - Other public facilities.
2. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
3. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

Police Services Impacts

Impact PUB-1: The Project could result in an increase in calls for police protection services, but would not require new or physically altered police facilities in order to maintain acceptable performance objectives. (Less than Significant)

Approximately 218 crimes were reported in 2008 within a 1,000 foot radius of the Project area. The Project would increase development intensity on the Project Site as well as increase the onsite population (employees and visitors). This increase could result in an increase in reported crimes. Currently, the Project Site is patrolled by one beat officer, 24 hours a day, seven days a week. The Police Department does not, however, anticipate the need for any new physical facilities as a result of the Proposed Project.

In addition, the on-site Kaiser Center security staff will continue to be present during Project construction and with operation of the Proposed Project. During construction, site security will be supplemented by additional private security hired by the construction contractor to patrol the construction site. Furthermore, the Lake Merritt/Uptown Community Benefits District will also continue to patrol the 20-block area with implementation of the Proposed Project. These security teams will support and assist the OFD as needed.

Mitigation: None required.

Fire Protection and Emergency Medical Services Impacts

Impact PUB-2: The increased population and density resulting from the Project would not involve or require new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and emergency medical services and facilities. (Less than Significant)

The Project Site is within the response boundaries of Fire Stations 1, 10, 12, and 15, which are located approximately one mile each from the Project Site.

New employees and visitors to the Kaiser Center complex resulting from the Proposed Project could increase the number of calls for fire and emergency service. However, the Fire Department indicates that it would be able to provide adequate fire suppression and emergency medical response services to the Project Site, with existing staff, and that the Project would not require development of new or physically altered facilities. In accordance with the California State Fire Code, the Fire Department would require that fire prevention measures, such as automatic sprinklers, smoke detectors, fire alarm systems, and fire resistant construction, be incorporated into final Project plans for each building. An automatic defibrillator should be installed in each building, specifically at public gathering points, to address potential heart related emergencies (Sierra, 2008). The appropriate building and fire code requirements adopted by the City of Oakland would be incorporated into Project construction. The Fire Department would review the Project, including provisions for onsite access, exits, and any necessary special equipment to assist firefighters on-site. The Project applicant would be required to incorporate the Fire Department's recommendations into the final Project. Project-specific Conditions of Approval that will be applied to the Project include incorporating building design elements to enhance fire-fighting and rescue capabilities beyond basic code requirements. Elements would include, but are not limited to, one elevator designed for fire-fighter use and rescue air stations at every fifth floor.

To further reduce the need for emergency response and new staff to serve the Project Site, the Project sponsor would provide occupants with fire prevention and public education information to reduce hazards and risks. These features would be required as part of the City's SCA PUB-1 and SCA PUB-2 to the Project and would supplement the standard fire prevention measures required by the California State Fire Code.

Mitigation: None required.

Public Schools Impacts

Impact PUB-3: The Project could result in new students for local schools, but would not require new or physically altered school facilities to maintain acceptable performance objectives. (Less than Significant)

The Proposed Project would not provide new residential uses, and therefore, would not directly generate new student enrollment in the Oakland Unified School District. However, it is possible that families could relocate to Oakland or other adjacent communities as a result of new employment opportunities generated by the Project. Although it cannot be determined where new employees would reside, based on projected employee residence patterns, the majority of new employees who do not currently reside in Oakland would potentially be located in other East Bay cities (Berkeley, Albany, Piedmont, Emeryville, Alameda, and San Leandro) and in Contra Costa County.

Pursuant to Senate Bill 50 (SB 50), the Project sponsor would be required to pay school impact fees established to offset potential impacts from new development on school facilities. Therefore, although the Project could indirectly increase resident populations and potential student enrollment in Oakland, payment of fees mandated under SB 50 is the mitigation measure prescribed by the statute, and payment of such fees is deemed full and complete mitigation. Therefore, no additional mitigation would be required.

Mitigation: None required.

Parks and Recreational, and Library Facilities

Impact PUB-4: The Project could increase the demand for parks, recreational facilities, and library facilities, but would not result in substantial physical deterioration of such facilities or require new or physically altered facilities in order to maintain acceptable performance objectives. (Less than Significant)

The Proposed Project's effect on parks and recreation, facilities and library facilities would be indirect, resulting from the provision of additional employment opportunities, which could increase the resident population in Oakland and surrounding communities.

Increases in the number of employees and visitors at the Project Site could result in an increased use of Lakeside Park and Snow Park, given their proximity to the Project Site, and the roof garden located on the Project Site. Based on observed uses of the parks and roof garden during typical daytime hours during the weekday, these areas offer substantial capacity for increased use.

Increased use of the park, particular at the highly visible, urban Lakeside and Snow parks situated in a high-activity area, would benefit the vitality of the area as well as public safety. However, it would be speculative to assume that the degree of use by employees and visitors would significantly increase from existing levels of use. In any case, the Proposed Project would not result in increased use to levels that would result in substantial physical deterioration of Lakeside Park or Snow Park facilities.

In summary, the effects on parks and recreation facilities, and library facilities from the Proposed Project would be less than significant.

Mitigation: None required.

Cumulative Impacts

Impact PUB-5: The Project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, could result in cumulative impacts to the provision of public services. (Less than Significant)

Geographic Context

As discussed above, the Proposed Project would not result in significant Project-level effects on the ability of service providers to provide adequate police services, fire protection and emergency medical services, public schools, and parks and recreation facilities to the Project area and vicinity. Considered in combination with other cumulative development, there would likely be an increased demand for public services. Overall, the city of Oakland and its surrounding areas was used as context for assessing cumulative impacts on police services, fire protection and emergency medical services, public schools, and parks and recreational facilities.

Impacts

The Proposed Project would have a less-than-significant impact on the ability of the City of Oakland and other service providers to provide adequate public services (including police and fire protection, emergency medical services, schools, parks, recreational facilities, and library facilities) to the Project area and vicinity. Although likely to increase the demand for such services, other present and reasonably foreseeable development within the area would be addressed case by case during the development and review of such development. This would ensure that services to accommodate current and future citywide growth could be reasonably provided within the cumulative context. Therefore, the effect of the Proposed Project, in combination with other foreseeable development, would not be cumulatively significant.

Mitigation: None required.

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L. Transportation and Circulation

This section describes the existing traffic and site access conditions on the Project Site and in the vicinity of the Proposed Project and analyzes the potential impacts of the Project on the transportation network. This transportation impact assessment conforms to the requirements and methodologies of the City of Oakland CEDA Transportation Services Division (TSD) and Alameda Countywide Congestion Management Agency (ACCMA[1]) guidelines. The transportation analysis describes the operational characteristics of the existing study area circulation system, determines the circulation system needs based on future transportation demand, and summarizes the potential circulation impacts associated with the development of the Proposed Project. **Appendix G** (Appendices G.1 through G.13) contains technical background information relating to transportation and circulation.

The analysis evaluates the traffic-related impacts of the Proposed Project during both the weekday morning and evening peak hours. Traffic conditions are analyzed at 51 key intersections and 12 roadway segments in the study area for the following seven scenarios:

- Existing Conditions – based on existing volumes obtained from traffic counts and site and area observations.
- Existing Plus Project (Phases I/II) – adds estimated traffic generated by the Project to existing volumes. Phase I includes buildout of only the south tower; Phase II includes buildout of both towers.
- Near-Term (2015) Without Project - Future conditions with planned population and employment growth and planned transportation system improvements for the year 2015. Traffic projections were developed using the newly updated Alameda Countywide Travel Demand Model provided by the ACCMA (ACCMA Model).
- Near-Term (2015) Plus Project (Phase I only) - Future forecasted conditions for the year 2015, as determined in the Near-Term (2015) Without Project scenario, plus Project Phase I-related traffic.
- Near-Term (2015) Plus Project (Phases I/II) - Future forecasted conditions for the year 2015, as determined in the Near-Term (2015) Without Project scenario, plus Project-related traffic for Phase I and Phase II.
- Cumulative (2030) Without Project - Future conditions with planned population and employment growth and planned transportation system improvements for the year 2030. Traffic projections were developed using the ACCMA Model.
- Cumulative (2030) Plus Project (Phases I/II) - Future forecasted conditions for the year 2030, as determined in the Cumulative (2030) Without Project scenario, plus Project-related traffic for Phase 1 and Phase II.

1 In 2010, the Alameda County Congestion Management Agency (ACCMA) and the Alameda County Transportation Improvement Authority (ACTIA) merged to form the Alameda County Transportation Commission (Alameda CTC). The transportation analysis in this document is based on ACCMA guidelines, referred to as ACCMA and the ACCMA Model.

Environmental Setting

The existing transportation-related context in which the Proposed Project would be constructed is described below, beginning with a description of the study area and the street network that serves the Project Site. **Figure IV.L-1** shows the study area street network. Existing transit service, bicycle and pedestrian facilities, and on- and off-street parking in the vicinity of the Project Site are also described. Intersection and roadway levels of service are then defined and current conditions for roadways and intersections in the Project vicinity are summarized. This subsection also discusses planned transportation improvements in the Project vicinity as well as the applicable planning policies.

Existing Roadway Network

Regional Access

A brief description of the regional roadway network serving the Project Site is provided below. Average daily traffic volumes were obtained from Caltrans' 2008 database of 2007 Traffic Volumes on California State Highways.

- **Interstate 80 (I-80)** is a regional freeway extending west to San Francisco via the San Francisco-Oakland Bay Bridge, and east through Berkeley, Sacramento, and into Nevada. Four or five lanes are generally provided in each direction on this freeway west of the Project Site. Access to and from I-80 is provided by Interstate 580 (I-580), Interstate 880 (I-880), and Interstate 980 (I-980). Average daily traffic is 254,000 vehicles on the Bay Bridge and 294,000 vehicles north of the I-580 Junction.
- **Interstate 580 (I-580)** is a regional freeway located west of the Project Site, stretching from U.S. 101 in Marin County to Interstate 5 (I-5) south of Tracy. I-580 joins I-80 just south of the Project Site, splitting off farther north near Richmond. Access to and from I-580 is provided via I-980. Average daily traffic on I-580 west of the I-580 / I-980 / State Route 24 (SR 24) Interchange is 218,000 vehicles. Additional access to I-580 is provided at the Oakland Avenue / Harrison Street Interchange, with average daily traffic at 201,000 vehicles west of the interchange and 203,000 vehicles east of the interchange.
- **Interstate 880 (I-880)** is a regional freeway located south of the Project Site, extending between I-80 in Emeryville and Interstate 280 (I-280) in San Jose. Four lanes are generally provided in each direction on this freeway near the Project area. Access to and from I-880 is provided at the Jackson Street / Oak Street and Broadway Interchanges, as well as I-980 to the east. Average daily traffic on I-880 is 199,000 vehicles north of Broadway and 222,000 vehicles south of Jackson Street / Oak Street.
- **Interstate 980 (I-980)** is a local freeway extending from I-880 to I-580 / SR 24 in Oakland. I-980 has three lanes in each direction in the vicinity of the Project area. Access to and from I-980 is provided at the 17th Street / 18th Street Interchange. Average daily traffic on I-980 north of the interchange is approximately 97,000 vehicles.
- **State Route 24 (SR 24)** is a regional freeway between Walnut Creek to the east and Downtown Oakland to the west. SR 24 becomes I-980 at the I-580 interchange. Three lanes are generally provided in each direction on this freeway near the Project Site. Access to and from SR 24 is provided by I-580 and I-980. Average daily traffic on SR 24 just east of the I-580 / I-980 / SR 24 Interchange is 137,000 vehicles.

SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-1
Project Study Area

Local Access

A brief description of the local and arterial streets serving the Project Site is given below:

- **Broadway** is a major north-south arterial stretching from Jack London Square in the south to SR 24 in the north. In the vicinity of the Project, Broadway consists of two lanes in the northbound direction and three lanes in the southbound direction. Broadway is the primary north-south roadway in the Downtown area.
- **Telegraph Avenue** is a major north-south arterial, beginning at Broadway in Downtown Oakland and continuing north into Berkeley. Generally, there are two through lanes in each direction. Telegraph Avenue, along with San Pablo Avenue, are the primary local roadways connecting Downtown Oakland with Berkeley.
- **San Pablo Avenue** is a major north-south arterial stretching from Downtown Oakland north to the City of San Pablo. It is designated as State Route 123. In the vicinity of the Project Site, San Pablo Avenue operates with two lanes in each direction, with left-turn pockets provided at key intersections. Along with Telegraph Avenue, it is one of the primary local roadways connecting Downtown Oakland with Berkeley.
- **Harrison Street** and **Webster Street** are north-south collectors providing access between the Webster and Posey Tubes to Alameda, Downtown Oakland, and I-580. South of 10th Street, Webster Street and Harrison Street operate as a one-way couplet, with Webster Street southbound (towards Alameda) and Harrison Street northbound (from Alameda). North of 10th Street, Harrison Street becomes a two-way roadway, while Webster Street remains one-way southbound, operating as a one-way couplet with Franklin Street. In the vicinity of the Project Site, both Harrison Street and Webster Street generally provide four lanes. Harrison Street continues north of Grand Avenue and provides access to and from I-580 at the Oakland Avenue / Harrison Street Interchange.
- **Madison Street** and **Oak Street** / **Lakeside Drive** are north-south collectors providing access between I-580, the Lake Merritt area, and I-880. Madison Street and Oak Street / Lakeside Drive operate as a one-way couplet, with Madison Street serving southbound traffic and Oak Street / Lakeside Drive serving northbound traffic. In the vicinity of the Project Site, both Madison Street and Oak Street / Lakeside Drive generally provide four lanes. North of 14th Street, Oak Street officially becomes Lakeside Drive, while north of 20th Street, Lakeside Drive merges with Harrison Street and continues north, providing access to I-580 at the Oakland Avenue / Harrison Street Interchange.
- **20th Street (Thomas L. Berkley Way)** is an east-west collector between Harrison Street / Lakeside Drive and Castro Street. In the vicinity of the Project Site, it operates with two lanes in each direction.
- **Grand Avenue** is an east-west arterial extending east from Broadway before veering north to connect with Pleasant Valley Avenue. Grand Avenue continues west past Broadway as West Grand Avenue until Maritime Street near the Oakland Army Base, offering access to I-80. In the vicinity of the Project Site, Grand Avenue generally operates with two lanes in each direction.
- **21st Street** is a two-lane minor street between Harrison Street and San Pablo Avenue.

Existing Traffic Conditions

Intersection operating conditions were analyzed at 51 key intersections in the vicinity of the Project Site for the weekday AM and PM peak hours (7:00-9:00 AM and 4:00-6:00 PM)—hereafter referred to simply as the “AM peak hour” and “PM peak hour.” These 51 intersections were selected in coordination with City of Oakland staff and are inclusive of all locations which could be significantly affected by Project traffic. The following study intersections were selected for analysis and are shown on **Figure IV.L-2**:

- Intersections outside of Downtown Oakland (all signalized, unless indicated otherwise)[2]

  1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (*unsignalized*)[3]
  2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps
  3. Harrison Street / 27th Street / 24th Street / Bay Place
  4. Broadway / 27th Street
  5. Telegraph Avenue / 27th Street
  6. Northgate Avenue / 27th Street / I-980 Eastbound On-Ramp
  7. Northgate Avenue / 27th Street / I-980 Westbound Off-Ramp

  45. Grand Avenue / El Embarcadero
  46. Lakeshore Avenue / El Embarcadero
  47. Grand Avenue / MacArthur Boulevard (Eastbound)
  48. Lakeshore Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound On-Ramp
  49. Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp
  50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue
  51. Oakland Avenue / Monte Vista Avenue / Vernon Street (*unsignalized*)

- Intersections within Downtown Oakland (all signalized, unless indicated otherwise)[2]

  8. Northgate Avenue / West Grand Avenue
  9. Telegraph Avenue / West Grand Avenue
  10. Broadway / Grand Avenue
  11. Webster Street / Grand Avenue
  12. Harrison Street / Grand Avenue
  13. Harrison Street / 21st Street
  14. Kaiser Center Access Road / 21st Street (*unsignalized*)
  15. Kaiser Center Garage Entrance (Northeast) / 21st Street (*unsignalized*)
  16. Kaiser Center Garage Entrance (Northwest) / 21st Street (*unsignalized*)
  17. Webster Street / 21st Street
  18. Franklin Street / 21st Street
  19. Broadway / 21st Street

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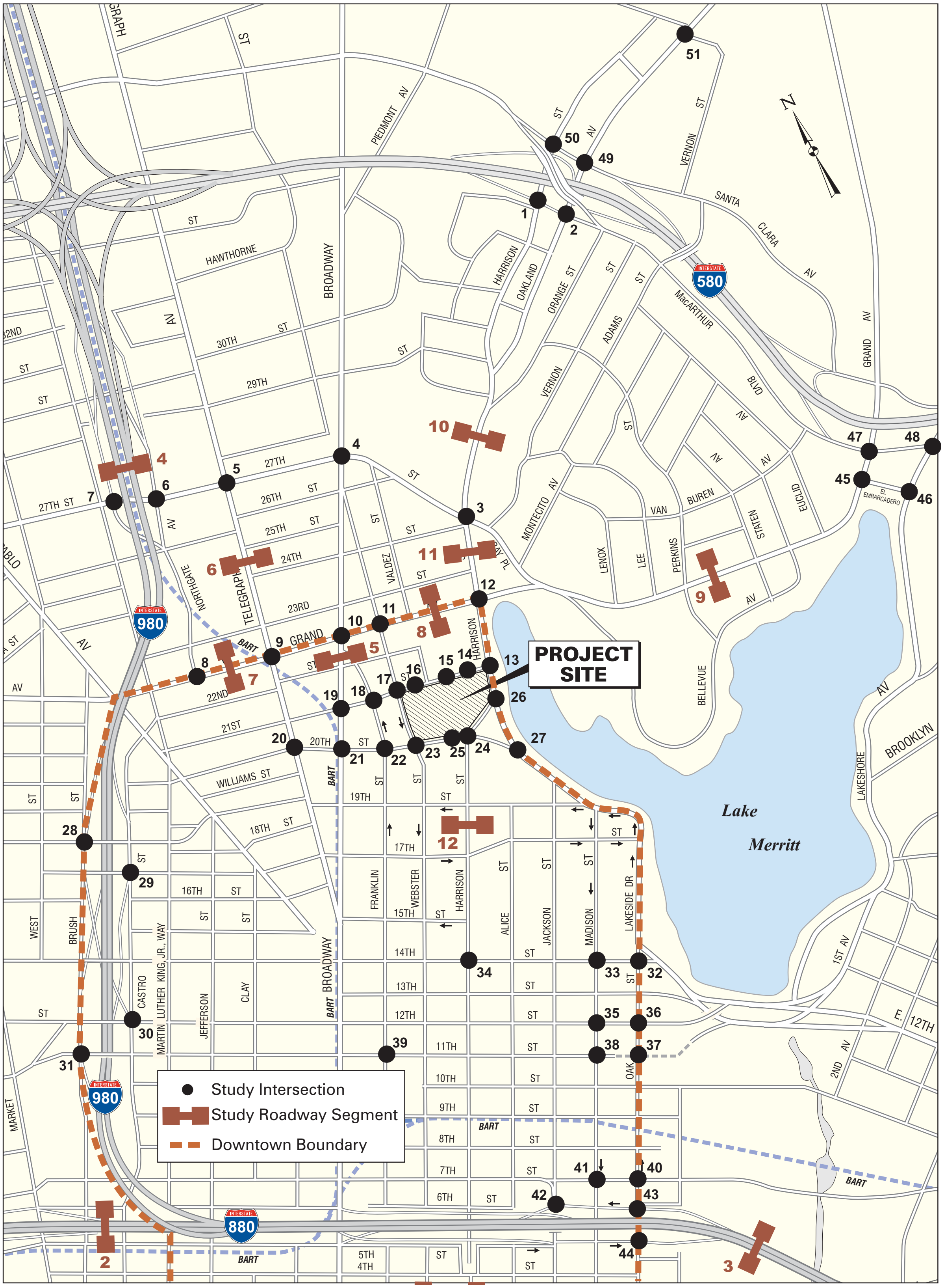
2 Downtown is defined in the Land Use and Transportation Element of the City of Oakland General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south and I-980 / Brush Street to the west.

3 Numbers shown (e.g., 1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp) identify the location of the intersection on Figure IV.L-2.



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-2

Study Intersections and Roadway Segments

20. Telegraph Avenue / 20th Street
21. Broadway / 20th Street
22. Franklin Street / 20th Street
23. Webster Street / 20th Street
24. Harrison Street / 20th Street / Kaiser Center Access Road
25. Kaiser Center Access Road / 20th Street (*unsignalized*)
26. Harrison Street / Lakeside Drive
27. Lakeside Drive / 20th Street
28. Brush Street / 18th Street / I-980 Westbound Off-Ramp
29. Castro Street / 17th Street / I-980 Eastbound Off-Ramp
30. Castro Street / 12th Street / I-980 Eastbound On-Ramp
31. Brush Street / 11th Street / I-980 Westbound On-Ramp
32. Oak Street / 14th Street
33. Madison Street / 14th Street
34. Harrison Street / 14th Street
35. Madison Street / 12th Street
36. Oak Street / 12th Street
37. Oak Street / 11th Street (*unsignalized*)
38. Madison Street / 11th Street
39. Franklin Street / 11th Street
40. Oak Street / 7th Street
41. Madison Street / 7th Street
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp
43. Oak Street / 6th Street / I-880 Northbound Off-Ramp
44. Oak Street / 5th Street / I-880 Southbound On-Ramp

Preliminary trip generation estimates determined that an ACCMA roadway analysis would be required. The following roadway segments in the vicinity of the Proposed Project are designated as part of the Congestion Management Program (CMP) and Metropolitan Transportation System (MTS) roadway networks and were selected for analysis (see Figure IV.L-2):

- Caltrans roadways

  1. SR 260 (Posey / Webster Tubes), from Alameda city limits to I-880 (*northbound / southbound*)
  2. I-880, from Market Street to I-980 (*eastbound / westbound*)
  3. I-880, from Oak Street to 5th Avenue (*eastbound / westbound*)
  4. I-980, from 27th Street to 29th Street (*northbound / southbound*)

- Non-Caltrans roadways

  5. Broadway, from 19th Street to Grand Avenue (*northbound / southbound*)
  6. Telegraph Avenue, from 20th Street to 27th Street (*northbound / southbound*)
  7. West Grand Avenue, from San Pablo Avenue to Telegraph Avenue (*eastbound / westbound*)
  8. Grand Avenue, from Broadway to Harrison Street (*eastbound / westbound*)

9. Grand Avenue, from Harrison Street to El Embarcadero (*eastbound / westbound*)
10. Harrison Street, from I-580 to 27th Street (*northbound / southbound*)
11. Harrison Street, from 27th Street to Grand Avenue (*northbound / southbound*)
12. Harrison Street, from 20th Street to 14th Street (*northbound / southbound*)

Level of Service Analysis Methodologies

The operation of a local roadway network is commonly evaluated using the Level of Service (LOS) methodology. This methodology qualitatively characterizes traffic conditions associated with varying levels of vehicular traffic, ranging from LOS A (indicating free flow traffic conditions with little or no delay experienced by motorists) to LOS F (indicating congested conditions where traffic flows exceed design capacity and result in long queues and delays). The LOS methodology applies to both signalized and unsignalized intersections and is summarized in **Table IV.L-1**.

TABLE IV.L-1
DEFINITIONS FOR INTERSECTION LEVEL OF SERVICE

Unsignalized Intersections			Signalized Intersections	
Description	**Average Total Vehicle Delay (Seconds)**	**LOS Grade**	**Average Control Vehicle Delay (Seconds)**	**Description**
No delay for stop-controlled approaches.	≤10.0	A	≤10.0	Insignificant delays: No approach phase is fully utilized and no vehicle waits longer than one red indication.
Operations with minor delay.	>10.0 and ≤15.0	B	>10.0 and ≤20.0	Minimal delays: An occasional approach phase is fully utilized. Drivers begin to feel restricted.
Operations with moderate delays.	>15.0 and ≤25.0	C	>20.0 and ≤35.0	Acceptable delays: Major approach phase may become fully utilized. Most drivers feel somewhat restricted.
Operations with some delays.	>25.0 and ≤35.0	D	>35.0 and ≤55.0	Tolerable delays: Drivers may wait through more than one red indication. Queues may develop but dissipate rapidly, without excessive delays.
Operations with high delays and long queues.	>35.0 and ≤50.0	E	>55.0 and ≤80.0	Significant delays: Volumes approaching capacity. Vehicles may wait through several signal cycles and long vehicle queues form upstream.
Operation with extreme congestion, with very high delays and long queues unacceptable to most drivers.	>50.0	F	>80.0	Excessive delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.

SOURCE: Transportation Research Board, *Highway Capacity Manual*, 2000.

Signalized Intersections

At signalized study intersections, traffic conditions were evaluated using the 2000 *Highway Capacity Manual* (HCM) operations methodology. The operations analysis uses various intersection characteristics (e.g., traffic volumes, lane geometry, and signal phasing / timing) to estimate the average control delay experienced by motorists at an intersection.

Unsignalized Intersections

At unsignalized (side-street, and all-way stop-controlled) study intersections, traffic conditions were also evaluated using the 2000 HCM operations methodology. With this methodology, the LOS is related to the total delay per vehicle for the intersection as a whole (for all-way stop-controlled intersections) or for each stop-controlled approach only (for side-street stop-controlled intersections). Total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs the queue. This time includes the time required for a vehicle to travel from the last-in-queue position to the first-in-queue position.

Roadway Segments

The ACCMA roadway analysis addresses Project impacts to roadway facilities on the CMP/MTS network, with LOS determinations based ranges of volume-to-capacity (v/c) ratios from the 2000 HCM (for Caltrans facilities), and from the 1985 HCM (for non-Caltrans facilities). The ranges of v/c ratios from both versions of the HCM are summarized in **Table IV.L-2**. LOS E or better is generally considered acceptable, and LOS F is considered unacceptable.

The assumed capacities are 2,000 vehicles per hour per lane (vphpl) for typical freeway segments, 1,700 vphpl for tunnel sections (Posey and Webster Tubes), and 900 vphpl for arterials such as Broadway, Telegraph Avenue, Grand Avenue, and Harrison Street.

TABLE IV.L-2
CRITERIA FOR ROADWAY LEVEL OF SERVICE

1985 HCM Methodology	LOS	Description	2000 HCM Methodology
V/C Ratio			V/C Ratio
≤0.30	A	Vehicles travel at free-flow speeds and can maneuver almost freely within the traffic stream.	≤0.30
>0.30 and ≤0.50	B	Vehicles travel at free-flow speeds and movement within the traffic stream is only slightly restricted.	>0.30 and ≤0.50
>0.50 and ≤0.70	C	Vehicles travel at or near free-flow speed and movement is somewhat restricted. Incidents can cause local queuing.	>0.50 and ≤0.71
>0.70 and ≤0.84	D	Vehicle speed declines as density increases, and maneuverability within the traffic stream is noticeably limited.	>0.71 and ≤0.89
>0.84 and ≤1.00	E	Roadway is operating at or near capacity, with vehicles closely spaced. Any incident can cause backups that propagate upstream.	>0.89 and ≤1.00
>1.00	F	Roadway operates beyond capacity, with significant queuing at bottlenecks such as key intersections or lane drops. Vehicles are closely spaced and maneuverability is extremely restricted.	>1.00

SOURCE: Transportation Research Board, 1985, 2000.

Existing Intersection Operating Conditions

Weekday traffic counts for the AM and PM peak hours were collected on Tuesdays, Wednesdays, and Thursdays of non-holiday weeks in July and September of 2007; in May, June, August, October, and November of 2008; and, in January of 2009 (see **Appendix G.1**). **Figure IV.L-3** shows the existing intersection geometry (lane geometry and signal control) for the 51 study intersections. **Figure IV.L-4** shows existing traffic volumes during the AM and PM peak hours.

The 51 study intersections were analyzed using Synchro 7 software package based on the methodologies in the 2000 HCM. As shown in **Table IV.L-3**, the following five intersections currently operate at an unacceptable LOS during one or both peak hour (all others operate acceptably). The LOS calculation sheets for all study intersections are provided in **Appendix G.2**.

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in PM peak hour)

Within Downtown Area

42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in PM peak hour)

Measure DD Implementation

The Existing Conditions analysis assumes roadway changes have been installed or are currently in the process of being constructed as part of the Measure DD Implementation Project (see **Appendix G**). These changes include the following improvements:

- Lakeshore Avenue is being restriped to one lane in each direction (with a center two-way left-turn lane), with bicycle lanes. The pedestrian crossing at El Embarcadero has been improved, with crosswalks with pedestrian push buttons on both the north and south sides of the intersection.
- The former southern (eastbound) half of the El Embarcadero couplet has been removed, allowing for an expanded plaza area fronting Lake Merritt. The northern (westbound) segment was widened two feet north towards Lakeview Branch Public Library and reconfigured to accommodate two-way traffic (one eastbound lane and one westbound lane). The intersection of Lakeshore Avenue / El Embarcadero was also signalized as part of this improvement.
- Lakeside Drive has been narrowed from the existing four lanes of traffic to two lanes from 14th Street to just beyond 17th Street, and striped with a new Class 2 bicycle facility (bicycle lane).[4] The shoreline east of Lakeside Drive has been improved and new trails constructed, and a staircase has been connecting Lakeside Drive to the Municipal Boathouse. Bulbouts have been constructed along Lakeside Drive at the Scottish Rite Center (midblock between 14th Street and 17th Street) and at 17th Street.

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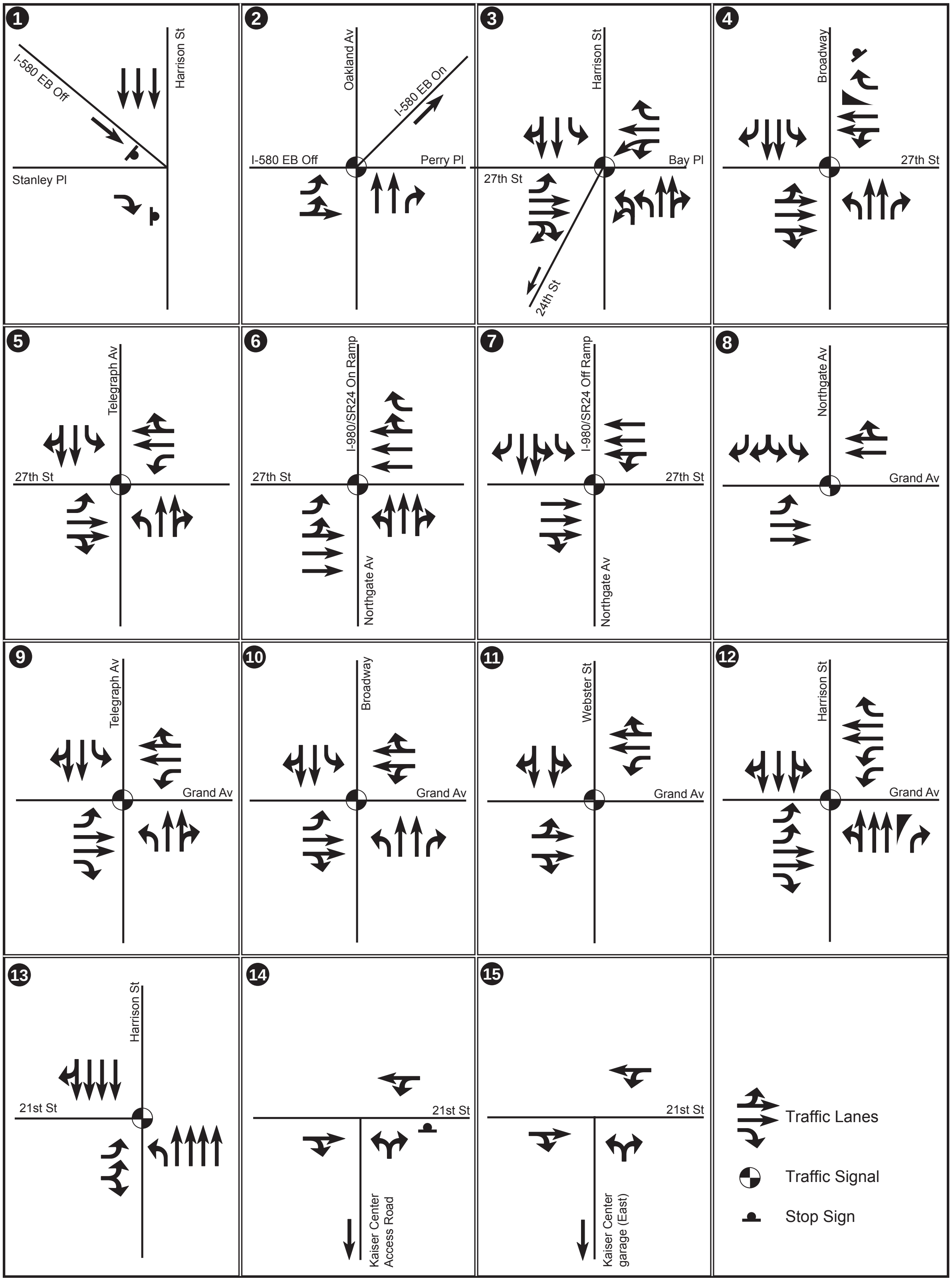
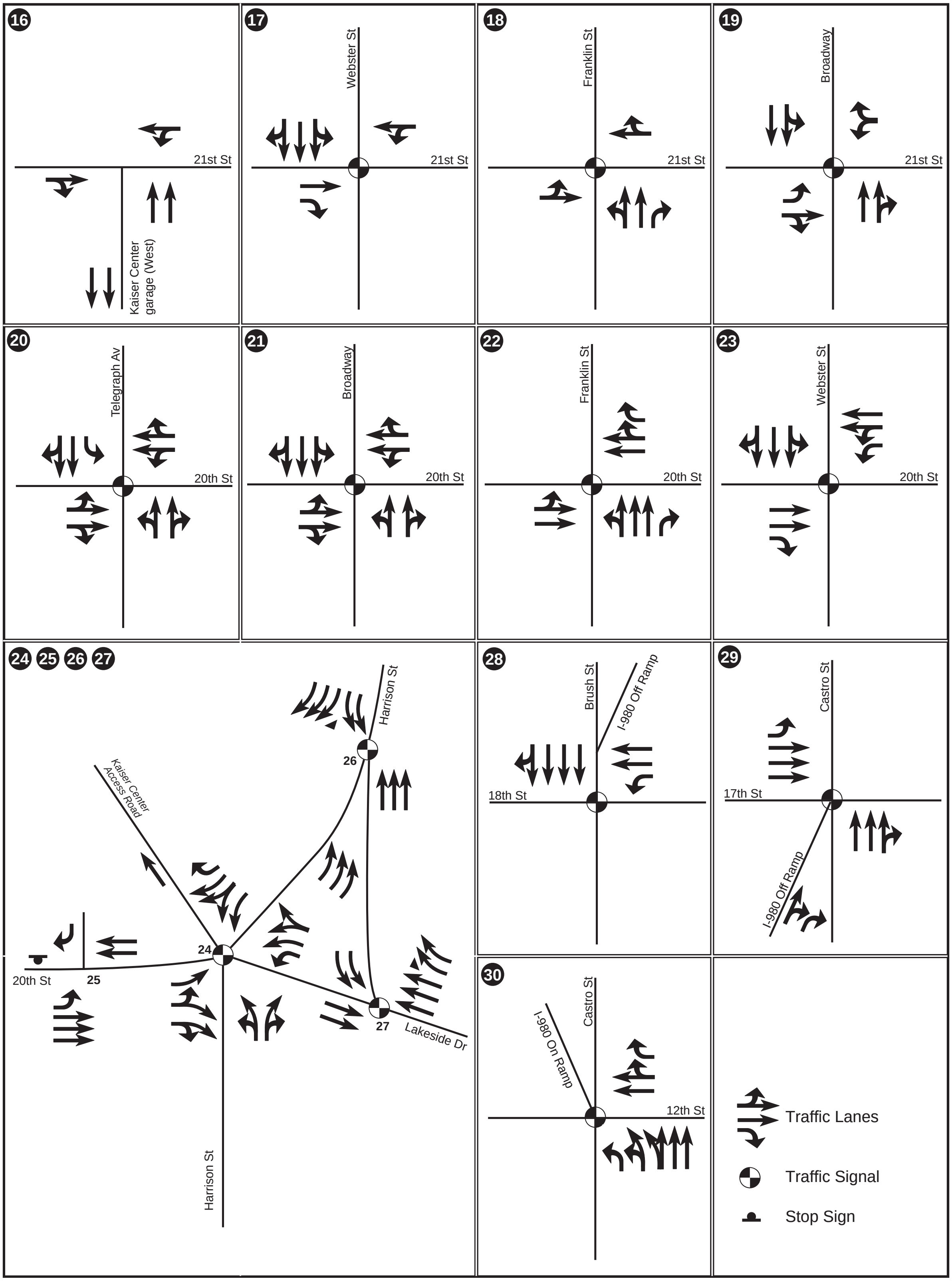
4 See page IV.L-30 for a description of how bicycle facilities are classified (as Class 1, Class 2, and Class 3).



SOURCE: AECOM

Kaiser Oakland . 206213

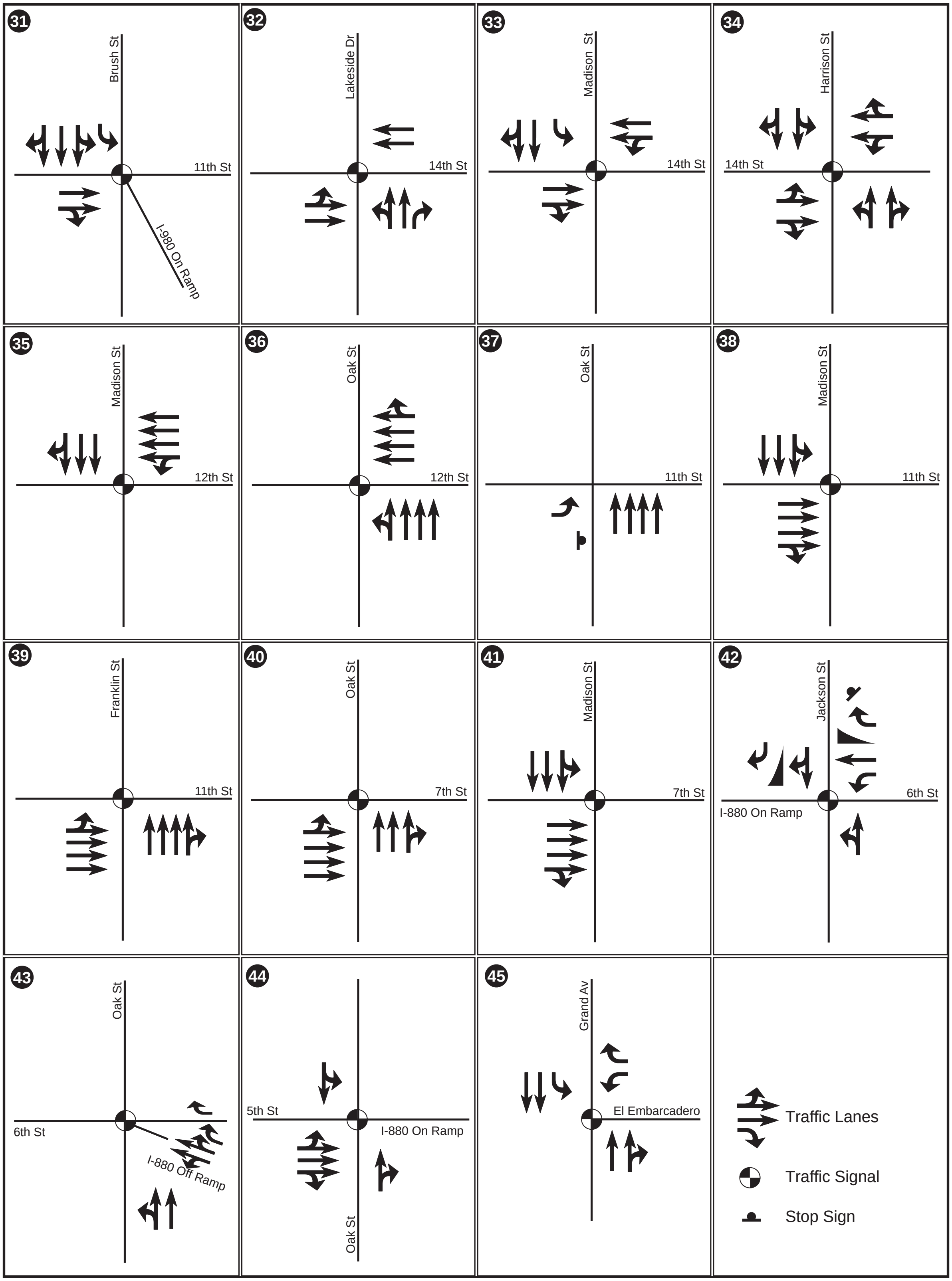
Figure IV.L-3a
Existing Intersection Geometry



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-3b
Existing Intersection Geometry

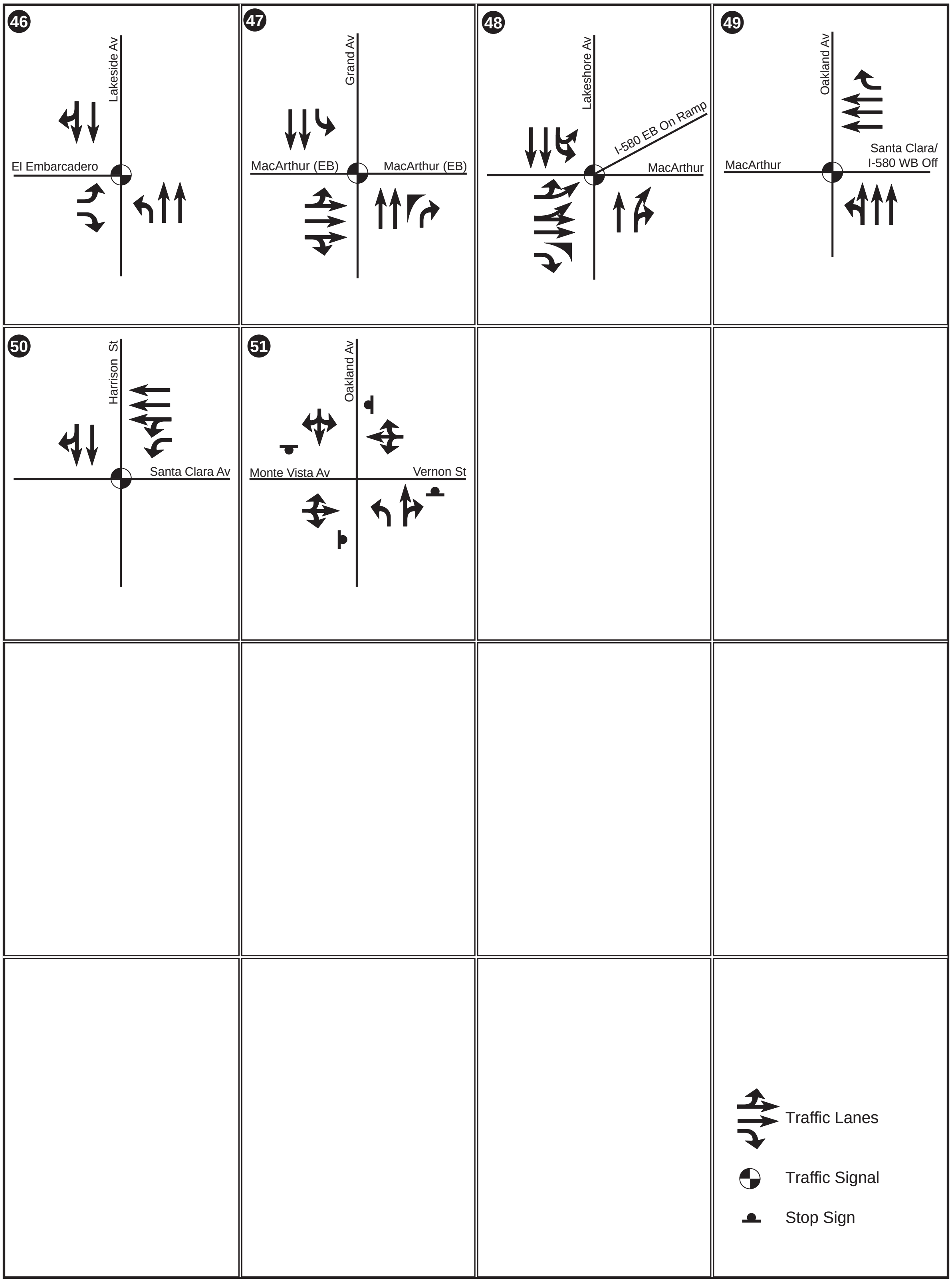


SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-3c

Existing Intersection Geometry



SOURCE: AECOM

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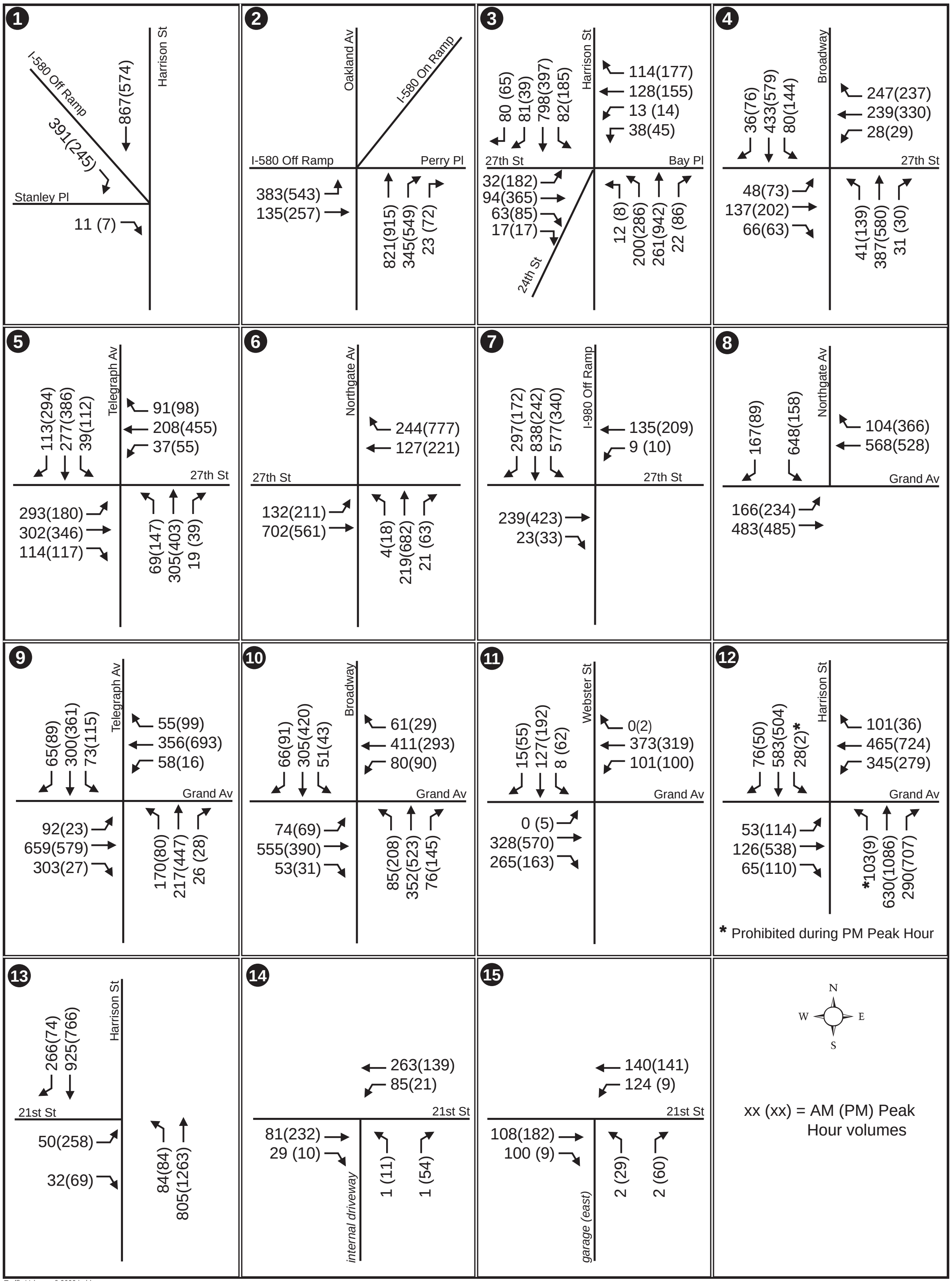
Figure IV.L-3d
Existing Intersection Geometry



SOURCE: AECOM

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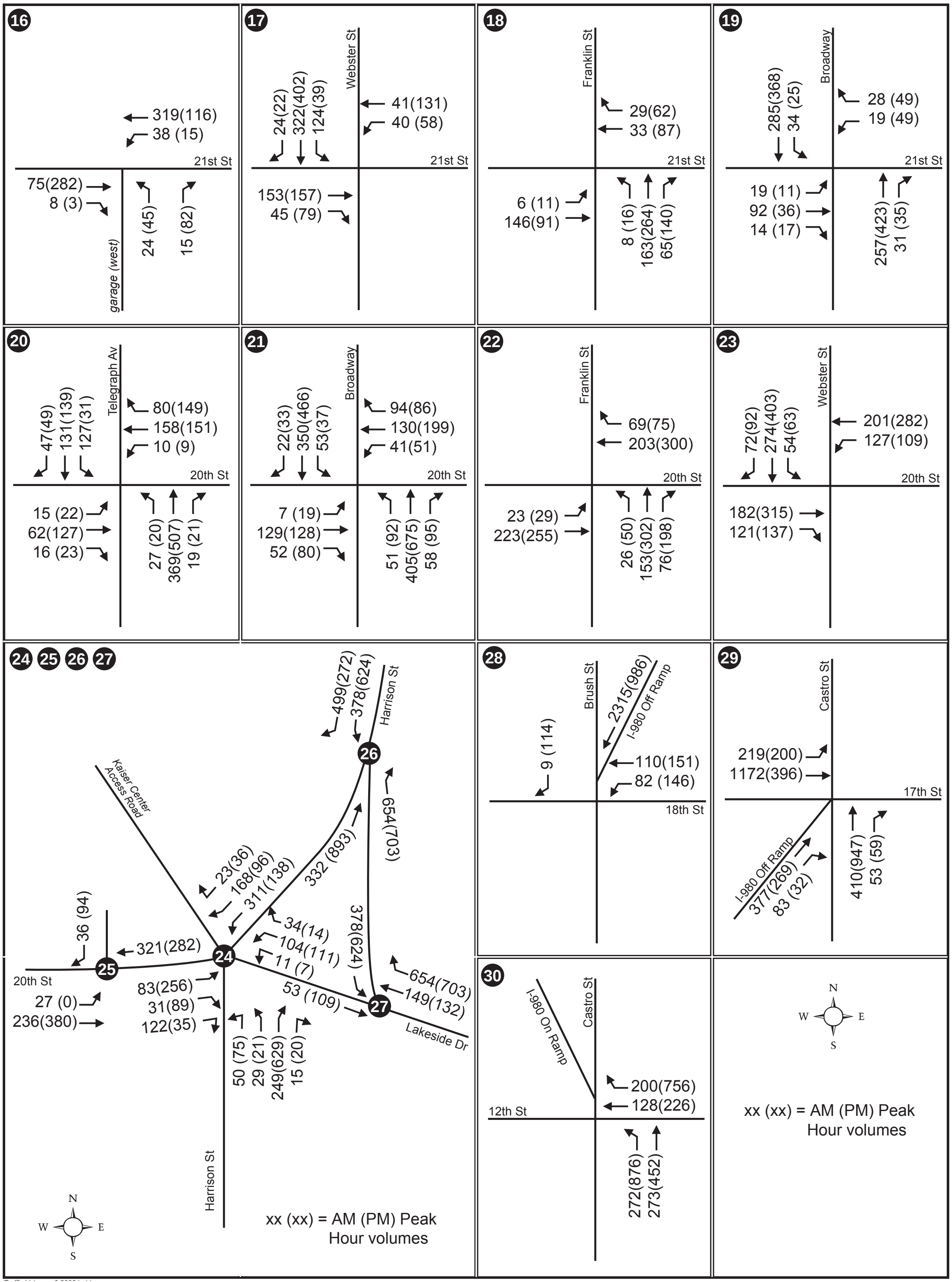
Figure IV.L-4a
Existing Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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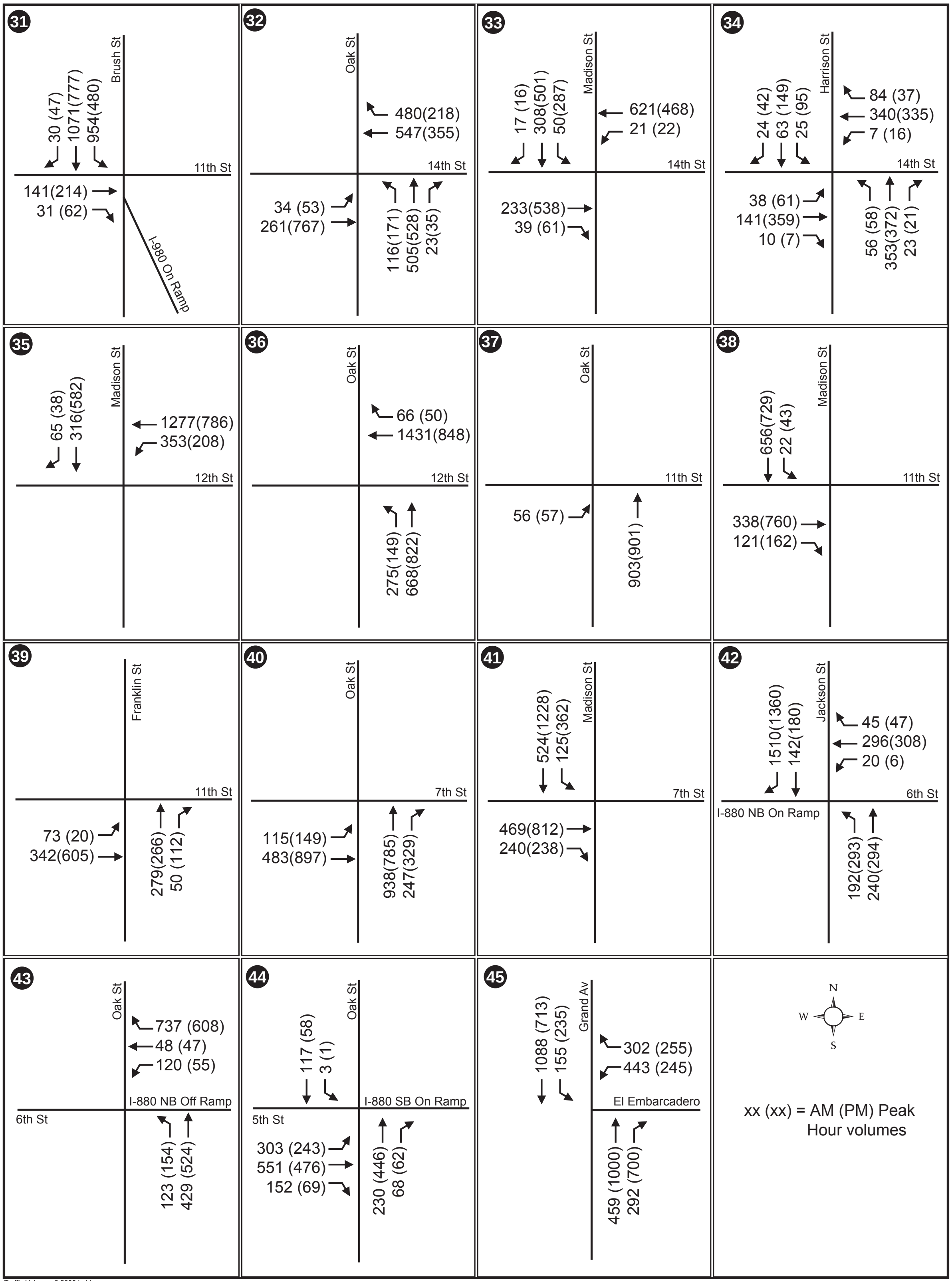
Figure IV.L-4b
Existing Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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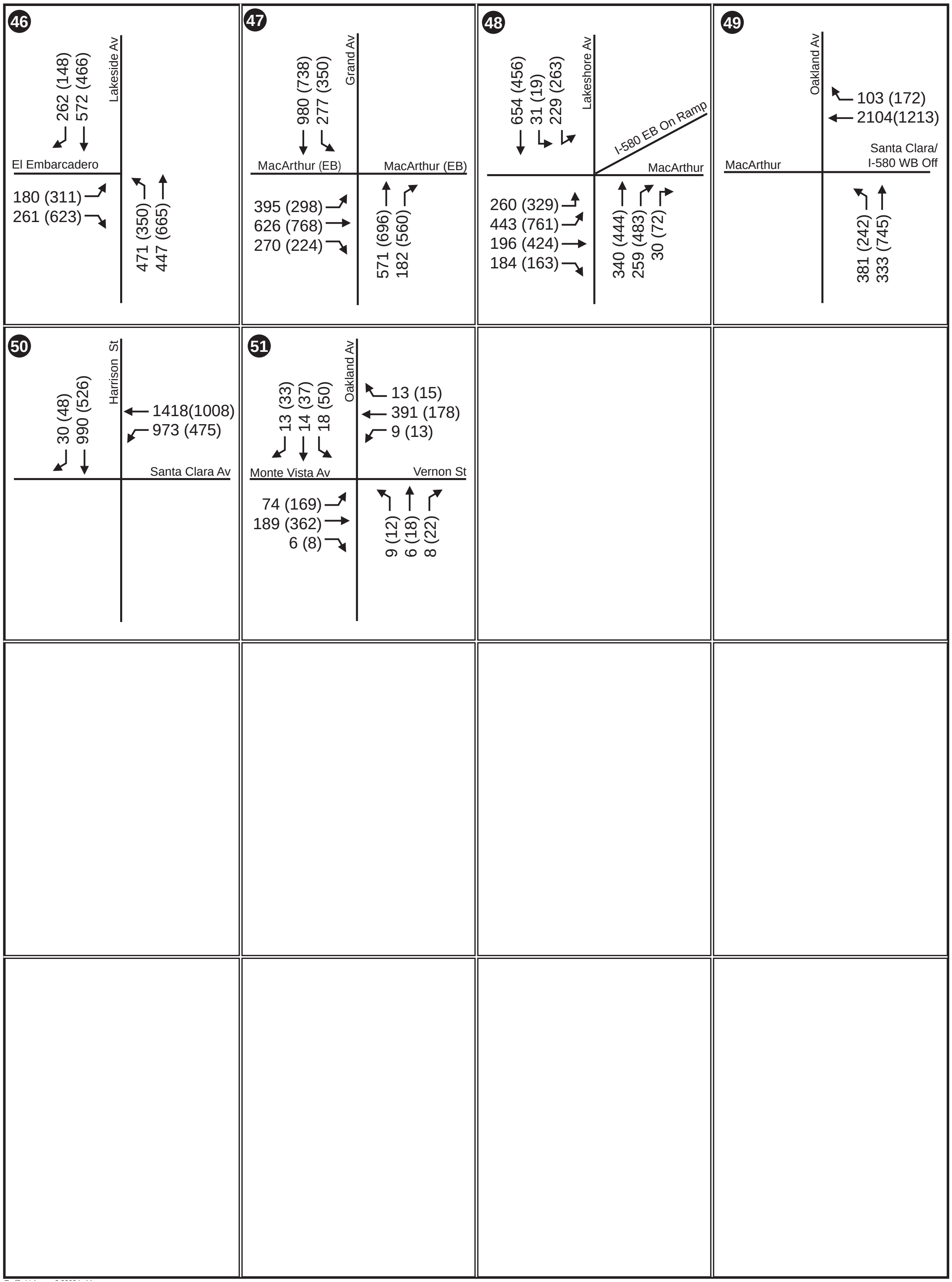
Figure IV.L-4c
Existing Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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Figure IV.L-4d
Existing Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-3
EXISTING INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control[a]	Count Date[b]	AM Peak Hour		PM Peak Hour	
				LOS	Delay[c]	LOS	Delay[c]
Outside Downtown							
1	Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp	SSSC	08/07/08	C	16.9	B	11.9
2	Oakland Avenue / Perry Place / I-580 Eastbound Ramps	Signal	11/19/08	B	18.1	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	08/07/08 11/20/08	C	27.6	D	49.2
4	Broadway / 27th Street	Signal	10/21/08	B	15.3	B	18.0
5	Telegraph Avenue / 27th Street	Signal	05/22/08	B	18.8	C	25.0
6	Northgate Avenue / 27th Street / I-980 Eastbound On-Ramp	Signal	05/22/08	A	8.9	B	10.9
7	Northgate Avenue / 27th Street / I-980 Westbound Off-Ramp	Signal	05/22/08	B	12.0	B	11.0
45	Grand Avenue / El Embarcadero[d]	Signal	11/12/08 11/06/08	C	25.7	**F**	**90.9**
46	Lakeshore Avenue / El Embarcadero[d]	Signal	11/12/08 11/06/08	C	32.5	C	24.5
47	Grand Avenue / MacArthur Blvd. (Eastbound) / I-580 EB Off-Ramp	Signal	11/12/08 11/06/08	D	41.9	**E**	**76.2**
48	Lakeshore Ave. / MacArthur Blvd. (Eastbound) / I-580 EB On-Ramp	Signal	11/12/08 11/06/08	C	23.9	D	49.2
49	Oakland Ave. / MacArthur Blvd. (Westbound) / Santa Clara Ave. / I-580 WB Off-Ramp	Signal	10/29/08	C	22.8	B	12.1
50	Harrison St. / MacArthur Blvd. (Westbound) / Santa Clara Ave.	Signal	01/13/09	C	26.1	B	16.5
51	Oakland Avenue / Monte Vista Ave.	AWSC	07/31/07	B	12.7	B	12.8
Within Downtown							
8	Northgate Avenue / West Grand Avenue	Signal	10/21/08 05/22/08	C	21.3	B	17.7
9	Telegraph Avenue / West Grand Ave.	Signal	05/22/08	C	24.9	C	27.1
10	Broadway / Grand Avenue	Signal	10/21/08	C	20.9	B	17.0
11	Webster Street / Grand Avenue	Signal	08/06/08	C	29.2	C	23.7
12	Harrison Street / Grand Avenue	Signal	05/22/08	C	27.8	D	39.0
13	Harrison Street / 21st Street	Signal	08/07/08	A	6.9	B	13.7
14	Kaiser Center Access Road / 21st St.	SSSC	08/07/08	B	11.6	B	10.9
15	Kaiser Center Garage Entrance (NE) / 21st Street	SSSC	08/07/08	B	12.5	B	11.4
16	Kaiser Center Garage Entrance (NW) / 21st Street	SSSC	08/07/08	B	11.5	B	10.8
17	Webster Street / 21st Street	Signal	08/06/08	B	13.8	B	18.2
18	Franklin Street / 21st Street	Signal	08/06/08	B	10.1	B	10.8
19	Broadway / 21st Street	Signal	08/06/08	A	10.0	B	10.6
20	Telegraph Avenue / 20th Street	Signal	10/29/08	B	11.6	B	12.5
21	Broadway / 20th Street	Signal	05/22/08	B	13.3	B	17.0
22	Franklin Street / 20th Street	Signal	08/06/08	B	13.0	B	15.1
23	Webster Street / 20th Street	Signal	08/06/08	C	20.8	C	21.0
24	Harrison Street / 20th Street / Kaiser Center Access Road	Signal	05/22/08	C	24.2	C	27.2
25	Kaiser Center Access Road / 20th St.	SSSC	08/07/08	B	14.7	B	14.8
26	Harrison Street / Lakeside Drive	Signal	05/22/08	A	6.2	B	13.8
27	Lakeside Drive / 20th Street	Signal	08/07/08	B	11.6	B	10.1

See next page for table footnotes.

**TABLE IV.L-3 (Continued)
EXISTING INTERSECTION LEVELS OF SERVICE (LOS)**

No.	Intersection	Traffic Control[a]	Count Date[b]	AM Peak Hour LOS	AM Peak Hour Delay[c]	PM Peak Hour LOS	PM Peak Hour Delay[c]
Within Downtown							
28	Brush Street / 18th Street / I-980 Westbound Off-Ramp	Signal	06/02/08	A	5.9	A	9.5
29	Castro Street / 17th Street / I-980 Eastbound Off-Ramp	Signal	06/02/08	C	21.0	C	23.8
30	Castro Street / 12th Street / I-980 Eastbound On-Ramp	Signal	08/05/08	C	21.4	B	16.7
31	Brush Street / 11th Street / I-980 Westbound On-Ramp	Signal	08/05/08	C	32.9	B	15.9
32	Oak Street / 14th Street	Signal	05/21/08	B	17.4	C	34.6
33	Madison Street / 14th Street	Signal	05/22/08	A	9.6	B	10.1
34	Harrison Street / 14th Street	Signal	08/05/08	A	9.3	A	9.7
35	Madison Street / 12th Street	Signal	05/21/08	A	7.7	A	7.8
36	Oak Street / 12th Street	Signal	05/21/08	B	12.8	B	12.8
37	Oak Street / 11th Street	SSSC	05/21/08	B	10.5	B	10.7
38	Madison Street / 11th Street	Signal	05/21/08	B	12.2	A	9.7
39	Franklin Street / 11th Street	Signal	08/05/08	B	13.3	B	14.9
40	Oak Street / 7th Street	Signal	05/21/08	A	9.4	B	14.2
41	Madison Street / 7th Street	Signal	05/21/08	A	8.8	B	11.8
42	Jackson Street / 6th Street / I-880 Northbound On-Ramp	Signal	10/23/08	**F**	**>120**	**F**	**>120**
43	Oak Street / 6th Street / I-880 Northbound Off-Ramp	Signal	05/21/08	B	14.9	B	11.2
44	Oak Street / 5th Street / I-880 Southbound On-Ramp	Signal	05/21/08	E	65.3	**F**	**>120**

Bold indicates intersections operating at unacceptable LOS E (outside Downtown) or LOS F (outside and within Downtown).

[a] SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection
[b] Two count dates indicates separate dates for AM and PM peak period counts, respectively.
[c] The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.
[d] Volumes for this intersection are before Measure DD improvements.

SOURCE: AECOM, 2009.

For the changes to Lakeshore Avenue and El Embarcadero, which affect Intersection #45 (Grand Avenue / El Embarcadero) and Intersection #46 (Lakeshore Avenue / El Embarcadero), traffic counts were conducted both before implementation of Measure DD and after implementation of Measure DD (with some ongoing construction activity to the median on Lakeshore Avenue and surrounding roadway and sidewalks). The latter counts were found to be lower, but because construction was still occurring at the time, older counts for these intersections were used instead, adjusted to match the new intersection geometries. This is a conservative assumption, as reductions in roadway capacity generally result in corresponding reductions in traffic volumes.

Existing Roadway Operating Conditions

A roadway facility operating at LOS F indicates that the facility is over-capacity (i.e., v/c ratio is greater than 1.00). As shown in **Table IV.L-4**, all of the study roadway segments currently operate at LOS E or better during the AM and PM peak hours. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

Existing Transit Conditions

The Project is served by AC Transit and Bay Area Rapid Transit (BART). The existing transit network in the vicinity of the Project is illustrated in **Figure IV.L-5**.

Bus Services

AC Transit provides local and regional bus service within Alameda and Contra Costa Counties and between the East Bay and San Francisco's Transbay Terminal. AC Transit bus service in the vicinity of the Project is summarized in **Table IV.L-5**.

In the immediate vicinity of the Project, AC Transit lines 11, 12, and 59 provide local service within Oakland. Line NL provides direct service to San Francisco and parts of the Dimond District and East Oakland via MacArthur Boulevard. In addition to these services within the immediate vicinity of the Project, multiple AC Transit lines converge at the 19th Street BART Station and the Uptown Transit Center, providing additional local service within Oakland and regional service to Emeryville, Berkeley, Albany, El Cerrito, and Richmond in the north and San Leandro and Hayward in the south. In addition to the services summarized in Table IV.L-5, an extensive network of "all-nighter" services also connects the Project with San Francisco and major destination points in the East Bay during the late evening and early morning.

BART

BART provides local and regional rail service. The 19th Street BART station is located underneath Broadway between 19th and 20th streets, with the closest station entrance to the Project Site located on the northeast corner of the intersection of Broadway / 20th Street. This entrance is within one quarter-mile (approximately five-minute walking distance) of the Project.

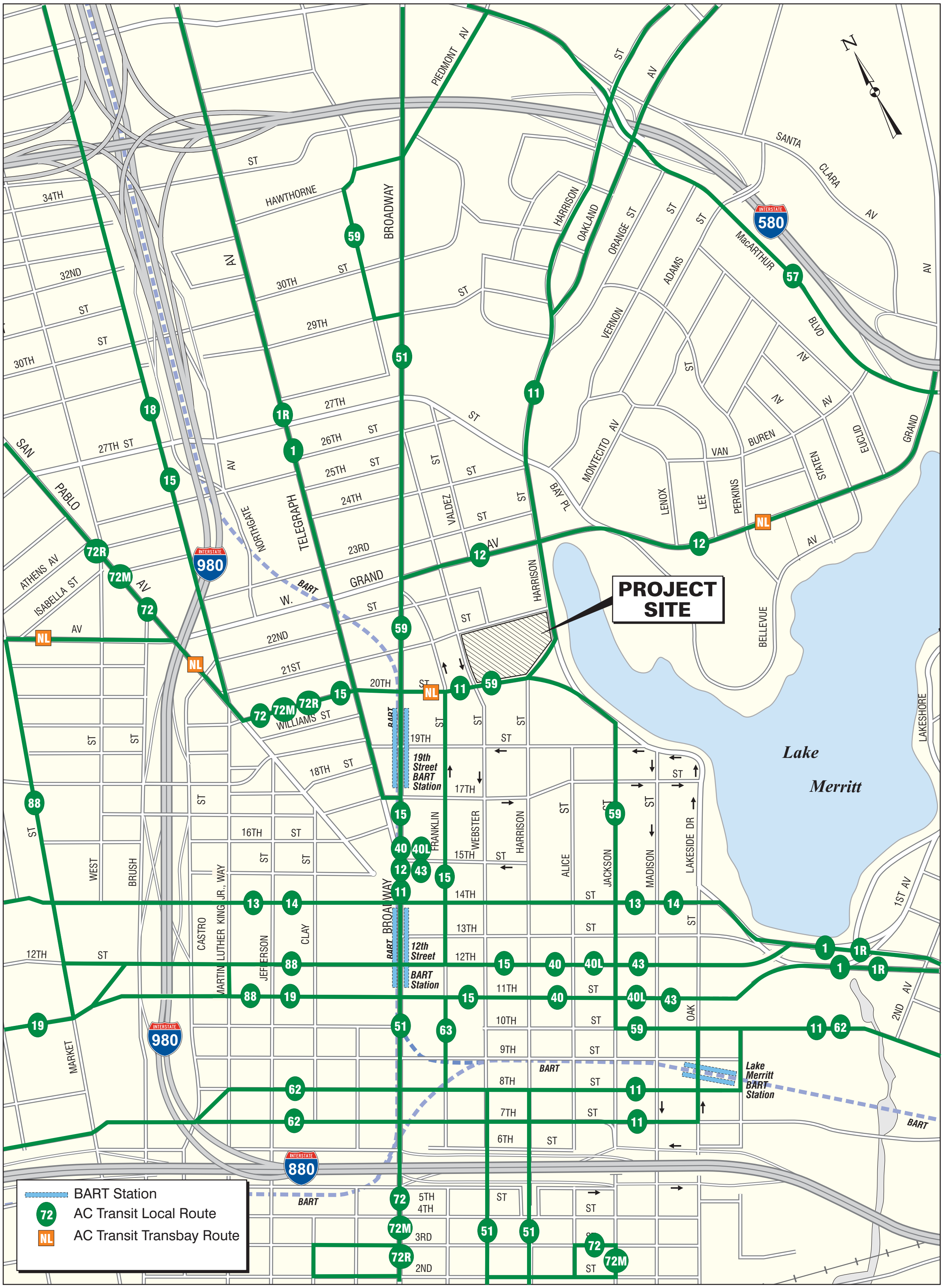
Three BART lines serve the 19th Street Station (Richmond – Millbrae, Pittsburg / Bay Point – San Francisco International Airport (SFO), and Richmond – Fremont). In this regard, all BART stations (with the exception of Dublin / Pleasanton and Castro Valley) have direct service to and from 19th Street Station during the weekday peak and midday periods.

Weekday peak period and midday frequencies on these lines are every 15 minutes, except for the Pittsburg / Bay Point – SFO line, which operate every five to ten minutes during the weekday peak periods (AM peak to SFO, AM and PM peaks to Pittsburg / Bay Point). The Richmond – Millbrae line stops running at about 6:50 p.m. on weekdays, about 7:50 p.m. on Saturdays, and does not operate at all on Sundays. Directly above the Station at ground level is the Uptown Transit Center on 20th Street, which allows for easy connections between the various AC Transit lines and BART. Service at 19th Street Station is summarized in **Table IV.L-6**.

TABLE IV.L-4
EXISTING ROADWAY SEGMENT LEVEL OF SERVICE (LOS)

No.	Roadway Segment	Direction	Lanes	Capacity (veh/hr)	AM Peak Hour LOS	AM Peak Hour Volume	AM Peak Hour v/c ratio	PM Peak Hour LOS	PM Peak Hour Volume	PM Peak Hour v/c ratio
Caltrans Facilities										
1	**SR 260 (Posey / Webster Tubes)** from Alameda city limits to I-880	NB	2	3,400	E	3,081	0.91	D	2,478	0.73
		SB	2	3,400	B	1,575	0.46	C	2,347	0.69
2	**I-880** from Market Street to I-980	EB	4	8,000	B	3,070	0.38	B	3,164	0.40
		WB	4	8,000	B	3,720	0.47	B	3,426	0.43
3	**I-880** from Oak Street to 5th Avenue	EB	4	8,000	C	4,968	0.62	D	5,737	0.72
		WB	4	8,000	C	5,606	0.70	C	5,075	0.63
4	**I-980** from 27th Street to 29th Street	NB	3	6,000	A	1,611	0.27	C	3,609	0.60
		SB	3	6,000	D	4,679	0.78	B	1,858	0.31
Non-Caltrans Facilities										
5	**Broadway** from 19th Street to Grand Avenue	NB	2	1,800	A	513	0.29	B	876	0.49
		SB	2	1,800	A	438	0.24	B	597	0.33
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	2	1,800	A	464	0.26	B	678	0.38
		SB	2	1,800	B	661	0.37	B	565	0.31
7	**West Grand Avenue** from San Pablo Avenue to Telegraph Avenue	EB	2	1,800	C	1,054	0.59	B	719	0.40
		WB	2	1,800	B	672	0.37	B	862	0.48
8	**Grand Avenue** from Broadway to Harrison Street	EB	2	1,800	B	682	0.38	B	762	0.42
		WB	2	1,800	B	644	0.36	B	783	0.44
9	**Grand Avenue** from Harrison Street to El Embarcadero	EB	2	1,800	B	751	0.42	E	1,700	0.94
		WB	2	1,800	E	1,531	0.85	C	968	0.54
10	**Harrison Street / Oakland Avenue** from I-580 to 27th Street	NB	2	1,800	C	1,189	0.66	E	1,536	0.85
		SB	2	1,800	C	1,041	0.58	B	686	0.38
11	**Harrison Street** from 27th Street to Grand Avenue	NB	3	2,700	A	784	0.29	B	1,236	0.46
		SB	3	2,700	B	899	0.33	A	556	0.21
12	**Harrison Street** from 20th Street to 14th Street	NB	2	1,800	A	475	0.26	B	745	0.41
		SB	2	1,800	A	444	0.25	A	286	0.16

SOURCE: AECOM, 2009.



SOURCE: AECOM

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Figure IV.L-5
Existing Transit Network

TABLE IV.L-5
EXISTING AC TRANSIT NETWORK

Line	Route	Service Frequency (minutes) Weekday Peak	Weekday Off-Peak	Weekend
1 International	From Downtown Berkeley to Bay Fair BART via Telegraph Avenue and International Boulevard	15	20	20
1R International Rapid	From Downtown Berkeley to Bay Fair BART via Telegraph Avenue and International Boulevard	12	12	15
11 Harrison	From Dimond to Piedmont via 14th Avenue, Lake Merritt, Downtown Oakland, and Oakland Avenue	20	30	60
12 Grand	From MacArthur BART to Downtown Oakland via Grand Avenue	20	30	30
13 14th Street	From Oakland Army Base to Trestle Glen via 14th Street and Lakeshore Avenue	20	30	60
14 East 18th Street	From MacArthur BART to Fruitvale via Adeline Street, East 18th Street, and High Street	15	30	30
15 MLK, Jr.	From UC Berkeley to Downtown Oakland via Martin Luther King, Jr. Way	20	20	20
18	From Albany to Montclair via Shattuck Avenue, Martin Luther King, Jr. Way, and Park Boulevard	15	20	20
19 Hollis	From Downtown Berkeley to Fruitvale via Hollis Street and Alameda	30	30	30
40	From Bay Fair BART to Downtown Oakland via Bancroft Avenue and Foothill Boulevard	8-12	8-12	8-12
51 Broadway	From Berkeley Amtrak to Alameda via University Avenue, College Avenue, and Broadway	8-10	8-10	15
59 Piedmont Avenue	From Rockridge BART to Lake Merritt BART via Piedmont Ave. and Downtown Oakland	60	60	60
72 San Pablo Avenue	From Hilltop Mall to Jack London Square via San Pablo Avenue	30	30	30
72M Macdonald	From Point Richmond to Jack London Square via San Pablo Avenue	30	30	30
72R San Pablo Rapid	From Contra Costa College to Jack London Square via San Pablo Avenue	12	12	----
88 Market	From North Berkeley BART to Lake Merritt BART via Sacramento Street and Market Street	20	20	20
NL MacArthur	From Eastmont Transit Center to San Francisco via MacArthur Boulevard	15	15	30

SOURCE: AC Transit, 2008.

TABLE IV.L-6
EXISTING BART SERVICE AT 19TH STREET STATION

Corridor	Areas Served	Service Frequency (minutes) Weekday Peak	Weekday Mid-day	Weekend
Richmond	Richmond, El Cerrito, Albany, Berkeley, North Oakland	7-8	7-8	5-15
Pittsburg / Bay Point	Pittsburg, Concord, Pleasant Hill, Walnut Creek, Lafayette, Orinda, Rockridge	5-10	15	20
Fremont / Dublin-Pleasanton	Fremont, Union City, Hayward, Dublin, Pleasanton, Castro Valley, San Leandro, East Oakland, Fruitvale, Lake Merritt	15	15	20
San Francisco / Daly City / Millbrae	Millbrae, San Bruno, South San Francisco, Colma, Daly City, San Francisco, West Oakland	5	7-8	10

SOURCE: BART, 2009.

As shown in Table IV.L-6, service on BART corridors to / from 19th Street Station generally operates every ten minutes or less during the weekday peak periods. The only exceptions are stations on the Fremont and Dublin / Pleasanton Lines and the SFO and Millbrae Stations, which have 15-minute headways.

Given the nature of Downtown Oakland as a center of commercial activities, transit service heading into Downtown Oakland during the weekday AM and PM peak periods is generally well-utilized. Service in the reverse commute direction (e.g., away from Downtown Oakland during the AM peak period) is generally less well-utilized.

Existing Pedestrian and Bicycle Conditions

Existing Pedestrian Conditions

A field survey of crosswalk and sidewalk facilities in the immediate vicinity of the Project was also conducted to determine where curb ramps are not yet updated to ADA compliance and pedestrian countdown signals were lacking. The results of this field survey are summarized in **Appendix G.4**.

Unobstructed widths for existing sidewalk facilities along the north side of 20th Street are illustrated in **Figure IV.L-6**. Existing sidewalk and crosswalk conditions at key locations in the vicinity of the Project are illustrated in **Figure IV.L-7**.

Sidewalk Conditions

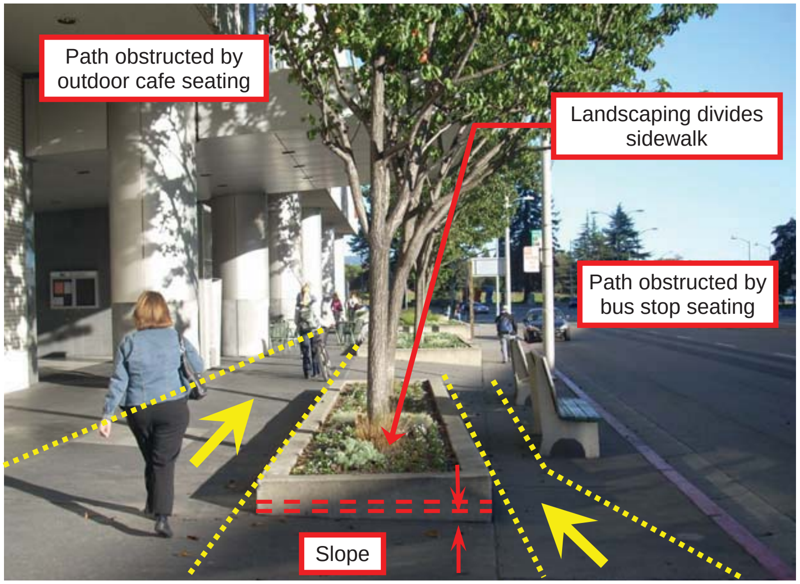
Sidewalks are provided on all streets in the vicinity of the Project Site including the north side of 20th Street – the primary pedestrian route between the 19th Street BART Station and the Project Site. This is also the primary route for AC Transit bus passengers alighting on Broadway to access the Project Site.

SOURCE: AECOM

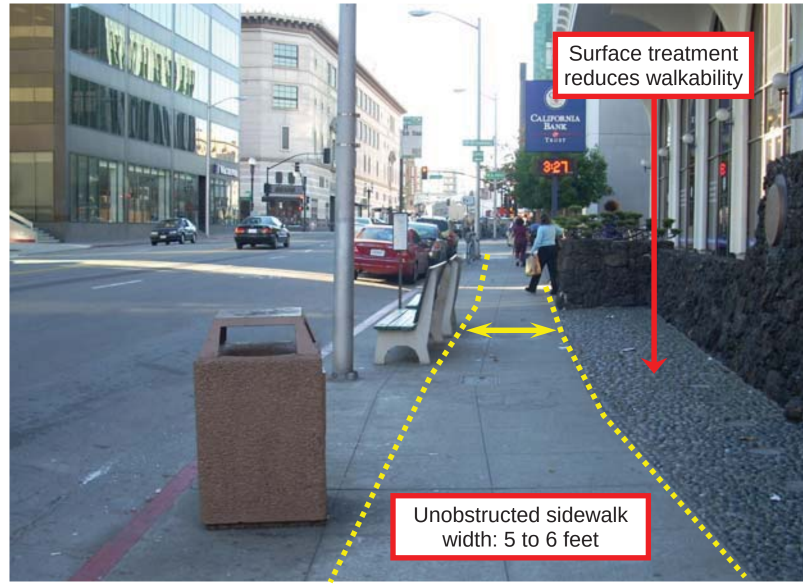
Kaiser Oakland . 206213

Figure IV.L-6
Existing Pedestrian Network

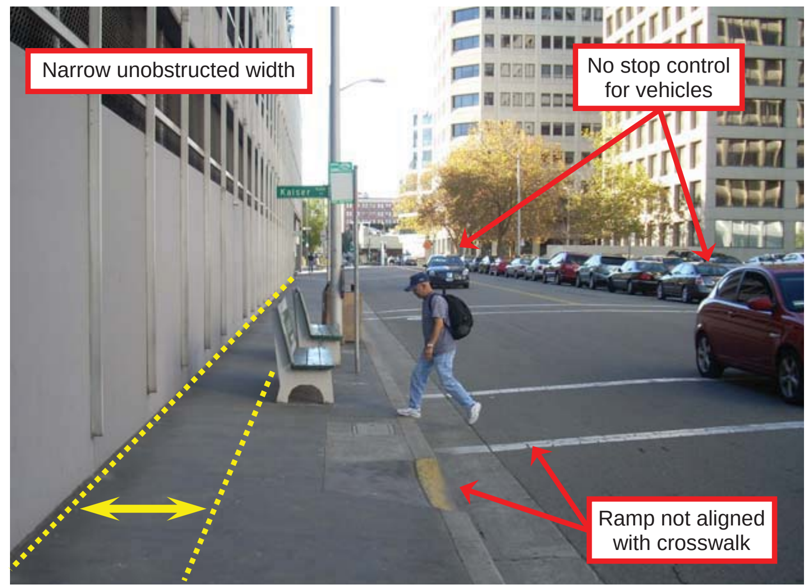
20th Street (North Side) – Abutting Project Site



20th Street (North Side) – Between BART Station and Franklin Street



20th Street (North Side) – Between Franklin Street and Webster Street



21st Street (South Side) – Abutting Kaiser Center Garage

SOURCE: AECOM

Kaiser Oakland . 206213

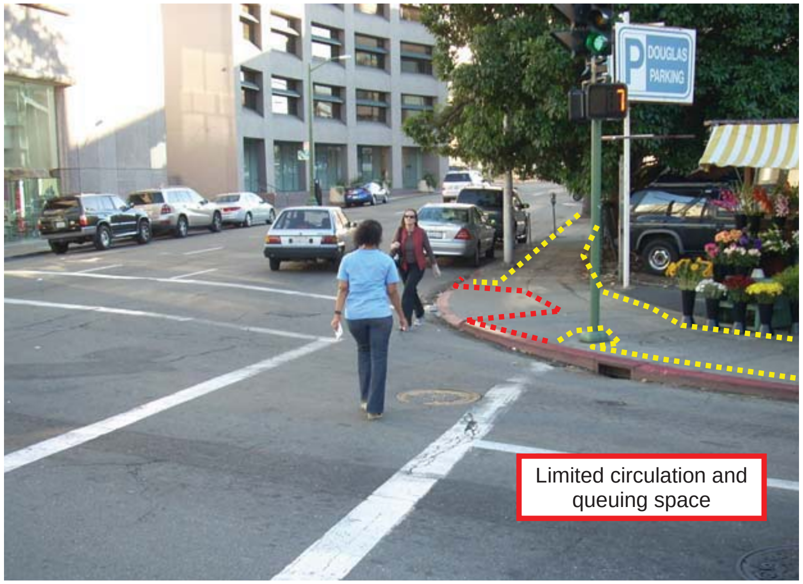
Figure IV.L-7a

Existing Sidewalk and Crosswalk Conditions

Franklin Street / 20th Street – Northeast Corner

Webster Street / 20th Street – Northwest Corner

Webster Street / 20th Street – Southwest Corner



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-7b
Existing Sidewalk and Crosswalk Conditions

It should be noted, however, that while the paved width of the sidewalk (measured from curb edge to building frontage) along this route ranges from about eight to ten feet, the unobstructed width is reduced in many locations to about five to six feet due to obstructions such as signs, lamp poles, and outdoor seating, as shown in Figure IV.L-6 and Figure IV.L-7. The sidewalk on 20th Street directly abutting the Project Site is obstructed by planter boxes, support columns, bus stop seating, and outdoor cafe seating. These obstructions create a pedestrian path that can be circuitous, discontinuous, and narrow (as narrow as three feet wide in certain locations).

Sidewalk width along 21st Street on the north side of the Project Site is about seven to eight feet, but obstacles such as bus stop seating (currently unused) also reduce the unobstructed width to less than five feet.

Crosswalk Conditions

Signalized pedestrian crosswalks are provided at all four approaches at the intersections immediately west of the Project Site (Webster Street / 20th Street and Webster Street / 21st Street).

Pedestrian countdown signals are provided on all approaches at intersections between the BART Station and the Project Site. Crossing distances along the north side of 20th Street are about 47 feet across Webster Street and 60 feet across Franklin Street. The crossing distance across 20th Street at Webster Street is about 90 to 100 feet. Some intersection corners (e.g., northeast corner of Franklin Street / 20th Street and southwest corner of Webster Street / 20th Street) are currently designed with large radii, which increases the crossing distance, encourages high vehicle turning speeds, and reduces the pedestrian storage area.

Field observations during the midday lunch hour period indicated that pedestrian storage areas at intersections along 20th Street was limited, particularly due to conflicts between pedestrians attempting to cross with the signal in one direction and queued pedestrians waiting to cross in the perpendicular direction.

Pedestrian access is generally more limited on the east side of the Project Site along Harrison Street and Lakeside Drive. Only one crosswalk is provided across Harrison Street and Lakeside Drive, located at 21st Street on the south side of the intersection. No crosswalk is provided on the north side of the intersection. At the intersection of Harrison Street / 20th Street, crosswalks are provided at all approaches except for the northeast side across Harrison Street, due to signal operations.

The existing configuration of crosswalks across the Kaiser Center Access Road at Harrison Street / 20th Street introduces potential pedestrian conflicts with vehicular traffic because vehicles are permitted to make turns into the Access Road without signal control. Pedestrians using the two crosswalks across the Access Road must be cautious of left-turning vehicles from the exclusive left-turn lane along eastbound 20th Street and right-turning vehicles from the exclusive right-turn lane on southbound Harrison Street. In particular, vehicles attempting to make the left turn from 20th Street may pay more attention to conflicting vehicular traffic heading westbound on 20th Street than to pedestrians in the crosswalk.

Uncontrolled crosswalks are provided across 21st Street between Webster Street and Harrison Street at Kaiser Plaza.

Pedestrian Facility Operations

Site observations undertaken during the AM peak period indicated that the existing pedestrian facilities are insufficient to accommodate pedestrian traffic on 20th Street traveling from and to the BART station. There is also insufficient space for pedestrian queuing at some intersections on 20th Street during the noon peak period. The highest concentration of pedestrians was observed on the north side of 20th Street between the BART Station and Franklin Street. A maximum of 50 pedestrians per minute were recorded during the AM peak periods as "platoons" of pedestrians exited the BART Station. This section of sidewalk was observed to carry by far the highest pedestrian volumes of all the sidewalks in vicinity of the Project Site. Pedestrians were observed to disperse at the intersection of Franklin Street / 20th Street, with some heading north or south along Franklin Street or east along 20th Street.

An additional concern identified from site observations was the fact that about 90 percent of pedestrians who queue at the intersection of Franklin Street / 20th Street resorted to illegally crossing against the "Do Not Walk" signal to avoid lengthy waiting times. This intersection operates on 80-second cycle lengths during the AM peak period, and pedestrian wait times to cross Franklin Street (along 20th Street) were between 42 and 53 seconds, depending on the pedestrian's willingness to cross during the "Flashing Do Not Walk" period. Field observations indicated that the majority of queued pedestrians would wait about 20 to 30 seconds for traffic to clear before crossing illegally.

Existing Bicycle Conditions

Bikeways are typically classified as Class 1, Class 2, and Class 3 facilities, depending primarily on the level of separation from vehicular traffic:

- *Class 1 bicycle facility:* Also known as a bicycle path, this is a dedicated path for bicyclists and pedestrians that does not permit motorized travel. Bicycle paths create a relaxed environment for non-motorized travel and reduce the risk of potential conflict between vehicles and bicyclists. Often these facilities are located in parks or greenway areas, areas connecting two dead-end streets, or atop railroad right-of-way that is no longer in use. The only existing Class 1 bicycle facility in the vicinity of the Project consists of portions along the north and west shore of Lake Merritt.
- *Class 2 bicycle facility:* Also known as a bicycle lane, this is a portion of the roadway network that has been striped and signed for bicycle use. Implementation of Class 2 facilities requires sufficient right-of-way between the vehicle stream and the curb or curbside parking. Bicycle lanes are typically used along collector or major streets with medium to high traffic volumes, providing additional travel space for bicyclists along busy roadway segments. Bicycle lanes exist on most of Grand Avenue / West Grand Avenue and portions of Broadway in the vicinity of the Project.
- *Class 3 bicycle facility:* Also known as a bicycle route, this is a bikeway that primarily serves to connect other facilities and destinations in the bikeway network but provides a lower level of service than Class 1 or Class 2 bikeway facilities. These routes include signage but do not have roadway markings or striping to indicate reserved space for the

bicyclist. Bicycle routes are easier to implement because they do not require right of way to be reallocated from vehicular traffic. Bicycle routes currently exist on Grand Avenue between Telegraph Avenue and Webster Street.

- *Class 3A and 3B facilities*: These facilities are similar to Class 3 facilities in that they are shared bicycle-automobile facilities. Class 3A facilities ("arterial bicycle routes") generally have lower posted speed limits (around 25 miles per hour) and feature shared-lane bicycle stencils with wide curb lanes. Class 3B facilities ("bicycle boulevards") are bikeways on low-volume residential streets that prioritize bicycle traffic.

Figure IV.L-8 illustrates the existing bikeway network in the vicinity of the Project. It should be noted that the existing bikeways illustrated represent the network before the implementation of Measure DD-related bikeway projects (particularly, Lakeside Drive) and other more recent projects such as the Oakland Avenue bike lane.

Existing Parking Conditions

On-Street Parking Conditions

Surveys conducted in October 2008 observed that weekday midday peak on-street parking occupancy was about 95 percent along most streets in the vicinity of the Project. Most on-street parking in the vicinity of the Project is metered or restricted, but some street sections currently provide unrestricted parking. Metered parking is currently charged at the rate of $2.00 per hour (Monday through Saturday, 8:00 AM to 6:00 PM) within the City of Oakland.[5] **Figure IV.L-9** illustrates on-street parking restrictions in the vicinity of the Project.

Off-Street Parking Conditions

Numerous off-street parking facilities are located within walking distance of the Project. **Figure IV.L-10** illustrates the location of off-street parking facilities located in the vicinity of the Project Site, most of which are located within a three-block radius of the site. The majority of these parking facilities charge about $3.00 to $4.00 per hour, limited to a maximum daily charge of about $8.00 to $20.00.

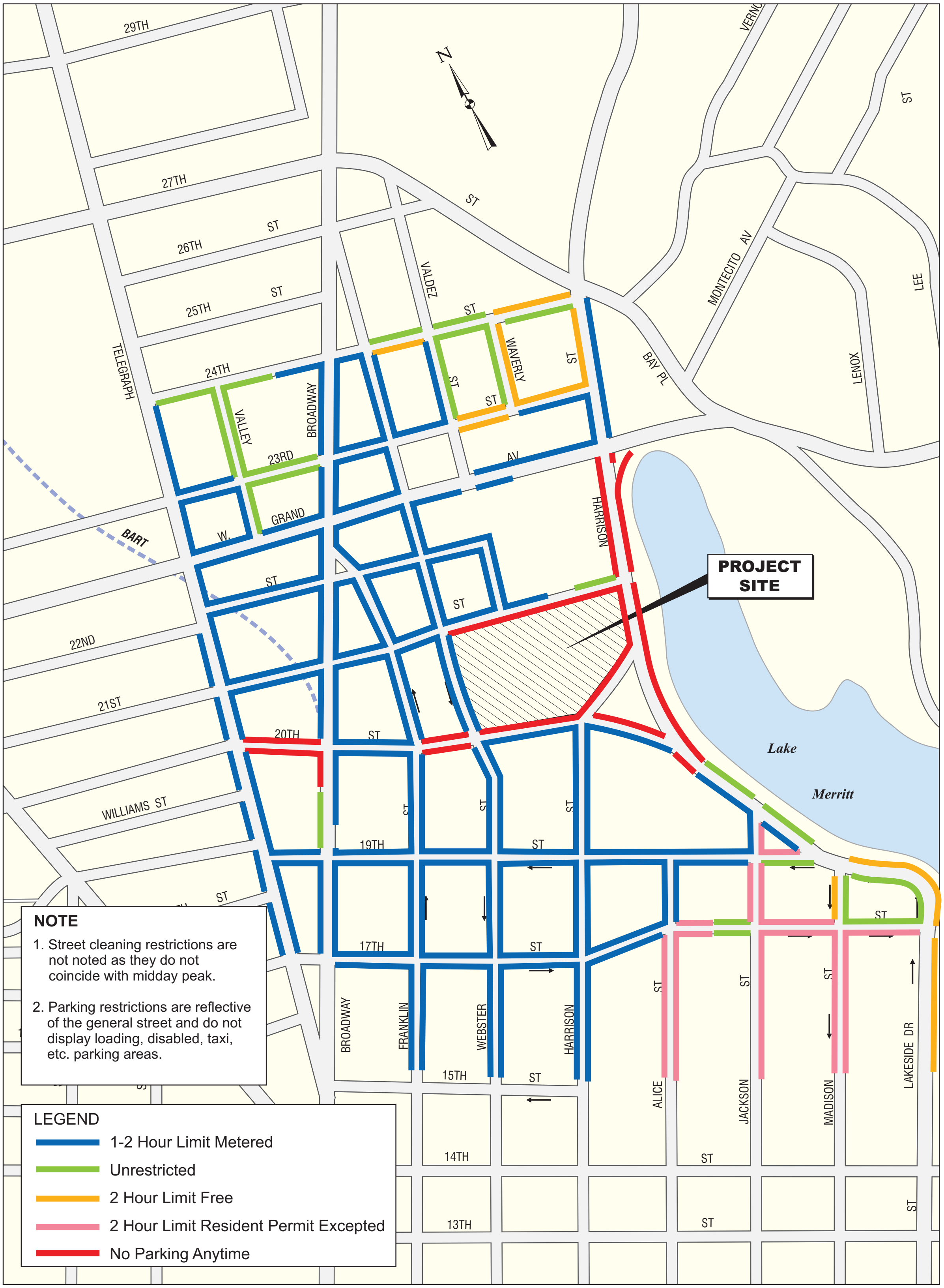
Parking occupancy surveys were conducted for the off-street parking facilities shown in Figure IV.L-10 during the midday peak period on a typical weekday in October 2008. For the Kaiser Center Garage, existing occupancy data was collected in April and July 2010. **Table IV.L-7** summarizes the results of this survey. It should be noted that the survey was conducted prior to the July 2009 increase in parking meter rates, while rates were $1.50 per hour. As shown in Table IV.L-7, there is a total midday parking surplus of approximately 913 spaces among the off-street parking facilities in the vicinity of the Project, assuming a typical maximum occupancy rate of 95 percent to minimize excessive driving when looking for a space, as well as to account for underutilization of handicapped spaces or undesirable spaces. Some facilities are shown with greater than 95 percent occupancy rates because they are valet facilities or facilities with low parking turnover. The existing Kaiser Center Garage alone has surplus capacity to accommodate an additional 241 vehicles during the midday peak period.

5 In July 2009, the City of Oakland raised parking meter rates from $1.50 per hour to $2.00 per hour and also extended parking enforcement until 8 p.m. Monday through Saturday (was originally until 6 p.m.). On October 7, 2009, the City Council rescinded the extended parking enforcement back to 6 p.m.; the $2.00 per hour rate remains in place.

SOURCE: AECOM

Kaiser Oakland . 206213

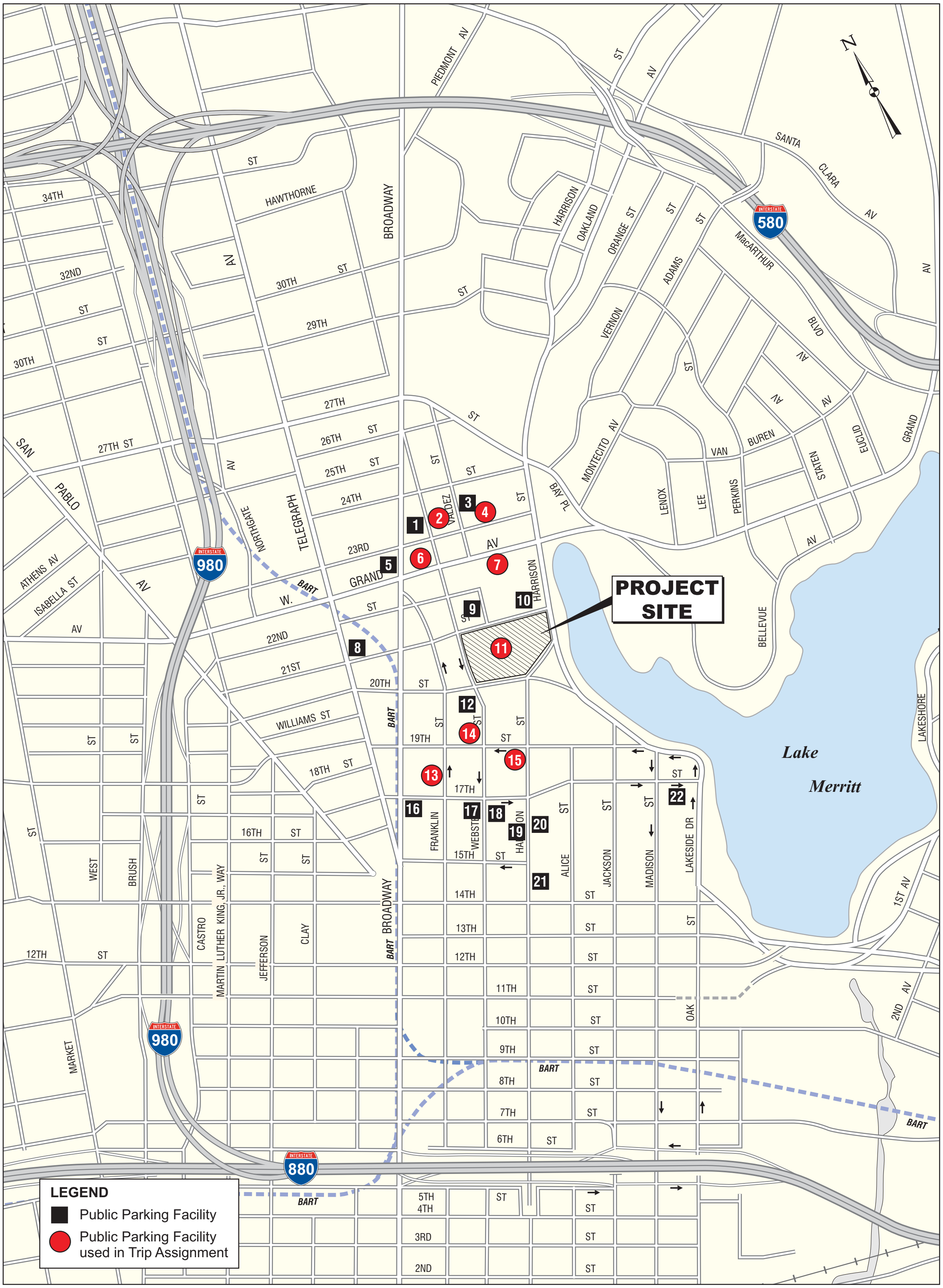
Figure IV.L-8
Existing and Proposed Bikeway Network



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-9
Existing On-Street Parking Conditions



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-10
Existing Public Off-Street Parking Conditions

TABLE IV.L-7
OFF-STREET PARKING FACILITIES

No.	Operator / Facility Location	Rate	Capacity	Occupancy[a]	Surplus[b]
1	**Douglas Parking Lot 54** Webster Street at 23rd Street	$3/hr. $10/day	40	70%	10
2	**Douglas Parking Labor Temple Lot** Webster Street between 23rd Street / 24th Street	$3/hr. $12/day	230	67%	64
3	**West Coast Parking Inc. (Lot)** Valdez Street at 23rd Street	$8/day	250	96%	0
4	**180 Grand (Structure)** Waverly Street at 23rd Street	$8/day	334	71%	80
5	**Broadway Grand (Structure)** Broadway at Grand Avenue	$3/hr. $10/day	62	89%	4
6	**Douglas Parking 80 Grand Lot** Webster Street at Grand Avenue	$3/hr. $12/day	78	69%	20
7	**Douglas Parking 155 Grand Garage** Grand Avenue between Webster St. / Harrison St.	$4/hr. $15/day	250	68%	68
8	**Bay Area Parking Company (Structure)** Telegraph Avenue at 21st Street	$0.63/hr. $7/day	300	97%	0
9	**Douglas Parking Kaiser Plaza Lot** Kaiser Plaza at 21st Street	$4/hr. $17/day	186	92%	6
10	**Douglas Parking / Cathedral of Christ the Light Garage** Harrison Street at 21st Street	$4/hr. $12/day	200	93%	4
11	**Douglas Parking Kaiser Center Garage** Harrison Street at 20th Street	$8/hr. $15/day	1,340	64%	419
12	**Douglas Parking 20th and Webster Lot** Webster Street at 20th Street	$6/hr. $16/day	60	100%	0
13	**Douglas Parking Franklin Plaza** Franklin Street at 19th Street	$4/hr. $20/day	473	63%	151
14	**Douglas Parking Webster Lot / Lot 77** Webster Street between 17th Street / 19th Street	$10/day	190	71%	46
15	**Douglas Parking Scott Lot / Lot 8** Harrison Street at 19th Street	$2/hr. $10/day	168	88%	12
16	**Douglas Parking 17B Lot** Broadway at 17th Street	$6/hr. $15/day	100	94%	1
17	**Central Parking System (Lot)** Webster Street at 17th Street	$6/hr. $10/day	42	76%	8
18	**Douglas Parking Lot 23** Webster Street at 17th Street	$9/day	35	91%	1
19	**Douglas Parking Lot 69** Harrison Street at 15th Street	$8/day	78	86%	7
20	**Star Park (Lot)** Harrison Street at 15th Street	$7/day	22	100%	0
21	**Douglas Parking Lot 36** Harrison Street at 15th Street	$8/day	60	77%	11
22	**Star Park (Lot)** Madison Street at 15th Street	$6/day	30	90%	2
	Total		**4,528**	**75%**	**913**

[a] Parking occupancy surveys were conducted during the midday peak period on a typical weekday in October 2008, with the exception of the Kaiser Center Garage, where existing occupancy data were obtained for April and July 2010.
[b] Surplus is based on an assumed (optimized) occupancy rate of no more than 95 percent.

SOURCE: AECOM, 2009.

Planned Improvements

Planned Transit Improvements

AC Transit has proposed converting the existing 1R-International Rapid into a full Bus Rapid Transit (BRT) service. The 1R currently operates with some BRT features, such as widely-spaced stops at key destinations and transfer points, vehicles designed for easy boarding and alighting, real-time schedules, and transit signal priority. However, AC Transit plans on implementing additional features for the service in the near future, including bus-only median and side-running transitways and stations along the line, completing BRT treatments for a corridor stretching from Berkeley through Downtown Oakland to San Leandro via Telegraph Avenue and International Boulevard.

In the vicinity of the Project, these improvements would generally require the removal of one through lane in each direction along Telegraph Avenue, narrowing the roadway to one vehicular lane in each direction. Buses would run in a protected median, with left turn pockets for autos provided at key intersections. Along 11th and 12th streets in Downtown Oakland, the BRT service would operate in a side-running configuration, removing one lane of through traffic and eliminating some parking to allow for bulbouts at stations.

Although the BRT is planned to be in service in 2015, the Project is only partially funded and not yet approved. As a result, implementation has not been assumed under Near-Term (2015) or Cumulative (2030) analysis scenarios. However, **Appendix G.10** contains intersection and roadway LOS results after implementation of the BRT project.

Planned Pedestrian and Bicycle Facility Improvements

The planned reconfiguration of the intersections of Harrison Street / 20th Street and Harrison Street / Lakeside Drive (discussed under Near-Term (2015) without Project conditions, on page IV.L-71) would improve pedestrian access between Downtown and Lake Merritt and enlarge Snow Park, helping to create a pedestrian-friendly environment in the immediate vicinity of the Project.

The City of Oakland Bicycle Master Plan (December 2007) calls for the implementation of the following bikeway network improvements (Figure IV.L-8):

- Class 2 / 3 facilities on Lakeside Drive / Harrison Street, extending south of I-880 and north of Grand Avenue;
- Class 2 / 3 facilities on 20th Street between Lakeside Drive and San Pablo Avenue;
- Class 2 / 3 facilities on Webster Street / Franklin Street between 8th Street and Broadway;
- Class 2 / 3 facilities on 14th Street extending east and west from Downtown Oakland;
- Class 2 / 3 facilities on 8th Street / 9th Street between Lakeside Drive and Martin Luther King, Jr. Way; and,
- Class 2 / 3 facilities on 27th Street between Grand Avenue and San Pablo Avenue.

The Lake Merritt Master Plan also proposes the completion of a Class 1 "loop" around Lake Merritt by upgrading the existing recreational paths to accommodate bicycles.

Other Transportation Improvements

In addition to the changes to the Harrison Street / Lakeside Drive / 20th Street triangle as part of the Measure DD Implementation Project and the geometry changes as part of the 27th Street / Bay Place bike lanes, additional transportation improvements have also been proposed as part of the following projects:

- AC Transit East Bay Bus Rapid Transit (BRT) Project;
- Franklin-Webster Bike Lane Project;
- Harrison Street / Oakland Avenue Community-Based Transportation Plan (CBTP) Study for improvements to the Harrison Street / Oakland Avenue couplet between Grand Avenue and Monte Vista Avenue to improve access for all modes; (see **Appendix G.12**)
- Broadway Retail Corridor Specific Plan; and,
- I-880 Broadway / Jackson Street Interchange.

The above projects are in various stages of planning and are neither fully funded nor approved. In several cases, such as for the Harrison Street / Oakland Avenue CBTP and Broadway Retail Corridor Specific Plan, the exact nature or design of planned transportation improvements has yet to be finalized. Although only funded and approved projects are typically considered for inclusion in impact analyses, separate supplementary traffic analyses have been conducted as part of this EIR for the BRT project and the Franklin-Webster bike lanes. **Appendix G.10** summarizes the results of these supplementary analyses and includes a discussion of possible transportation improvements under the other projects.

Regulatory Setting

Local Plans and Policies

The Oakland General Plan is comprised of numerous elements, and those containing policies relevant to transportation resources primarily are contained in the Land Use and Transportation Element (LUTE). The goals and policies contained in the various General Plan Elements are often competing. In reviewing a project for conformity with the General Plan, the City is required to 'balance' the competing goals and policies. This Project is reviewed for compliance with the following local plans and policies:

- General Plan LUTE
- City of Oakland Pedestrian Master Plan
- City of Oakland Bicycle Master Plan
- City of Oakland Bicycle Parking Ordinance
- AC Transit Short-Range Transit Plan
- BART Strategic Plan
- City of Oakland Standard Conditions of Approval

City of Oakland General Plan LUTE

The City of Oakland, through various policy documents, states a strong preference for encouraging use of alternative transportation modes. The following polices are included in the LUTE:

> LUTE Policy Framework: Encouraging Alternative Means of Transportation. "A key challenge for Oakland is to encourage commuters to carpool or use alternative modes of transportation, including bicycling or walking. The Policy Framework proposes that congestion be lessened by promoting alternative means of transportation, such as transit, biking, and walking, providing facilities that support alternative modes, and implementing street improvements. The City will continue to work closely with local and regional transit providers to increase accessibility to transit and improve intermodal transportation connections and facilities. Additionally, policies support the introduction of light rail and trolley buses along appropriate arterials in heavily traveled corridors, and expanded use of ferries in the bay and estuary."

- *Policy T3.5, Including Bikeways and Pedestrian Walks*. The City should include bikeways and pedestrian walks in the planning of new, reconstructed, or realized streets, wherever possible.
- *Policy T3.6, Encouraging Transit*. The City should encourage and promote use of public transit in Oakland by expediting the movement of and access to transit vehicles on designated "transit streets" as shown on the Transportation Plan. (Policies T3.6 and T3.7 are based on the City Council's passage of "Transit First" policy in October 1996.)
- *Policy T3.7, Resolving Transportation Conflicts*. The City, in constructing and maintaining its transportation infrastructure, should resolve any conflicts between public transit and single occupant vehicles in favor of the transportation mode that has the potential to provide the greatest mobility and access for people, rather than vehicles, giving due consideration to the environmental, public safety, economic development, health and social equity impacts.
- *Policy T4.1, Incorporating Design Features for Alternative Travel*. The City will require new development, rebuilding, or retrofit to incorporate design features in their projects that encourage use of alternative modes of transportation such as transit, bicycling, and walking.

City of Oakland Pedestrian Master Plan

In November 2002, the Pedestrian Master Plan (PMP) was adopted by the City Council and incorporated into the adopted General Plan. The PMP identifies policies and implementation measures that promote a walkable City. In the study area, the PMP designates a Pedestrian Route Network throughout Oakland and identifies a "City Route" on Broadway, Lakeside Drive – Harrison Street, and Grand Avenue, and a "Neighborhood Route" on Webster Street, and 20th and 17th Streets.

The *PMP* includes the following relevant policies and actions:

> *Policy 1.1. Crossing Safety*: Improve pedestrian crossings in area of high pedestrian activity where safety is an issue.

Action 1.1.1. Consider the full range of design elements – including bulbouts and refuge islands – to improve pedestrian safety.

Policy 1.2: Traffic Signals: Use traffic signals and their associated features to improve pedestrian safety at dangerous intersections.

Action 1.2.7. Consider using crossing enhancement technologies like countdown pedestrian signals at the highest pedestrian volume locations.

Policy 1.3. Sidewalk Safety: Strive to maintain a complete sidewalk network free of broken or missing sidewalks or curb ramps.

Action 1.3.7. Conduct a survey of all street intersections to identify corners with missing, damaged, or non-compliant curb ramps and create a plan for completing their installation.

Policy 2.1: Route Network: Create and maintain a pedestrian route network that provides direct connections between activity centers.

Action 2.1.8. To the maximum extent possible, make walkway accessible to people with physical disabilities.

Policy 2.3: Safe Routes to Transit: Implement pedestrian improvements along major AC Transit lines and at BART stations to strengthen connections to transit.

Action 2.3.1: Develop and implement street designs (like bus bulbouts) that improve pedestrian/bus connections.

Action 2.3.3: Prioritize the implementation of street furniture (including bus shelters) at the most heavily used transit stops.

Action 2.3.4: Improve pedestrian wayfinding by providing local area maps and directional signage at major AC Transit stops and BART stations.

Policy 3.2. Land Use: Promote land uses and site designs that make walking convenient and enjoyable.

Action 3.2.4: Require contractors to provide safe, convenient, and accessible pedestrian rights-of-way along construction sites that require sidewalk closure.

Action 3.2.8: Discourage motor vehicle parking facilities that create blank walls, unscreened edges along sidewalks, and/or gaps between sidewalks and building entrances.

City of Oakland Bicycle Master Plan

The Oakland City Council adopted the Oakland Bicycle Master Plan Update in December 2007. The adopted plan includes the following policy-supporting actions that are applicable to the Proposed Project:

Policy 1A: Bikeway Network: Develop and improve Oakland's bikeway network.

Action 1A.1 – Bicycle Lanes (Class 2): Install bicycle lanes where feasible as the preferred bikeway type for all streets on the proposed bikeway network (except for the bicycle boulevards proposed for local streets with low traffic volumes and speeds).

Action 1A.3 – Bicycle Boulevards (Class 3B): Enhance bicycle routes on local streets by developing bicycle boulevards with signage, striping, and intersection modifications to prioritize bicycle travel.

Action 1A.6 – Dedicated Right Turn Lanes and "Slip Turns": Where feasible, avoid the use of dedicated right turn lanes on streets included in the bikeway network. Where infeasible, consider a bicycle through lane to the left of the turn lane or a combined bicycle lane/right turn lane.

<u>*Policy 1B: Routine Accommodation*</u>: Address bicycle safety and access in the design and maintenance of all streets.

Action 1B.2 – Traffic Signals: Include bicycle-sensitive detectors, bicycle detector pavement markings, and adequate yellow time for cyclists with all new traffic signals and in the modernization of all existing signals.

<u>*Policy 1C – Safe Routes to Transit*</u>: Improve bicycle access to transit, bicycle parking at transit facilities, and bicycle access on transit vehicles.

Action 1C.1 – Bikeways to Transit Stations: Prioritize bicycle access to major transit facilities from four directions, integrating bicycle access into the station design and connecting the station to the surrounding neighborhoods.

<u>*Policy 1D – Parking and Support Facilities*</u>: Promote secure and conveniently located bicycle parking at destinations throughout Oakland.

Action 1D.6 – Bicycle Parking Ordinance: Adopt an ordinance as part of the City's Planning Code that would require new development to include short and long-term bicycle parking.

Action 1D.7 – Development Incentives: Consider reduced automobile parking requirements in exchange for bicycle facilities as part of transportation demand management strategies in new development.

City of Oakland Bicycle Parking Ordinance

The Oakland City Council adopted a Bicycle Parking Ordinance in 2008. The ordinance is contained in Municipal Code Chapter 17.117, and requires new development to provide both short-term (i.e., bicycle racks) and long-term bicycle parking (i.e., lockers or indoor storage) for bicycles.

AC Transit Short-Range Transit Plan

AC Transit, the provider of bus transit service in the Project study area, has established goals related to transit service. These goals are documented in the Short Range Transit Plan – Fiscal Year (FY) 2003 to FY 2012 (AC Transit, 2004). Some of the major goals of AC Transit include:

- Goal 1: Provide High Quality, Useful Transit Service for Customers in the East Bay.
- Goal 4: Plan and Advocate for the Funding and Implementation of Future Projects.

- Work with City and Local agencies to make transit usage as safe, secure, reliable, and quick as possible and to promote transit usage in the planning process.
- Promote "Transit First" development practices and increased funding for transit through transit mitigation funding for new developments.

AC Transit has also established a Strategic Vision to provide fast, frequent, reliable service on a wide variety of routes with attractive vehicles and an easy-to-use, affordable fare structure (AC Transit, 2002). Key elements of the AC Transit Strategic Vision include: increased frequency of buses to reduce wait time; greater frequency of service during midday, evening and owl travel times; an easy-to-use, integrated fare system; flexible routes; adequate around-the-clock service; a redesigned network that matches travel patterns and helps meet demand in the high-density urban core; gradual transition to "Bus Rapid Transit" in the highest ridership corridors; and bus stop improvements including real time display of arrival times.

BART Strategic Plan

BART, the provider of rail transit service in the Project study area, has established strategies, projects and programs related to transit service. These goals are documented in the BART Strategic Plan, adopted in October 2008. Some of the relevant elements of the BART Strategic Plan include:

- Station Access Strategy: Develop alliances with our transit partners and the community to maximize connectivity and to facilitate multi-modal access including transit, bicycling and walking.
- Projects and Programs: Station Access Program: Develop a package of programs and projects to improve access to our stations by modes other than single occupant vehicles. Station Wayfinding Program: Implement wayfinding signage to and from BART station and within the station, to aid the customer in navigating the BART system and in making connections to other transit and local destinations.
- Partnerships for Financial Health Strategy: Protect the Bay Area's investment in rail transit through long-term capital planning, strategic partnerships and outreach with elected and community leaders, the media and the public.
- Projects and Programs: Employer Transit Forum: Recognize and cultivate a closer relationship with the employers we serve.

City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards

The *City of Oakland's Standard Conditions of Approval and Uniformly Applied Development Standards* (SCAs) relevant to reducing traffic and circulation impacts due to the Proposed Project are listed below for reference. If the Project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts from traffic. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures. SCAs applicable to potential transportation, circulation and parking impacts due to the Project include:

- **SCA TRANS-1 Parking and Transportation Demand Management**.

  Prior to issuance of a final inspection of the building permit. The applicant shall submit for review and approval by the Planning and Zoning Division a Transportation Demand Management (TDM) plan containing strategies to reduce on-site parking demand and single occupancy vehicle travel. The applicant shall implement the approved TDM plan. The TDM plan shall include strategies to increase bicycle, pedestrian, transit, and carpools/vanpool use. All four modes of travel shall be considered. Strategies to consider include the following:

  – Inclusion of additional bicycle parking, shower, and locker facilities that exceed the requirement;
  – Construction of bike lanes per the Bicycle Master Plan Priority Bikeway Projects;
  – Signage and striping onsite to encourage bike safety;
  – Installation of safety elements per the Pedestrian Master Plan (such as cross walk striping, curb ramps, count down signals, bulb outs, etc.) to encourage convenient crossing at arterials;
  – Installation of amenities such as lighting, street trees, trash receptacles per the Pedestrian Master Plan and any applicable streetscape plan;
  – Direct transit sales or subsidized transit passes;
  – Guaranteed ride home program;
  – Pre-tax commuter benefits (checks);
  – On-site car-sharing program (such as City Car Share, Zip Car, etc.);
  – On-site carpooling program;
  – Distribution of information concerning alternative transportation options;
  – Parking spaces sold/leased separately; and,
  – Parking management strategies, including attendant / valet parking and shared parking spaces.

- **SCA TRANS-2 Construction Traffic and Parking**

  Prior to issuance of a grading, demolition or building permit, the Project applicant and construction contractor shall meet with appropriate City of Oakland agencies to determine traffic management strategies to reduce, to the maximum extent feasible, traffic congestion and the effects of parking demand by construction workers during construction of this project and other nearby projects that could be simultaneously under construction. The project applicant shall develop a construction management plan for review and approval by the Planning and Zoning Division, the Building Services Division, and the Transportation Services Division. The plan shall include at least the following items and requirements:

  – A set of comprehensive traffic control measures, including scheduling of major truck trips and deliveries to avoid peak traffic hours, detour signs if required, lane closure procedures, signs, cones for drivers, and designated construction access routes;
  – Notification procedures for adjacent property owners and public safety personnel regarding when major deliveries, detours, and lane closures will occur;
  – Location of construction staging areas for materials, equipment, and vehicles at an approved location;

- A process for responding to, and tracking, complaints pertaining to construction activity, including identification of an onsite complaint manager. The manager shall determine the cause of the complaints and shall take prompt action to correct the problem. Planning and Zoning shall be informed who the Manager is prior to the issuance of the first permit issued by Building Services;
- Provision for accommodation of pedestrian flow;
- Provision for parking management and spaces for all construction workers to ensure that construction workers do not park in on street spaces;
- Any damage to the street caused by heavy equipment, or as a result of this construction, shall be repaired, at the applicant's expense, within one week of the occurrence of the damage (or excessive wear), unless further damage/excessive wear may continue; in such case, repair shall occur prior to issuance of a final inspection of the building permit. All damage that is a threat to public health or safety shall be repaired immediately. The street shall be restored to its condition prior to the new construction as established by the City Building Inspector and/or photo documentation, at the applicant's expense, before the issuance of a Certificate of Occupancy;
- Any heavy equipment brought to the construction site shall be transported by truck, where feasible;
- No materials or equipment shall be stored on the traveled roadway at any time.
- Prior to construction, a portable toilet facility and a debris box shall be installed on the site, and properly maintained through project completion;
- All equipment shall be equipped with mufflers; and,
- Prior to the end of each work day during construction, the contractor or contractors shall pick up and properly dispose of all litter resulting from or related to the project, whether located on the property, within the public rights-of-way, or properties of adjacent or nearby neighbors.

Impacts and Mitigation Measures

This section estimates the Project's travel demand and evaluates the Project's potential impacts on transportation facilities, identifying mitigation measures where necessary.

Project Description

The Project would primarily consist of two new office towers totaling 1,470,000 square feet of office space to be located on the west portion of the block bounded by 21st Street on the north, 20th Street on the south, Webster Street on the west, and the existing Kaiser Center office tower on the east. Approximately 48,000 square feet of existing retail space would be removed and replaced with 46,000 square feet of retail located at street level along 20th Street and Webster Street and on the sixth floor adjacent to the existing Kaiser Center roof garden.

The Project is comprised of two phases: Phase I and Phase II. Tentative construction phasing of the Project as provided by the Project sponsor calls for construction of the South Tower first ("Phase I"), with the North Tower subsequent ("Phase II"). The removal of retail space would be executed across the two phases.

- *Phase I*: The "South Tower" consists of a 34-story office tower in conjunction with the street level retail complex along 20th Street, comprising about 552,000 square feet of office space and about 27,000 square feet of retail space located at street level and on the sixth floor; and,
- *Phase II*: The "North Tower" consists of a 42-story office tower in conjunction with the street level retail complex along Webster Street, comprising about 768,000 square feet of office space and about 19,000 square feet of retail space located at street level and on the sixth floor.

The Project Site plan, showing the location of uses, parking, and vehicular access, is illustrated in **Figures IV.L-11a** and **L-11b**.

Parking and Vehicular Access

The Project also proposes new subterranean and above-grade parking consisting of an additional 697 parking spaces. The new parking structures would be incorporated into the existing Kaiser Center Garage. Pedestrian entrances to the office towers would be located on Harrison Street, Webster Street, and 20th Street, while vehicular entrances to the Project complex would be via driveways on Harrison Street, 20th Street, and 21st Street. Vehicular access to the garage structure would be provided via the existing entrances and exits located on 21st Street and via the Access Road on the eastern portion of the block (entrances currently via Harrison Street, 20th Street, and 21st Street), as shown in Figures IV.L-11a and L-11b.

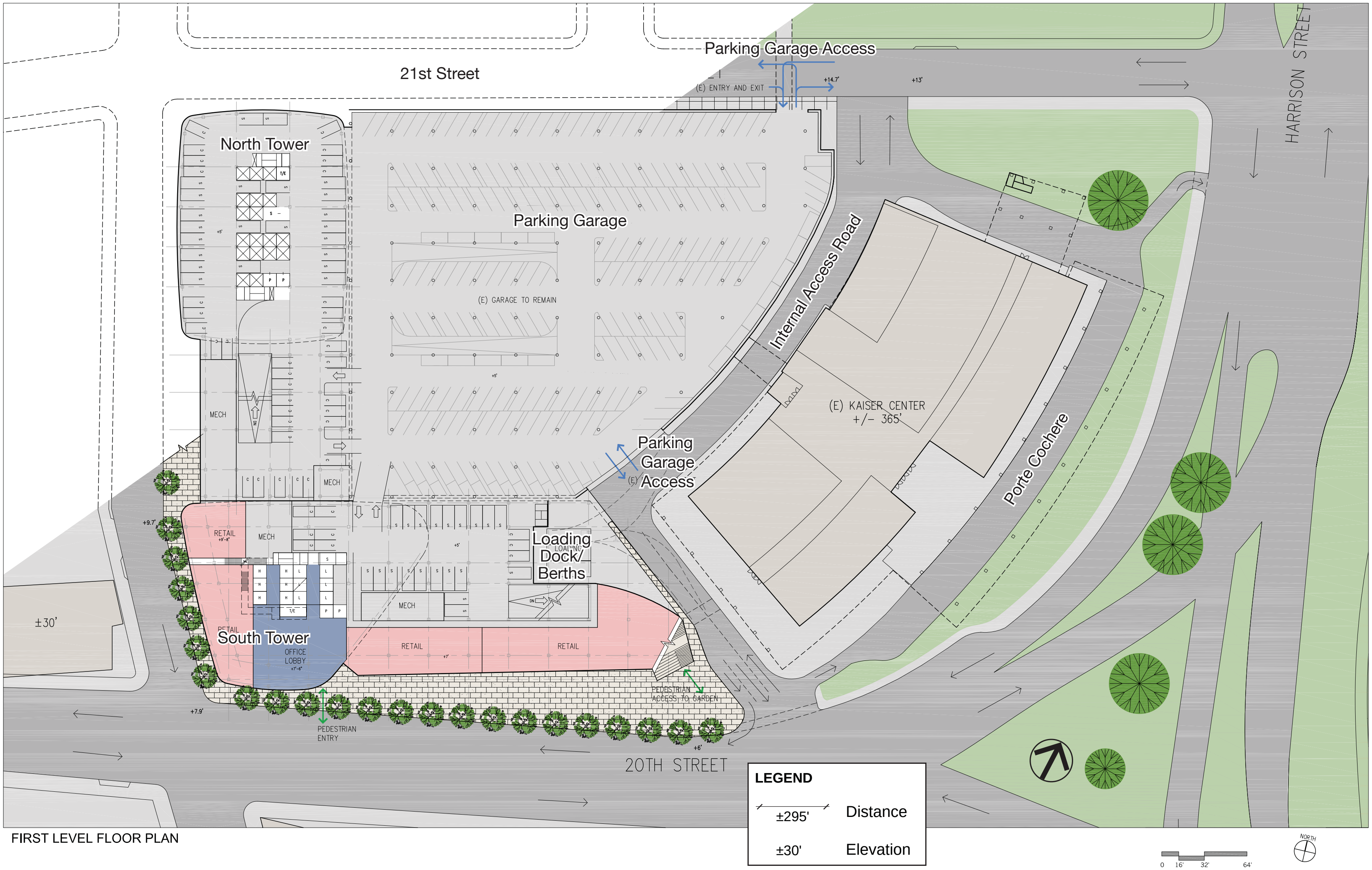
The direction of traffic flow in the existing porte cochere at the east entrance to the existing Kaiser Center Tower would be reversed to run eastbound. Currently, porte cochere traffic runs westbound via a slip lane off southbound Harrison Street. In order to improve the safety of pedestrians using the crosswalk at this slip lane and reduce the potential for queuing or disruptions in traffic flow along Harrison Street, the direction of the porte cochere would be reversed and its approach to Harrison Street would be stop-controlled. All internal intersections would be configured with stop control.

Project access at the intersection of Harrison Street / 20th Street would also change as part of the Project. The existing exit for the porte cochere would be removed to free up space for the upper level staircase to the roof garden. The existing inbound-only Access Road approach would be reconfigured with an outbound approach (one shared through-left lane and one exclusive right-turn lane).

Loading Docks

Loading docks would be located in two locations, as illustrated in Figure IV.L-11a:

- Near the southeast corner of the site, with primary access via the Access Road;
- Near the northwest corner of the site, with primary access via 21st Street. Trucks would back into the loading dock from 21st Street.



FIRST LEVEL FLOOR PLAN

SOURCE: AECOM; SOM

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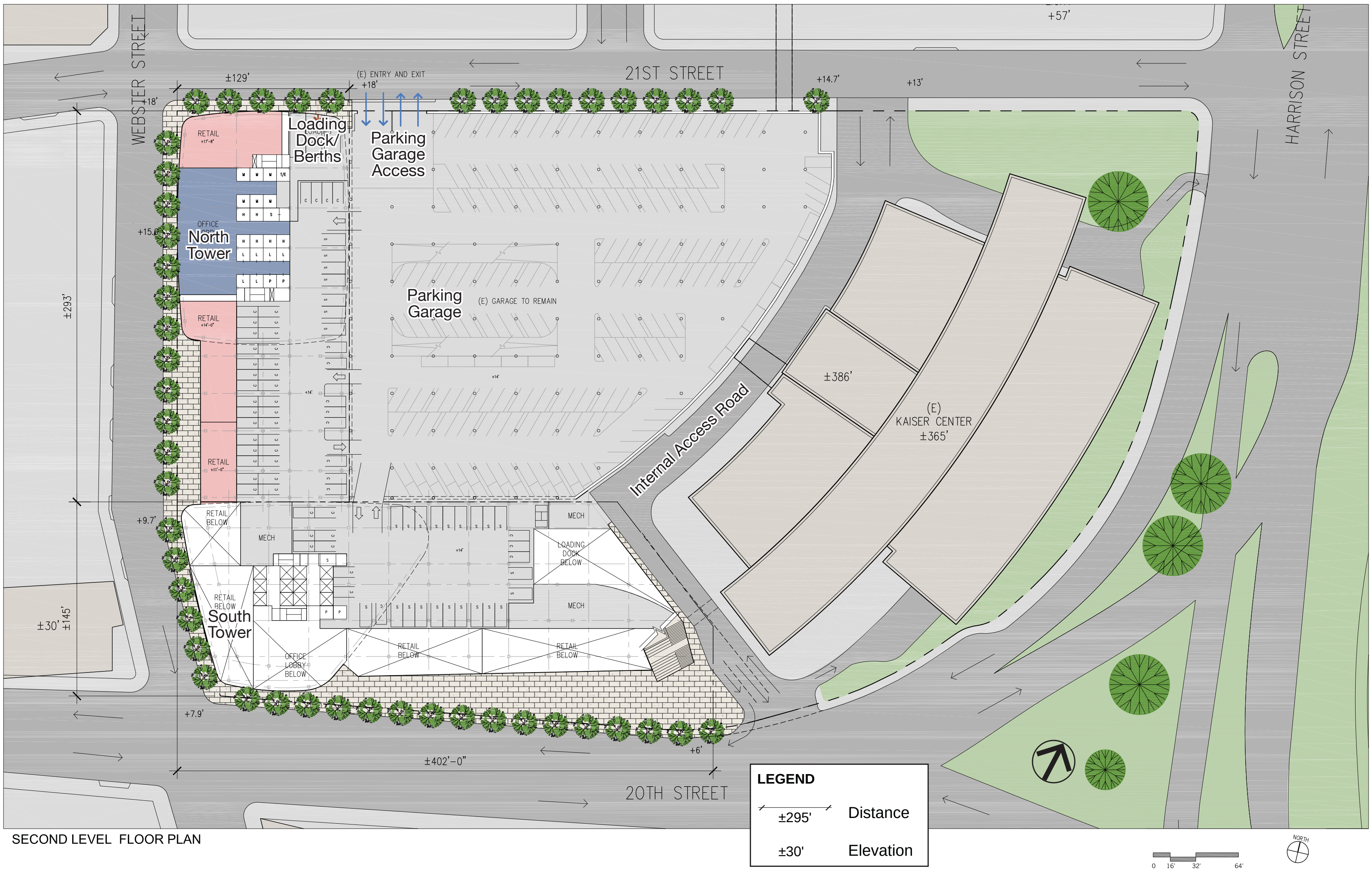
Figure IV.L-11a
Project Site Plan
First Level



SECOND LEVEL FLOOR PLAN

SOURCE: AECOM; SOM

Kaiser Oakland . 206213

Figure IV.L-11b
Project Site Plan
Second Level

Approach to Analysis

With respect to transportation and circulation, the Project is defined to have a significant impact on the environment if it satisfies the City of Oakland thresholds of significance detailed below.

Significance Criteria

The project would have a significant impact on the environment if it would:

Project Impacts

Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including, but not limited to, intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit, specifically:

Traffic Load and Capacity Thresholds

1. at a study, signalized intersection which is located outside the Downtown[6] area, the project would cause the level of service (LOS)[7] to degrade to worse than LOS D (i.e., E);
2. at a study, signalized intersection which is located within the Downtown area, the project would cause the LOS to degrade to worse than LOS E (i.e., F);
3. at a study, signalized intersection outside the Downtown area where the level of service is LOS E, the project would cause the total intersection average vehicle delay to increase by four (4) or more seconds, or degrade to worse than LOS E (i.e., F);
4. at a study, signalized intersection for all areas where the level of service is LOS E, the project would cause an increase in the average delay for any of the critical movements of six (6) seconds or more, or degrade to worse than LOS E (i.e., F);
5. at a study, signalized intersection for all areas where the level of service is LOS F, the project would cause (a) the total intersection average vehicle delay to increase by two (2) or more seconds, or (b) an increase in average delay for any of the critical movements of four (4) seconds or more; or (c) the volume-to-capacity ("V/C") ratio exceeds three (3) percent (but only if the delay values cannot be measured accurately);
6. At a study, unsignalized intersection the project would add ten (10) or more vehicles and after project completion satisfy the Caltrans peak hour volume warrant;
7. For a Congestion Management Program (CMP) required analysis, (ie., projects that generate 100 or more p.m. peak hour trips) cause a roadway segment on the Metropolitan Transportation System to operate at LOS F or increase the V/C ratio by more than three (3)

[6] Downtown is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south and I-980/Brush Street to the west.

[7] LOS and delay calculations for local intersections should be based on the *Highway Capacity Manual*, Transportation Research Board, National Research Council, 2000 edition. For CMA intersections (project proposes a general plan amendment, or if an EIR is performed and there are 100 or more peak trips), use the 2000 *Highway Capacity Manual.* For state facilities, consult with the Planning Department.

percent for a roadway segment that would operate at LOS F without the project;

8. Result in substantially increased travel times for AC Transit buses; [**NOTE**: Factors to consider in evaluating the potential impact include, but are not limited to, the proximity of the project site to the transit corridor(s), the function of the roadway segment(s), and the characteristics of the potentially affected bus routes(s). The evaluation may require a qualitative and/or quantitative analysis depending upon these relevant factors.]

Other Thresholds

9. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
10. Substantially increase traffic hazards to motor vehicles, bicycles, or pedestrians due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
11. Result in less than two emergency access routes for streets exceeding 600 feet in length unless otherwise determined to be acceptable by the Fire Chief, or his/her designee, in specific instances due to climatic, geographic, topographic, or other conditions; or
12. Fundamentally conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Cumulative Impacts (Year 2015 and 2030)

A project's contribution to cumulative impacts is considered "considerable" (i.e., significant) when the project exceeds at least one of the thresholds listed above under a future year scenario. [**NOTE:** The cumulative analysis shall analyze both the near-term future year and the long-term future year scenario of the applicable Alameda County Congestion Management Agency countywide transportation model.]

Planning-Related Non-CEQA Issues

The following transportation-related topics are not considerations under CEQA but should be evaluated in order to inform decision-makers and the public about these issues.

Transit Ridership

Evaluate the project's potential to:

- Increase the average ridership on AC Transit lines by three (3) percent at bus stops where the average load factor with the project in place would exceed 125% over a peak thirty minute period;
- Increase the peak hour average ridership on BART by three (3) percent where the passenger volume would exceed the standing capacity of BART trains;
- Increase the peak hour average ridership at a BART station by three (3) percent where average waiting time at fare gates would exceed one minute; and

Queuing

Evaluate the project's potential effect on 95th percentile queuing. Would the project cause an increase in 95th percentile queue length of 25 feet or more at a study, signalized intersection?

Traffic Control Devices

Evaluate the need for additional traffic control devices (e.g., stop signs, street lighting, crosswalks, traffic calming devices) using the California MUTCD and applicable City standards.

Collision History

Evaluate three years of vehicle, pedestrian, and bicycle collision data for intersections and roadway segments within three blocks of the project site to determine if the project would contribute to an existing problem or if any improvements are recommended in order to alleviate potential effects of the project.

Project Trip Generation

Trip Generation

Trip generation estimates are based on data published in the ITE's *Trip Generation*, 8th Edition, the industry standard for land-use based trip generation.[8] The data presented are derived from a national sample of surveys of similar land uses.

Mode Split

Through the evaluation of various technical documents and sources—including surveys of office workers in the Oakland Downtown area—a detailed comparison of mode split results was conducted. The comparison found that the actual observed transit mode share in Downtown area projects was substantially higher than the 17 percent typically assumed for the evaluation of transportation impacts of Downtown projects. The comparison is outlined in the Mode Split Findings Memorandum in **Appendix G.5**.

The mode split and average vehicle occupancy (AVO) results from the Downtown Transportation and Parking Plan, compiled by Dowling Associates in October 2003, showed a mode split of 66 percent automobile, 30 percent transit, and 4 percent walk / bike / other and an AVO of 1.16. To achieve a more conservative analysis evaluating the potential transportation impacts due to the addition of Project-generated vehicle trips, a mode split of 70 percent automobile and 30 percent transit was assumed in all trip generation calculations.

Table IV.L-8 summarizes the Project weekday person-trip generation. Although the proposed retail space would be smaller than the existing retail space, to achieve a more conservative analysis, it was assumed that the trip generation characteristics would remain the same. **Table IV.L-9** summarizes the Project weekday vehicle-trip generation.

8 ITE's *Trip Generation* typically provides both a weighted average rate and a regression equation ("fitted curve") with which to calculate the trips generated by each land use. Given the large sample size of office land uses in *Trip Generation*, the fitted curve was used, augmented with doorway counts of tenants in the existing retail space.

TABLE IV.L-8
PROJECT WEEKDAY PERSON-TRIP GENERATION

Land Use	Size (KSF)	Daily Total	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Office (North Tower)	768	7,438	978	133	1,111	186	904	1,090
Office (South Tower)	552	5,766	752	102	854	137	672	809
Retail	46	5,210	145	140	285	269	252	521
Existing Retail (to be removed)[a]	(48)	(5,210)	(145)	(140)	(285)	(269)	(252)	(521)
Net New Person-Trips		**13,204**	**1,730**	**235**	**1,965**	**323**	**1,576**	**1,899**

[a] Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2009.

TABLE IV.L-9
PROJECT WEEKDAY VEHICLE-TRIP GENERATION [a]

Land Use	Size (KSF)	Daily Total	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Office (North Tower)	768	4,487	590	81	671	112	545	657
Office (South Tower)	552	3,479	454	62	516	83	404	487
Retail	46	5,002	125	121	246	232	217	449
Existing Retail (to be removed)[b]	(48)	(5,002)	(125)	(121)	(246)	(232)	(217)	(449)
Net New Vehicle-Trips		**7,966**	**1,045**	**142**	**1,187**	**194**	**950**	**1,144**

a Vehicle-trip calculations based on 70 percent auto mode split and AVO of 1.16.
[b] Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2009.

Project Trip Distribution and Trip Assignment

The Project's trip distribution pattern was developed using information from the ACCMA Travel Demand Model (see **Figure IV.L-12**). Preliminary intersection and roadway LOS analysis indicated that the primary routes between the Project and both I-580 and I-880 would experience severe congestion and delays in the future, even without the addition of Project-generated traffic. Given that drivers will often find the "optimum" solution with regards to travel time and the fact that travel demand models are generally unconstrained and assign vehicles onto roadway facilities regardless of available capacity, a portion of both background and Project-generated traffic during the weekday PM peak hour bound for EB I-580 via the Oakland Avenue / Perry Place ramp and for SB I-880 via the Oak Street / 5th Street ramp were diverted to alternative routes—namely via Oakland Avenue and State Route 13 (SR 13), via Grand Avenue and the Lakeshore Avenue / MacArthur Boulevard ramp, and via Embarcadero and the Embarcadero / 10th Avenue ramp for I-880. More detail on these assumptions is provided in **Appendix G.11**.

SOURCE: AECOM

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Figure IV.L-12
Project Trip Distribution

For the assignment of Project vehicle trips, given that the capacity of the Kaiser Center Garage after the Project would not be sufficient to accommodate all additional vehicular travel demand generated by the Project, the "overflow" trips were assigned to public off-street parking facilities in the immediate vicinity of the Project. This methodology best replicates the projected parking demands and the resulting effects on circulation patterns in the vicinity of the Project. The following seven parking facilities, illustrated in Figure IV.L-10, were selected for consideration:

- Douglas Parking Labor Temple Lot (Webster Street between 23rd Street and 24th Street);
- 180 Grand (Structure) (Waverly Street at 23rd Street);
- Douglas Parking 80 Grand Lot (Webster Street at Grand Avenue);
- Douglas Parking 155 Grand Garage (Grand Avenue between Webster Street and Harrison Street);
- Douglas Parking Franklin Plaza (Franklin Street at 19th Street);
- Douglas Parking Webster Lot / Lot 77 (Webster Street between 17th Street and 19th Street); and,
- Douglas Parking Scott Lot / Lot 8 (Harrison Street at 19th Street).

Under only Phase I, the Kaiser Center Garage would have sufficient capacity to handle the additional vehicular travel demand generated by the Project. Under Phase I and Phase II, the Kaiser Center Garage would have insufficient capacity to handle all the additional vehicular travel demand, and some drivers would use one of the overflow parking facilities identified above. Based on data from the parking occupancy surveys summarized in Table IV.L-7, overflow parking facilities would receive from ten additional trips for small facilities, to 80 additional trips for larger facilities such as Douglas Parking Franklin Plaza.

Existing plus Project (Phase I and Phase II) Conditions

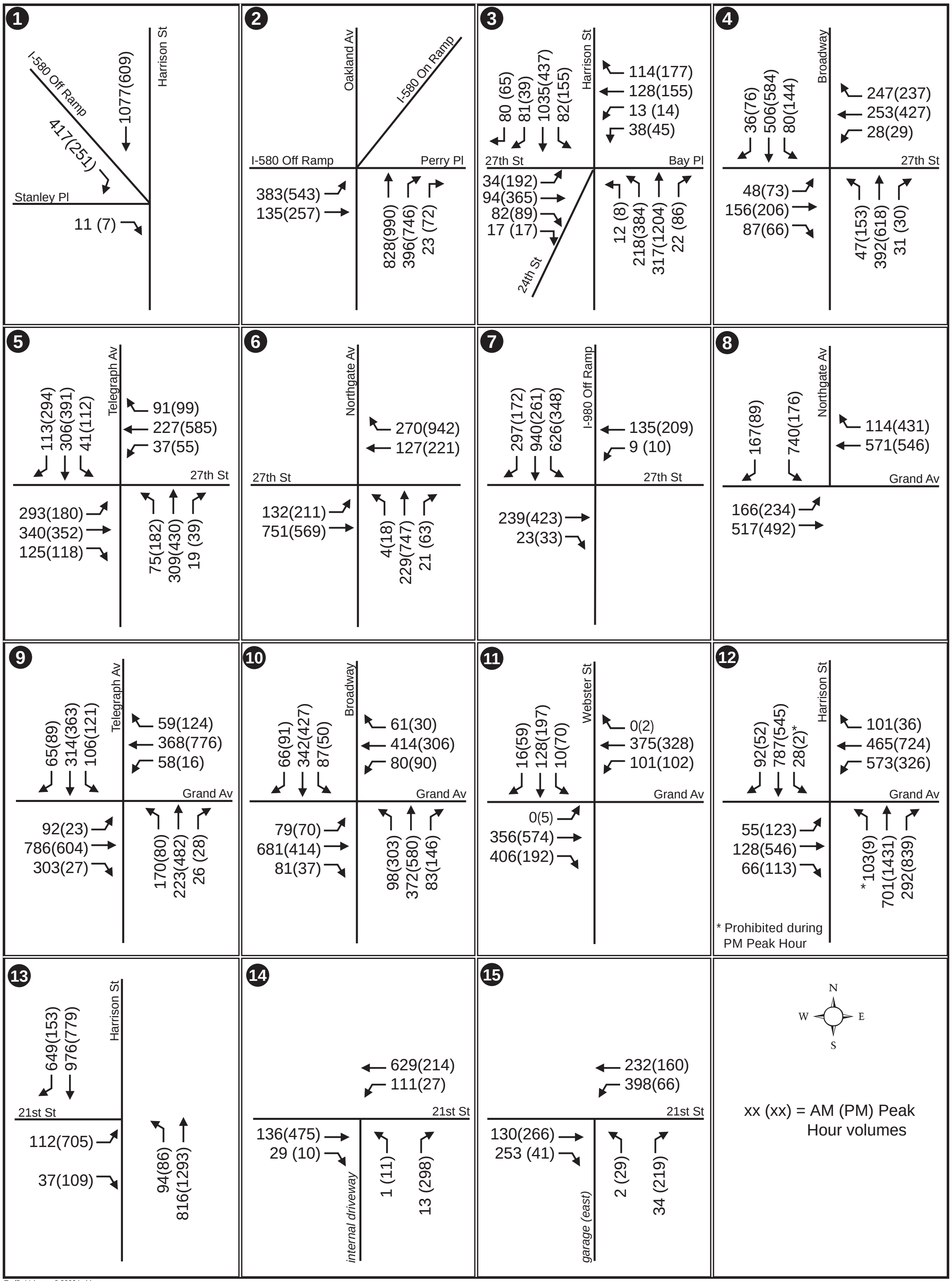
Intersection Impacts

Impact TRANS-1: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-1a through TRANS-1f)

Existing plus Project (Phase I and Phase II) Conditions traffic volumes are illustrated in **Figure IV.L-13**. **Table IV.L-10** summarizes the peak-hour LOS at the 51 study intersections under Existing plus Project (Phase I and Phase II) Conditions.

Average delay at some intersections would decrease under Existing plus Project (Phase I and Phase II) Conditions due to greater growth on movements that are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table IV.L-10, the following intersections would operate at unacceptable conditions under Existing plus Project (Phase I and Phase II) Conditions:



SOURCE: AECOM

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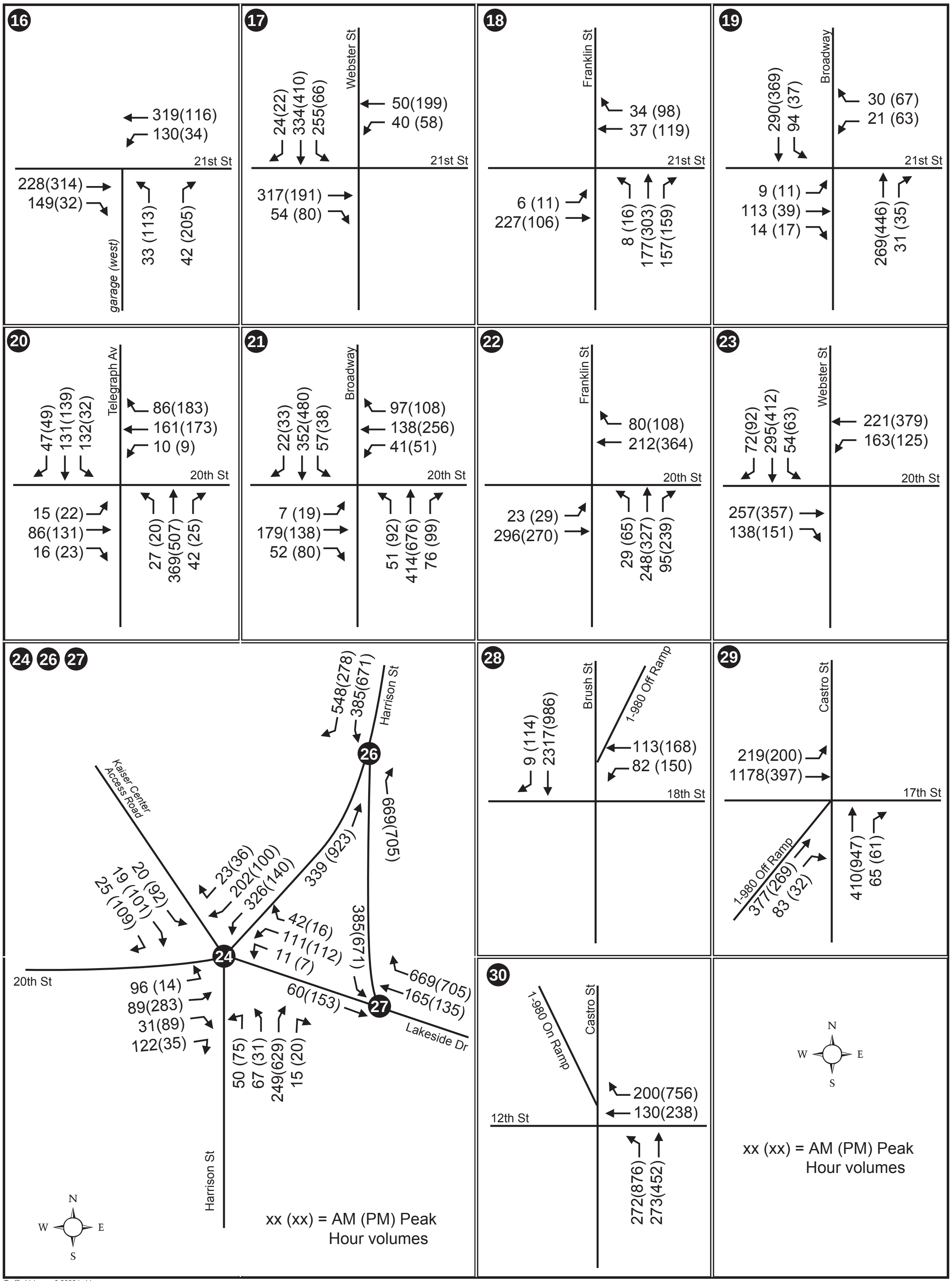
Figure IV.L-13a
Existing Plus Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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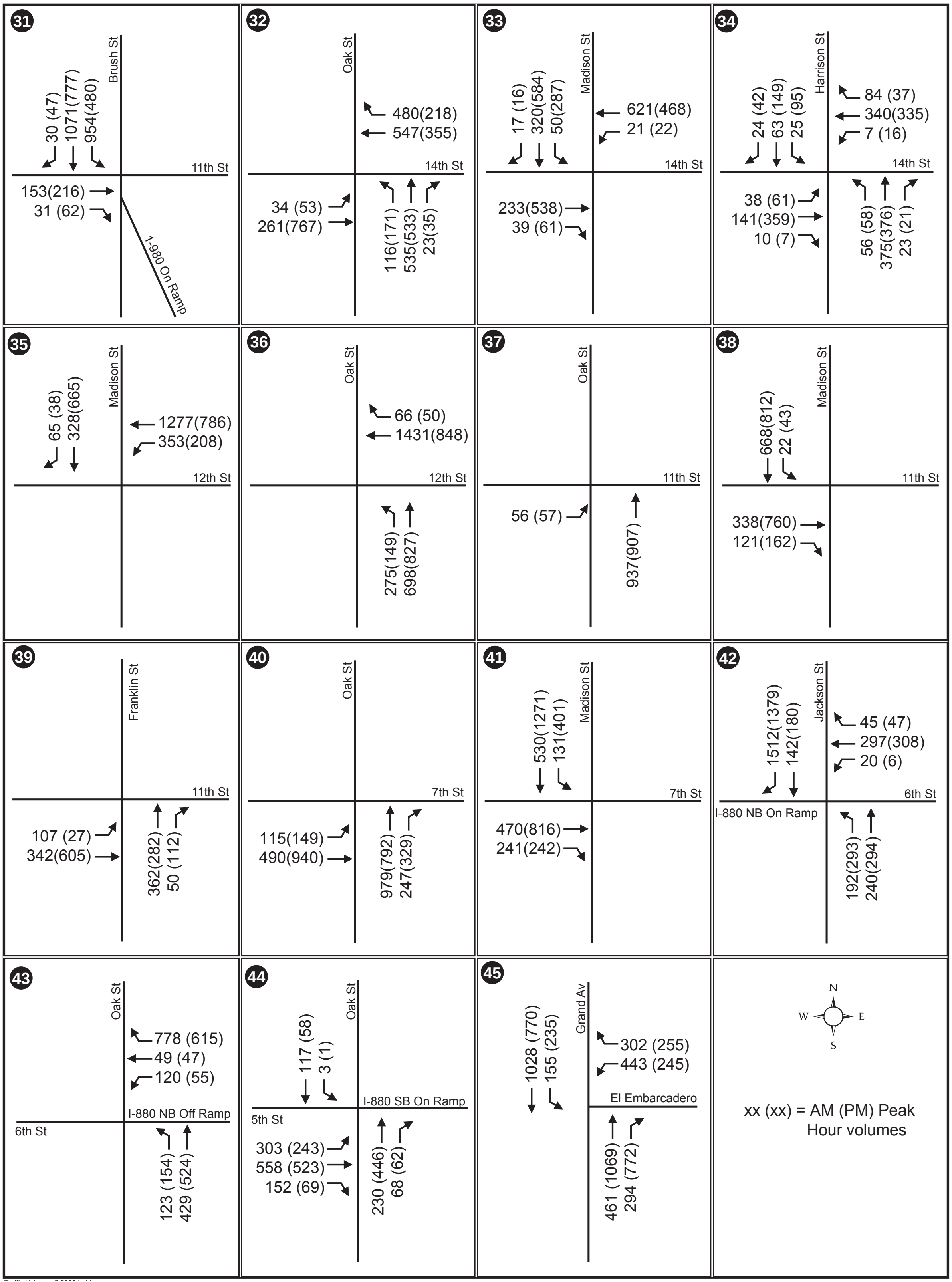
Figure IV.L-13b
Existing Plus Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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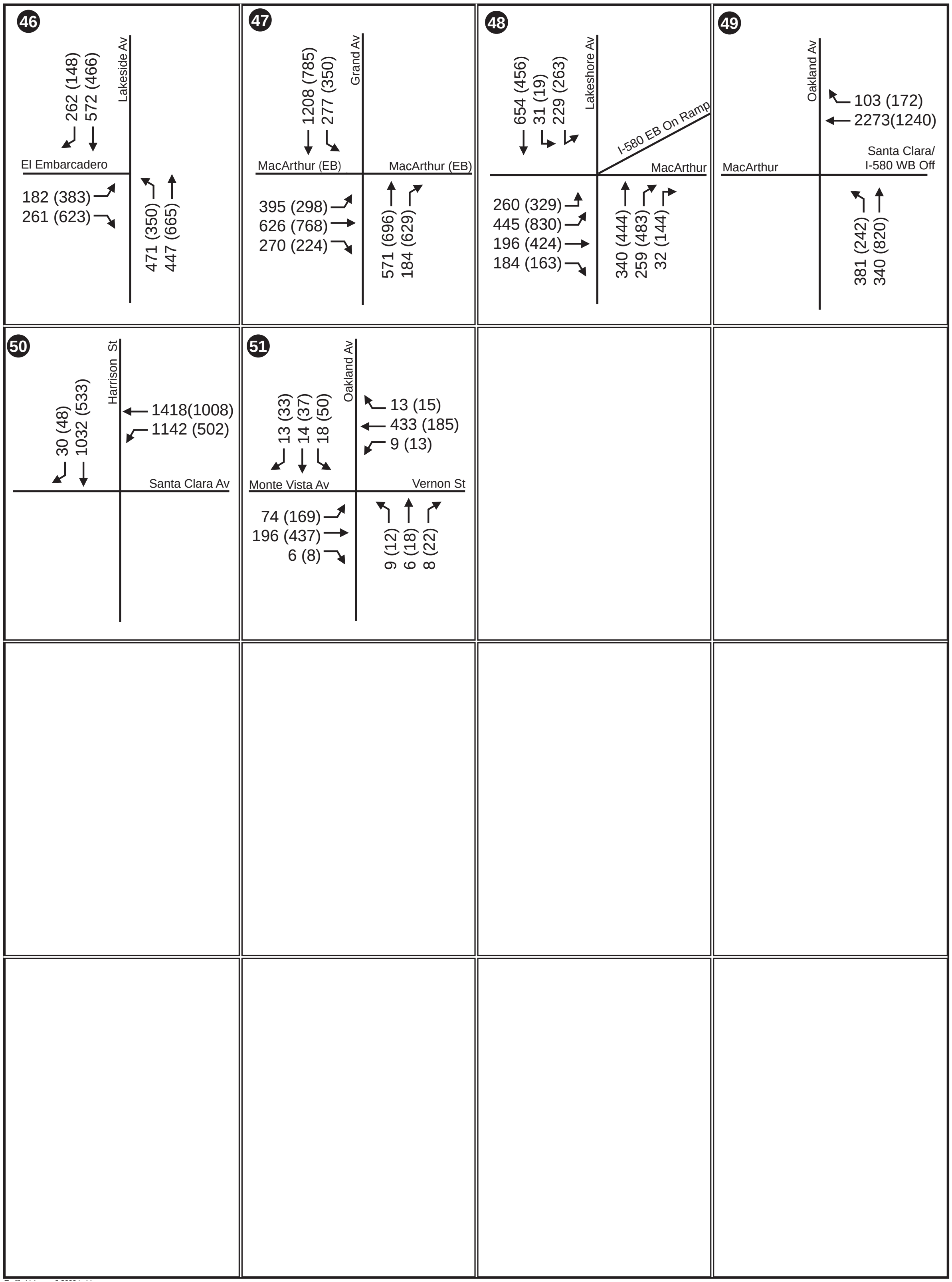
Figure IV.L-13c
Existing Plus Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-13d
Existing Plus Project Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-10
EXISTING PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE (LOS)

			Existing Conditions				Existing plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	SSSC	C	16.9	B	11.9	C	22.1	B	12.2
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	B	18.1	F	>120	C	25.4	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.6	D	49.2	C	31.3	**F**	**91.9**
4	Broadway / 27th Street	Signal	B	15.3	B	18.0	B	15.5	B	19.6
5	Telegraph Ave. / 27th St.	Signal	B	18.8	C	25.0	B	19.0	C	28.3
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	A	8.9	B	10.9	A	9.1	B	13.0
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	12.0	B	11.0	B	12.8	B	11.0
45	Grand Avenue / El Embarcadero	Signal	C	25.7	F	90.9	C	25.8	**F**	**119.9**
46	Lakeshore Avenue / El Embarcadero	Signal	C	32.5	C	24.5	C	32.8	C	26.5
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.9	E	76.2	D	41.9	**F**	**98.2**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	23.9	D	49.2	C	23.8	D	51.0
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	C	22.8	B	12.1	C	29.6	B	15.2
50	Harrison Street / MacArthur Blvd. (WB)	Signal	C	26.1	B	16.5	C	28.9	B	16.5
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	12.7	B	12.8	B	14.3	C	15.7
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	21.3	B	17.7	C	22.3	B	18.3
9	Telegraph Avenue / West Grand Avenue	Signal	C	24.9	C	27.1	E	60.1	D	35.5
10	Broadway / Grand Ave.	Signal	C	20.9	B	17.0	C	21.4	B	18.2
11	Webster St. / Grand Ave.	Signal	C	29.2	C	23.7	C	30.9	C	24.1
12	Harrison St. / Grand Ave.	Signal	C	27.8	D	39.0	D	45.2	E	64.4
13	Harrison St. / 21st Street	Signal	A	6.9	B	13.7	A	9.1	D	36.3
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.6	B	10.9	B	10.9	D	26.8
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.5	B	11.4	B	14.3	C	21.2
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	11.5	B	10.8	C	16.8	B	12.7
17	Webster St. / 21st Street	Signal	B	13.8	B	18.2	B	14.7	B	18.5
18	Franklin St. / 21st Street	Signal	B	10.1	B	10.8	A	9.8	B	10.3

See next page for table footnotes.

**TABLE IV.L-10 (*continued*)
EXISTING PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE (LOS)**

			Existing Conditions				Existing plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
19	Broadway / 21st Street	Signal	A	10.0	B	10.6	B	10.6	B	10.7
20	Telegraph Ave. / 20th St.	Signal	B	11.6	B	12.5	B	12.0	B	12.2
21	Broadway / 20th Street	Signal	B	13.3	B	17.0	B	13.5	B	17.2
22	Franklin St. / 20th Street	Signal	B	13.0	B	15.1	B	14.9	B	14.8
23	Webster St. / 20th Street	Signal	C	20.8	C	21.0	C	23.2	C	22.6
24	Harrison St. / 20th Street / Kaiser Ctr. Access Road	Signal	C	24.2	C	27.2	D	37.7	**F**	**81.2**
25	Kaiser Ctr. Access Road / 20th Street[c]	SSSC	B	14.7	B	14.8	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	A	6.2	B	13.8	A	9.1	B	19.8
27	Lakeside Dr. / 20th St.	Signal	B	11.6	B	10.1	B	11.7	B	14.7
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	5.9	A	9.5	A	5.9	A	9.6
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	21.0	C	23.8	C	21.2	C	23.8
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.4	B	16.7	C	21.4	B	16.7
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	C	32.9	B	15.9	C	32.8	B	15.9
32	Oak Street / 14th Street	Signal	B	17.4	C	34.6	B	17.6	C	34.5
33	Madison St. / 14th St.	Signal	A	9.6	B	10.1	A	9.6	B	10.2
34	Harrison St. / 14th St.	Signal	A	9.3	A	9.7	A	9.4	A	9.7
35	Madison St. / 12th St.	Signal	A	7.7	A	7.8	A	7.7	A	8.3
36	Oak Street / 12th Street	Signal	B	12.8	B	12.8	B	12.9	B	12.8
37	Oak Street / 11th Street	SSSC	B	10.5	B	10.7	B	10.6	B	10.7
38	Madison St. / 11th St.	Signal	B	12.2	A	9.7	B	12.1	A	9.5
39	Franklin St. / 11th St.	Signal	B	13.3	B	14.9	B	12.7	B	14.7
40	Oak Street / 7th Street	Signal	A	9.4	B	14.2	A	9.5	B	14.4
41	Madison St. / 7th St.	Signal	A	8.8	B	11.8	A	8.8	B	12.4
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak St. / 6th St. / I-880 NB Off-Ramp	Signal	B	14.9	B	11.2	B	16.0	B	11.3
44	Oak St. / 5th St. / I-880 SB On-Ramp	Signal	E	65.3	F	>120	E	67.9	**F**	**>120**

Bold indicates significant impact.

[a] SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection
[b] The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.
[c] The Project would eliminate this intersection.

SOURCE: AECOM, 2009.

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)

Within Downtown Area

24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in PM peak hour)

The Project would not result in a significant impact at the following intersection:

- *#42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)*. Although the intersection would operate at LOS F during both the AM and PM peak hours under both Existing Conditions and Existing plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.

Impacts due to the Project at the remaining intersections above are discussed below.

Impact TRANS-1a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was used to evaluate the impact. The intersection operates with a v/c ratio of 0.98 under Existing Conditions and would operate with a v/c ratio of 1.16 under Existing plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 18 percent, which is greater than the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-1a: Implement the following measures at the Oakland Avenue / Perry Place / I-580 Eastbound Ramps intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

Because the delays at this intersection are primarily on the northbound right turn to the I-580 Eastbound On-Ramp and Perry Place, the existing crosswalk on the southeast side of the intersection (across I-580 Eastbound On-Ramp / Perry Place) could be repositioned to the northwest side of the intersection (across the I-580 Eastbound Off-Ramp), providing more green time to the northbound right-turn. However, this would require pedestrians to cross the I-580 Westbound Off-Ramp on the north side of Oakland Avenue between Perry Place and MacArthur Boulevard. Because this on-ramp is uncontrolled and visibility can be poor, this configuration would likely present more safety issues than the existing crosswalk across the eastbound on-ramp at this intersection, which is a signalized crossing.

Geometric modifications to increase capacity on the northbound right-turn would also be infeasible. The I-580 Eastbound On-Ramp is restricted to one lane, precluding the provision of an additional turn lane onto the on-ramp. A Class 2 bicycle lane has also been recently striped on Oakland Avenue, and adding an additional exclusive right-turn lane could require the removal of the bicycle lane or a reduction to its attractiveness, or could present safety issues for bicycles.

In addition, signal optimization at this location would require approval of the change by Caltrans, making implementation of the proposed mitigation measure uncertain. Given these considerations, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impact at this intersection would be significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still be a significant and unavoidable impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (Existing). (Significant)

Mitigation Measure TRANS-1b: Implement the following measures at the Harrison Street / 27th Street / 24th Street intersection:

- Prohibit westbound left turns from Bay Place (to Harrison Street and 24th Street) during the PM peak hour.
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines

- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

With respect to implementation of the measure, one solution would involve restriping the existing westbound left-turn lane as a shared through-left lane and using special left-turn and through arrow bulbs on signal heads and extinguishable "no left turn" signs on the signal poles serving the westbound Bay Place approach.

A similar implementation of left-turn and through arrow bulbs and protected left-turn phasing for a shared through-left lane already exists on the westbound 20th Street approach at Webster Street / 20th Street. Likewise, a similar implementation of electronic "no right turn" signs has been installed at several intersections in Oakland Chinatown.

During off-peak periods, the shared westbound through-left lane at Harrison Street / 27th Street / 24th Street would be provided with a protected left-turn phase similar to the current signal phasing for the westbound 20th Street approach at Webster Street / 20th Street. After the end of the protected phase, like at Webster Street / 20th Street, vehicles would only be able to use this lane for through-movements until the next signal cycle. During the PM peak hour, the electronic "no left turn" sign would be illuminated and vehicles in the shared through-left lane would only be given through arrows. An illustration of the signal phasing sequence for the westbound Bay Place approach is included in **Appendix G.13**.

The 59 vehicles making these movements during the PM peak hour (45 vehicles to southbound Harrison Street and 14 vehicles to westbound 24th Street) would likely divert to the westbound through movement at this intersection or use other intersections in the area. Given that the volumes are relatively low, the diversion of traffic as a result of the left-turn prohibition would not result in substantial secondary impacts. By prohibiting westbound left turns, the green times can be reallocated to the northbound and southbound through Harrison Street movements. After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

However, the proposed mitigation measure would represent a less-than-ideal solution and could potentially still result in confusion for drivers who do not regularly use this intersection. This confusion could potentially result in drivers attempting to make abrupt lane changes out of the shared through-left lane or make prohibited traffic movements under the assumption that they have the "right of way."

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still be a conservatively deemed significant and unavoidable impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1c: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (Existing). (Significant)

Mitigation Measure TRANS-1c: Implement the following measures at the Harrison Street / 20th Street / Kaiser Center Access Road intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection (located within the Downtown area) would operate at an acceptable LOS E in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was used to evaluate the impact. The intersection operates with a v/c ratio of 1.45 under Existing Conditions and would operate with a v/c ratio of 1.51 under Existing plus Project (Phase I and Phase II) conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-1d: Implement the following measures at the Oak Street / 5th Street / I-580 Southbound On-Ramp intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

  – 2070L Type Controller

- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional on-ramp lane before the metering lights to increase storage space and reduce the effects of spillback queuing at this intersection. Because the intersection and on-ramp facilities are under the jurisdiction of Caltrans, however, implementation of the proposed mitigation measure is under the jurisdiction of Caltrans and would require encroachment permits and approval. Therefore, this impact is significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1e: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Mitigation Measure TRANS-1e: Implement the following measures at the Grand Avenue / El Embarcadero intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections in the same coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, the intersection (located outside the Downtown area) would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Existing conditions, mitigating the Project's impact at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-1f: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp)* (Existing). (Significant)

Mitigation Measure TRANS-1f: Implement the following measures at the Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing at this intersection with the adjacent intersections in the same signal coordination group.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

  – 2070L Type Controller
  – GPS communication (clock)
  – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  – City Standard ADA wheelchair ramps
  – Full actuation (video detection, pedestrian push buttons, bicycle detection)
  – Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  – Countdown Pedestrian Signals
  – Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  – Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane along Grand Avenue. However, this improvement would reduce pedestrian accessibility at the intersection, which is located in an area with a high level of pedestrian traffic. An additional southbound left-turn lane would also not be feasible, as it would result in offset issues with far-side diagonal parking on the west side of Grand Avenue. There are no feasible measures to completely mitigate the Project's impacts and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Existing plus Project (Phase I) Conditions.

Roadway Impacts

Impact TRANS-2: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would worsen level of service conditions on area roadway segments. (Significant on road segments described below under Impacts TRANS-2a through TRANS-2b)

Table IV.L-11 summarizes peak-hour LOS for the study roadway segments under Existing plus Project (Phase I and Phase II) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-11, the Non-Caltrans roadway segments on eastbound Grand Avenue (#9, Harrison Street to El Embarcadero), and on northbound Harrison Street / Oakland Avenue (#10, 27th Street to I-580) would operate at LOS F in the PM peak hour under Existing plus Project (Phase I and Phase II) Conditions:

The Project's impacts on those roadway segments are discussed below:

Impact TRANS-2a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on *Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero)* (Existing). (Significant)

Mitigation Measure TRANS-2a: Implement the following measures on Grand Avenue between Harrison Street and El Embarcadero:

- Optimize traffic signals (to include determination of allocation of green time for each intersection approach) at intersections along Grand Avenue (i.e., Harrison Street, Bay Place, Park View Terrace / Bellevue Avenue, Perkins Street, Staten Avenue, Euclid Avenue, and El Embarcadero) for the AM and PM peak hours in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing at the intersections in the road segment.

To implement this measure, the Project applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersections. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersections should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

TABLE IV.L-11
EXISTING PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE

					Existing Conditions						Existing plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	**Roadway Segment**	**Dir.**	**Ln.**	**Capacity (veh/hr)**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**
Caltrans Facilities																
1	**SR 260 (Posey / Webster Tubes)** from Alameda city limits to I-880	NB	2	3,400	E	3,081	0.91	D	2,478	0.73	E	3,086	0.91	D	2,479	0.73
		SB	2	3,400	B	1,575	0.46	C	2,347	0.69	B	1,577	0.46	C	2,363	0.70
2	**I-880** from Market Street to I-980	EB	4	8,000	B	3,070	0.38	B	3,164	0.40	B	3,164	0.40	B	3,181	0.40
		WB	4	8,000	B	3,720	0.47	B	3,426	0.43	B	3,733	0.47	B	3,512	0.44
3	**I-880** from Oak Street to 5th Avenue	EB	4	8,000	C	4,968	0.62	D	5,737	0.72	C	4,983	0.62	D	5,831	0.73
		WB	4	8,000	C	5,606	0.70	C	5,075	0.63	D	5,710	0.71	C	5,095	0.64
4	**I-980** from 27th Street to 29th Street	NB	3	6,000	A	1,611	0.27	C	3,609	0.60	A	1,647	0.27	C	3,842	0.64
		SB	3	6,000	D	4,679	0.78	B	1,858	0.31	D	4,832	0.81	B	1,885	0.31
Non-Caltrans Facilities																
5	**Broadway** from 19th Street to Grand Avenue	NB	2	1,800	A	513	0.29	B	876	0.49	B	553	0.31	C	1,029	0.57
		SB	2	1,800	A	438	0.24	B	597	0.33	A	503	0.28	B	611	0.34
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	2	1,800	A	464	0.26	B	678	0.38	A	470	0.26	B	712	0.40
		SB	2	1,800	B	661	0.37	B	565	0.31	B	675	0.38	B	573	0.32
7	**West Grand Avenue** from S. Pablo Ave. to Telegraph Ave.	EB	2	1,800	C	1,054	0.59	B	719	0.40	C	1,181	0.66	B	726	0.40
		WB	2	1,800	B	672	0.37	B	862	0.48	B	685	0.38	C	945	0.53
8	**Grand Avenue** from Broadway to Harrison Street	EB	2	1,800	B	682	0.38	B	762	0.42	B	851	0.47	B	782	0.43
		WB	2	1,800	B	644	0.36	B	783	0.44	B	660	0.37	B	785	0.44
9	**Grand Avenue** from Harrison St. to El Embarcadero	EB	2	1,800	B	751	0.42	E	1,700	0.94	B	755	0.42	**F**	**1,841**	**1.02**
		WB	2	1,800	E	1,531	0.85	C	968	0.54	E	1,759	0.98	C	1,015	0.56
10	**Harrison Street / Oakland Avenue** from I-580 to 27th Street	NB	2	1,800	C	1,189	0.66	E	1,536	0.85	C	1,247	0.69	**F**	**1,808**	**1.00**
		SB	2	1,800	C	1,041	0.58	B	686	0.38	D	1,278	0.71	B	726	0.40
11	**Harrison Street** from 27th Street to Grand Avenue	NB	3	2,700	A	784	0.29	B	1,236	0.46	B	857	0.32	C	1,590	0.59
		SB	3	2,700	B	899	0.33	A	556	0.21	B	1,155	0.43	A	599	0.22
12	**Harrison Street** from 20th Street to 14th Street	NB	2	1,800	A	475	0.26	B	745	0.41	A	497	0.28	B	755	0.42
		SB	2	1,800	A	444	0.25	A	286	0.16	A	459	0.26	A	286	0.16

Bold indicates significant impact.

SOURCE: AECOM, 2009.

- 2070L Type Controller
- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions on this road segment would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts would require substantial capacity improvements such as an additional travel lane on Grand Avenue in the eastbound direction, which would conflict with improvements recently constructed or currently being implemented as part of the Measure DD project and could require removal of bike lanes or substantial amounts of on-street parking. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.

Impact TRANS-2b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on *Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)* (Existing). (Significant)

It should also be noted that while the Project would cause the segment to operate to LOS F (because the traffic volume would exceed the hourly capacity of 1,800 vehicles), rounded to the hundredths place (per standard practice), the v/c ratio is 1.00, which is LOS E.

> **Mitigation Measure TRANS-2b:** Implement Mitigation Measures TRANS-1a and TRANS-1b.

After implementation of these measures, conditions on this road segment would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts would require substantial capacity improvements such as an additional travel lane on Harrison Street / Oakland Avenue in the northbound direction, which would require removal of bike lanes or substantial amounts of on-street parking. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would not be an impact under Existing plus Project (Phase I) Conditions.

Near-Term (2015) Without Project Traffic Conditions

This section evaluates traffic operations at the study intersections under Near-Term (2015) without Project conditions, for which traffic volumes were forecasted using the June 2007 release of the ACCMA Travel Demand Model, with refinements to the volume forecasts within the City of Oakland to allow for more accurate representation of projected travel demand within city limits. The model was calibrated and validated to Spring 2007 travel conditions (the most up-to-date conditions possible using ABAG Projections 2005 land use data) within Oakland. More information on model assumptions surrounding land use and other developments in the Project vicinity is included in **Appendix G.6**.

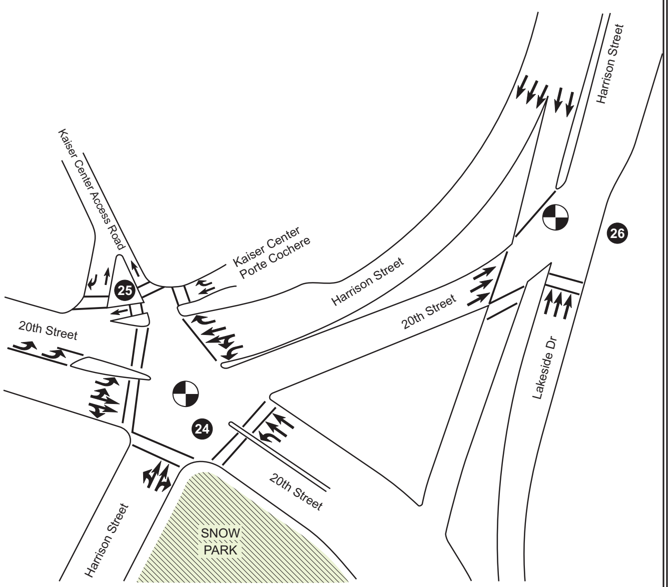
Planned Transportation Improvements

The following roadway and intersection geometry changes are planned to occur in the area within the near-term timeframe as a result of several different projects:

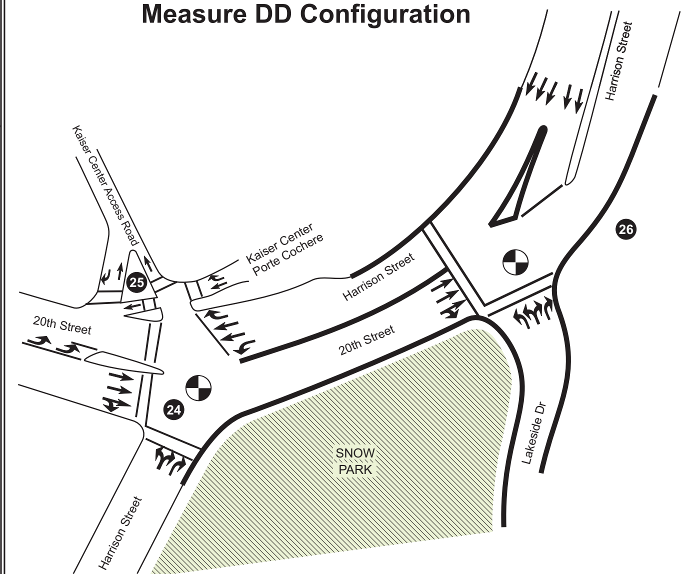
Measure DD Implementation Project

Measure DD improvements for Lakeshore Avenue, El Embarcadero, and Lakeside Drive have recently been installed or are currently under construction. Remaining improvements as part of the Measure DD Implementation Project include the removal of the 20th Street leg of the Harrison Street / Lakeside Drive / 20th Street "triangle" (the former right-of-way would then be converted to open space as part of an expanded Snow Park). The intersection of Harrison Street / Lakeside Drive would be reconfigured into a "T" intersection (this would require the realignment of Lakeside Drive). The reconfiguration of the triangle would improve pedestrian access to Lake Merritt from the Downtown area by simplifying routes for pedestrians and reducing the number of crossings. The proposed Measure DD Implementation Project roadway and intersection geometry changes at this location are illustrated in **Figure IV.L-14**.

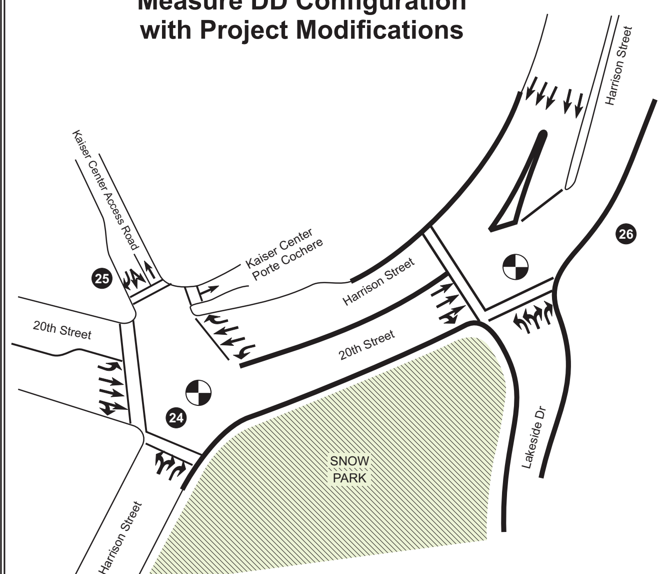
Existing Configuration



Measure DD Configuration



Measure DD Configuration with Project Modifications



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-14
Measure DD Implementation
Project Geometry Changes

27th Street / Bay Place Bike Lanes

The City of Oakland is in the process of expanding its bikeway network (Figure IV.L-8, page IV.L-32). Bike lanes along 27th Street and Bay Place have already been approved and funded and are thus assumed under Near-Term (2015) scenario. One travel lane in each direction would be removed along 27th Street and Bay Place to accommodate the bike lanes.

Near-Term (2015) without Project Intersection Operating Conditions

Growth factors between the ACCMA Travel Demand Model's traffic volumes for base (2005) and future (2030) conditions were calculated for each intersection approach, and interpolated to obtain near-term (2015) growth factors. These growth factors were applied to Existing Conditions traffic volumes to derive Near-Term (2015) without Project conditions traffic volumes. The volumes were then compared to the City of Oakland Measure DD Implementation Project Environmental Impact Report approved in April 2008 to ensure consistency. Near-Term (2015) without Project conditions traffic volumes at the 51 study intersections are illustrated in **Figure IV.L-15**.

The following intersections would operate unacceptable conditions under Near-Term (2015) without Project conditions:

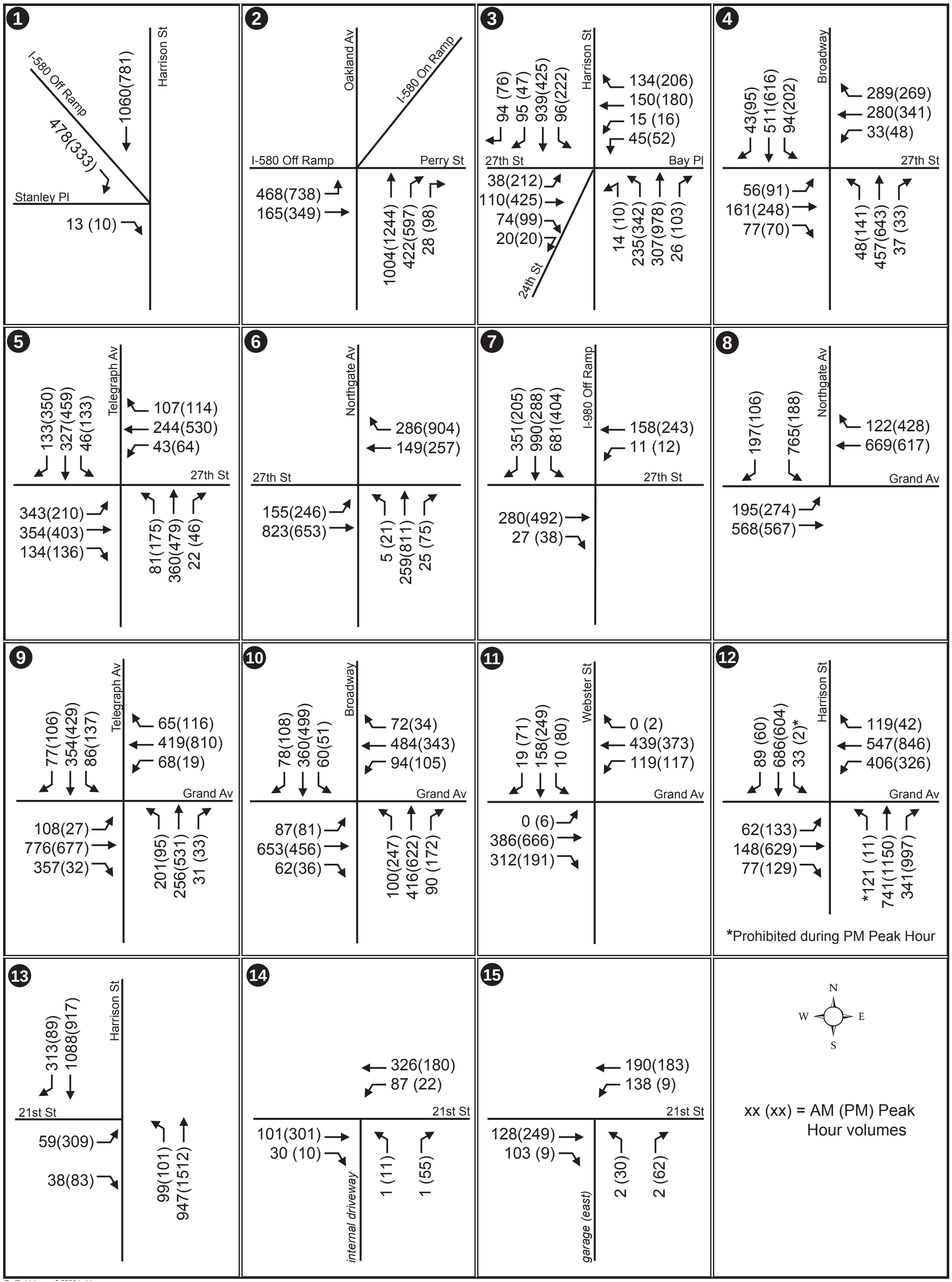
Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS E in AM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

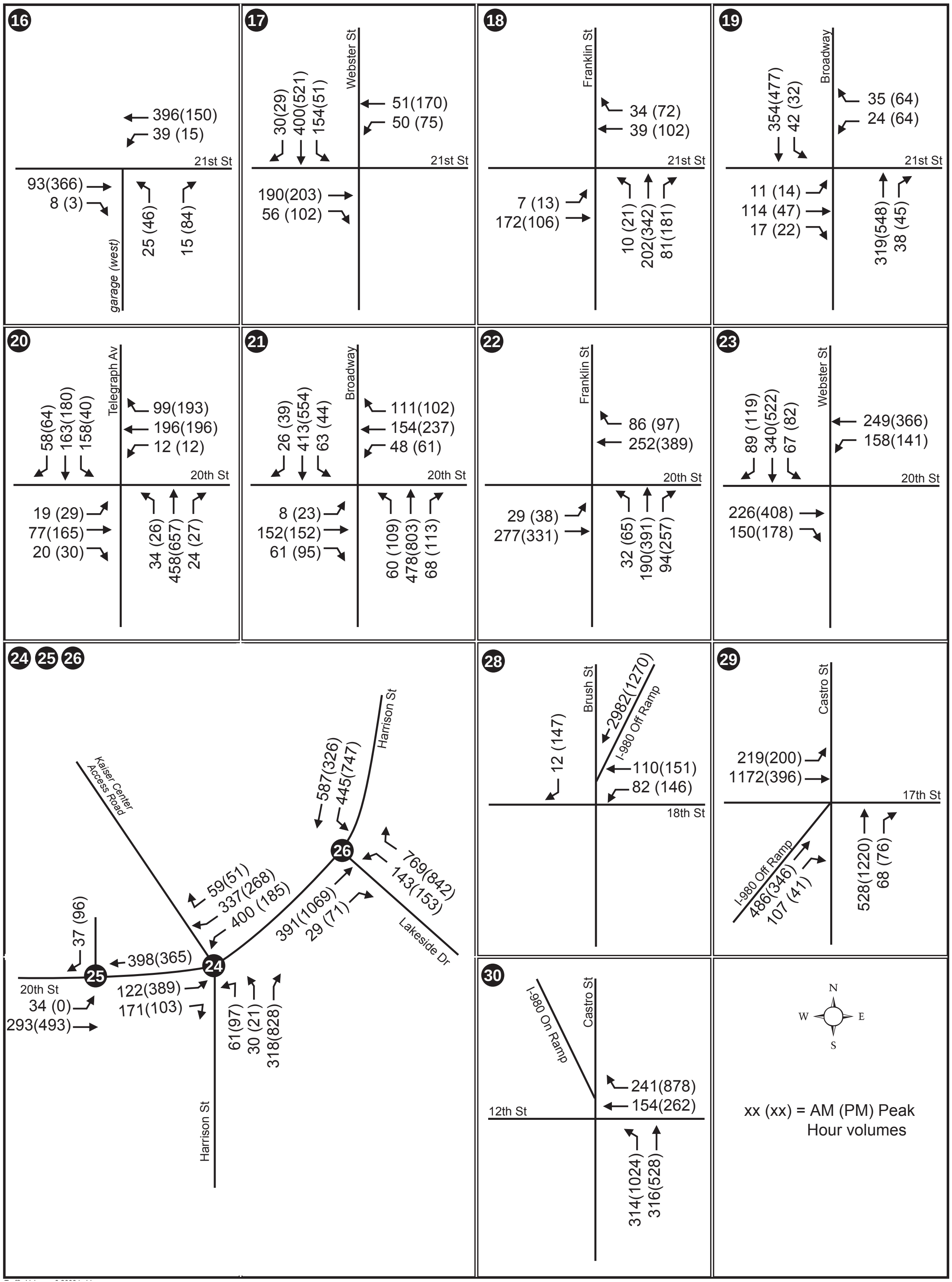
Average delay at some intersections would decrease under Near-Term (2015) without Project conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.



SOURCE: AECOM

Kaiser Oakland . 206213

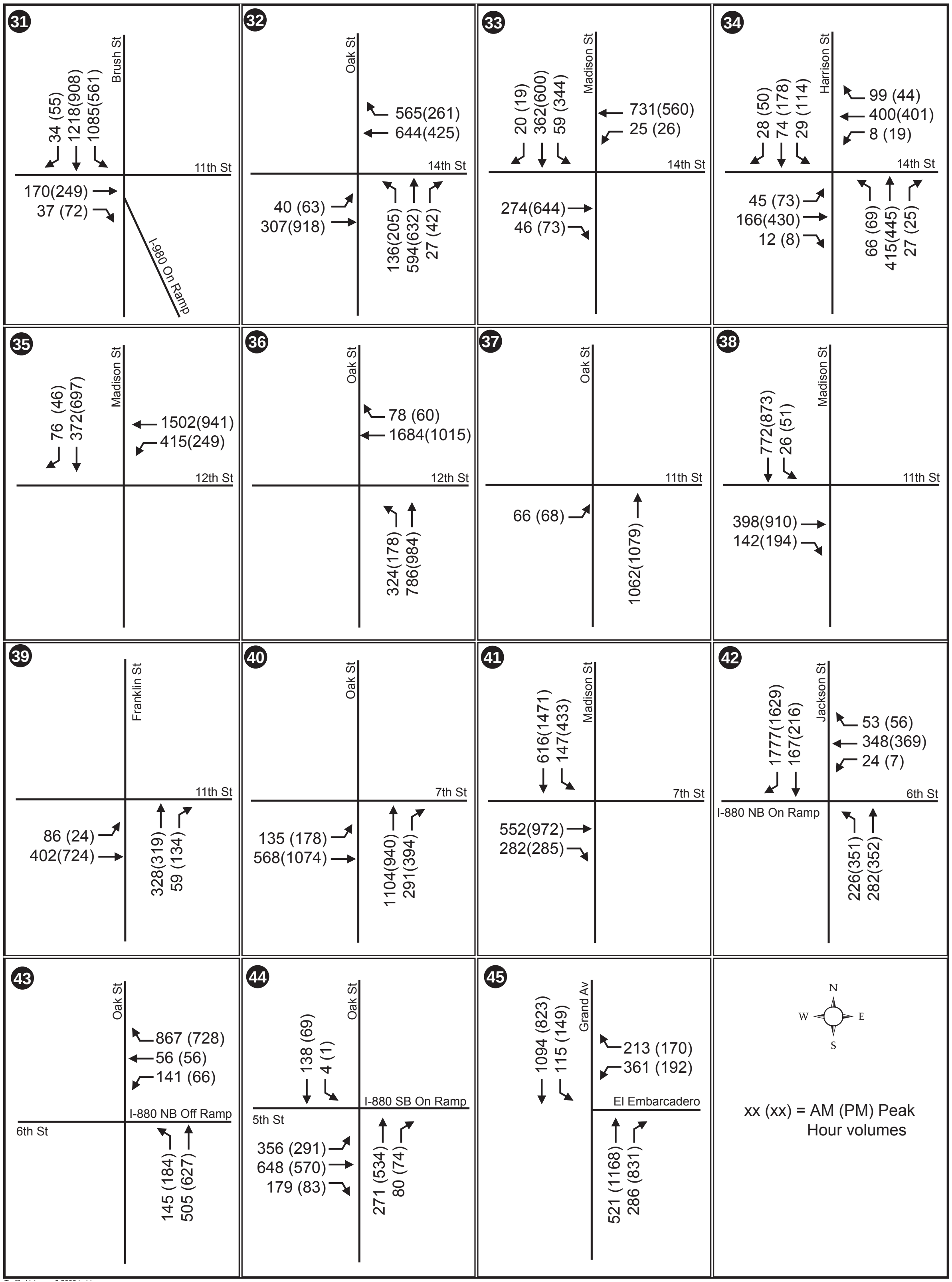
Figure IV.L-15a
Near Term (2015) Without Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

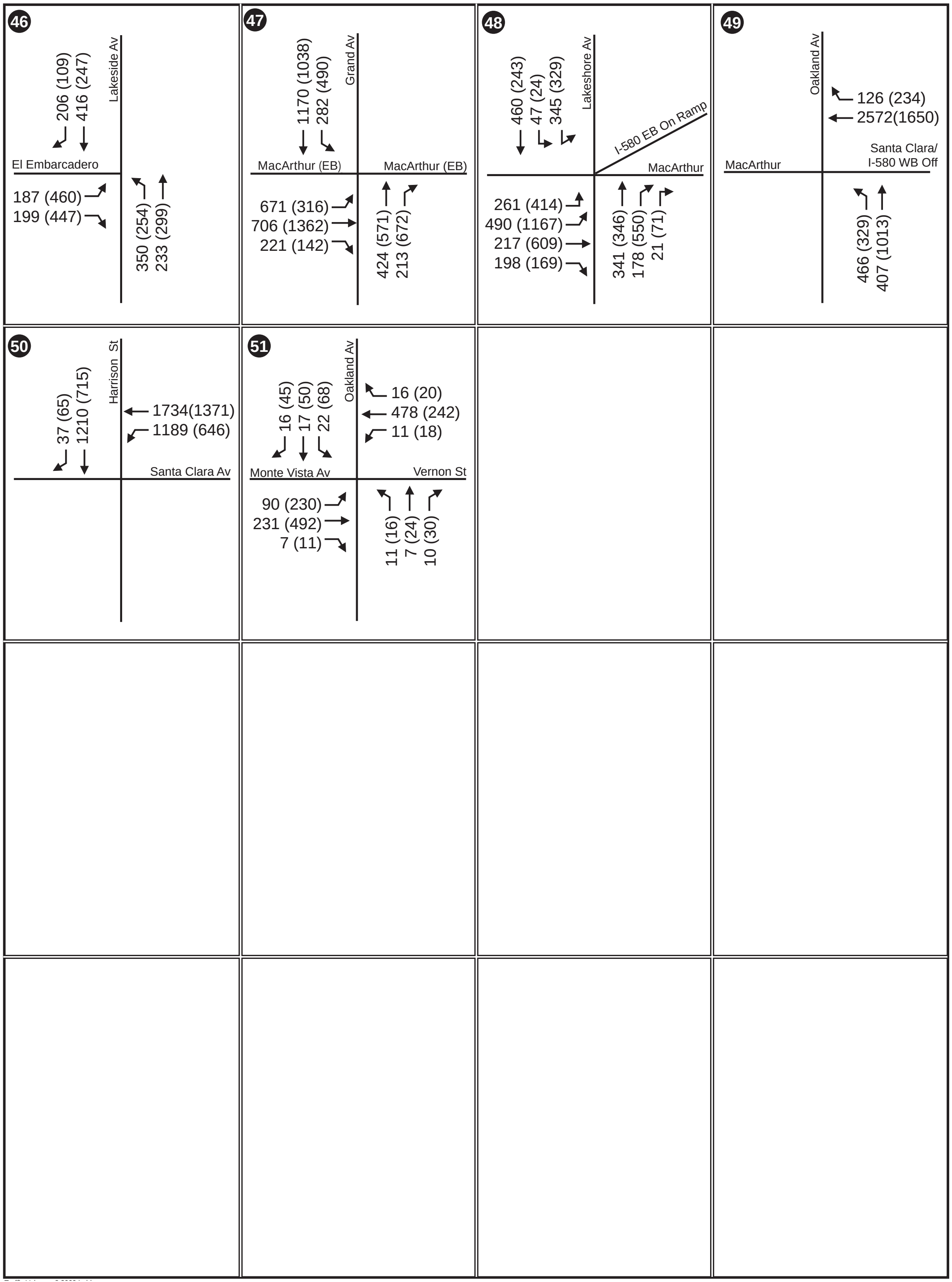
Figure IV.L-15b
Near Term (2015) Without Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-15c
Near Term (2015) Without Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-15d
Near Term (2015) Without Project Traffic Volumes
AM (PM) Peak Hour

For some peak hours, intersection delays at Intersection #45 (Grand Avenue / El Embarcadero) and Intersection #46 (Lakeshore Avenue / El Embarcadero) are lower in Near-Term (2015) without Project conditions than in Existing Conditions because the Existing Conditions analysis uses counts conducted before the Measure DD improvements were constructed. As construction of the improvements at these locations and adjacent roadways is still ongoing as of November 2009, drivers have yet to adjust to new traffic patterns and travel behavior.

Near-Term (2015) without Project Roadway Operating Conditions

A roadway facility operating at LOS F indicates that the facility is over-capacity (i.e., v/c ratio is greater than 1.00). The following two of the 11 roadway segments would operate at LOS F under Near-Term (2015) without Project conditions; detailed calculations for the roadway segment analysis are included in **Appendix G.9**:

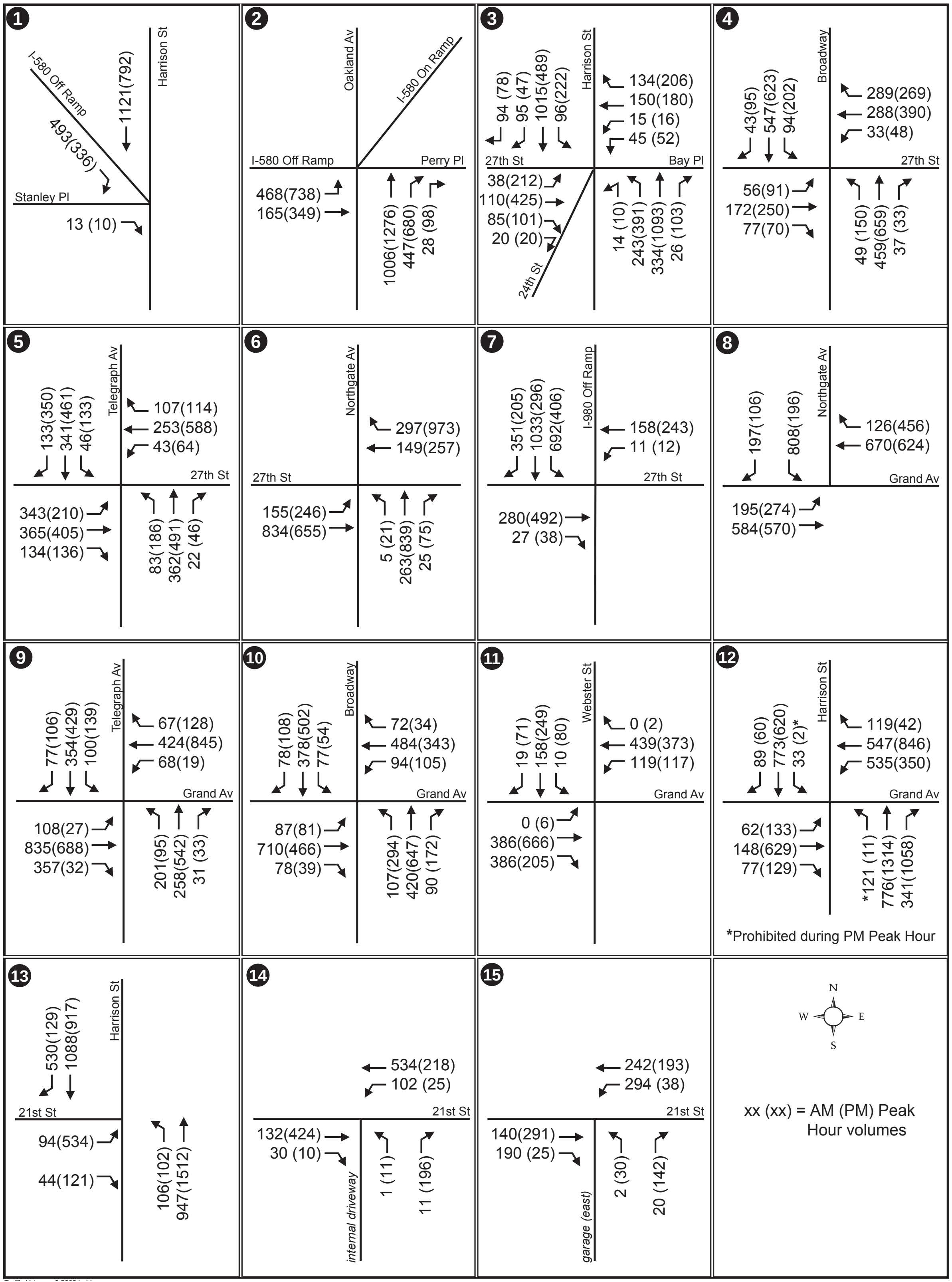
- <u>Non-Caltrans roadways</u>
  9. Grand Avenue, from Harrison Street to El Embarcadero (*eastbound, PM peak hour*)
  10. Harrison Street, from I-580 to 27th Street (*northbound, PM peak hour*)

Near-Term (2015) plus Project (Phase I) Conditions

Intersection Impacts

Impact TRANS-3: Phase I of the proposed Project, when added to projected 2015 traffic levels, would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-3a through TRANS-3e)

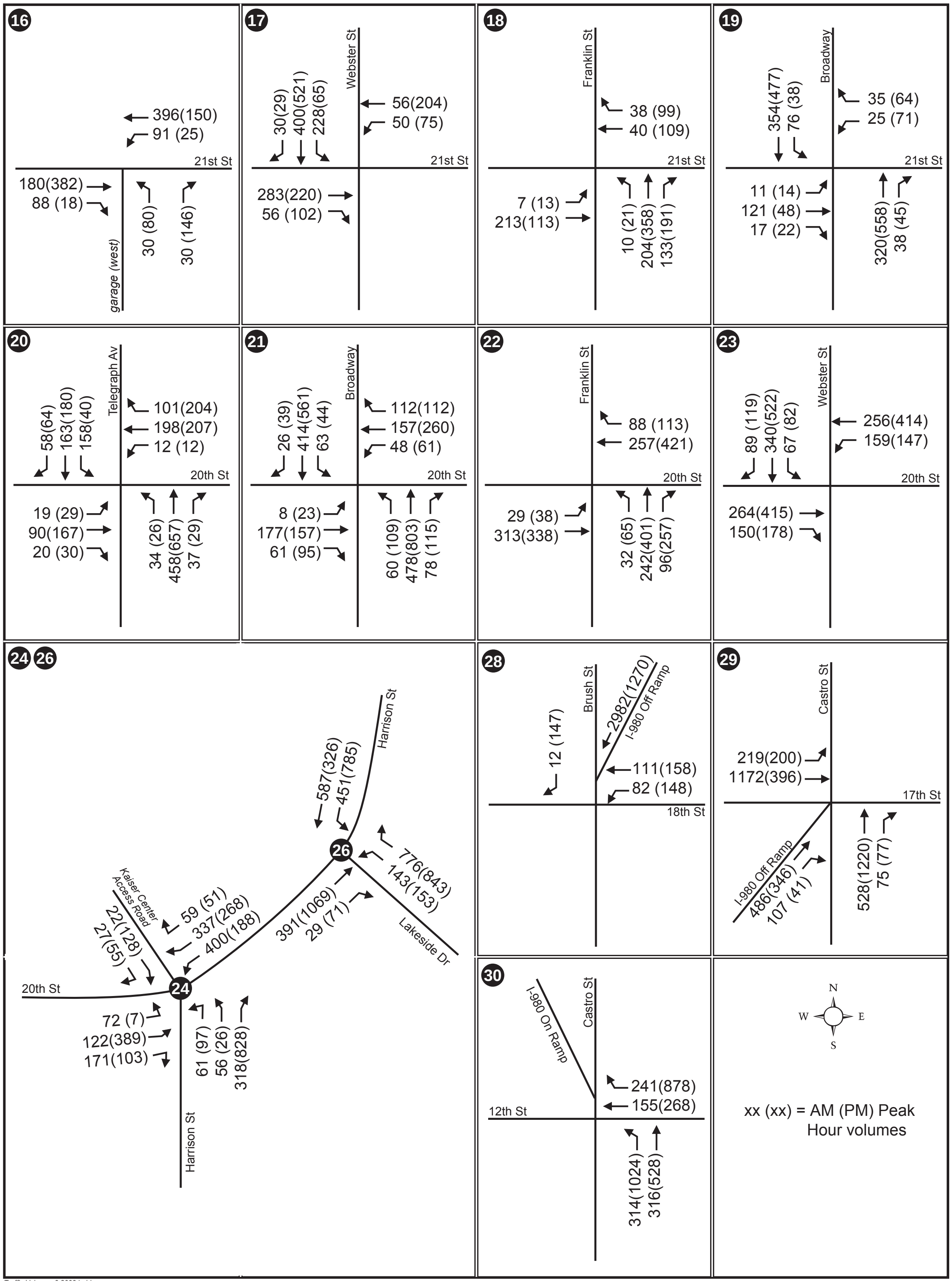
Near-Term (2015) plus Project (Phase I) conditions traffic volumes are illustrated in **Figure IV.L-16**. **Table IV.L-12** summarizes the peak hour LOS at the 51 study intersections under Near-Term (2015) plus Project (Phase I) conditions.



SOURCE: AECOM

Kaiser Oakland . 206213

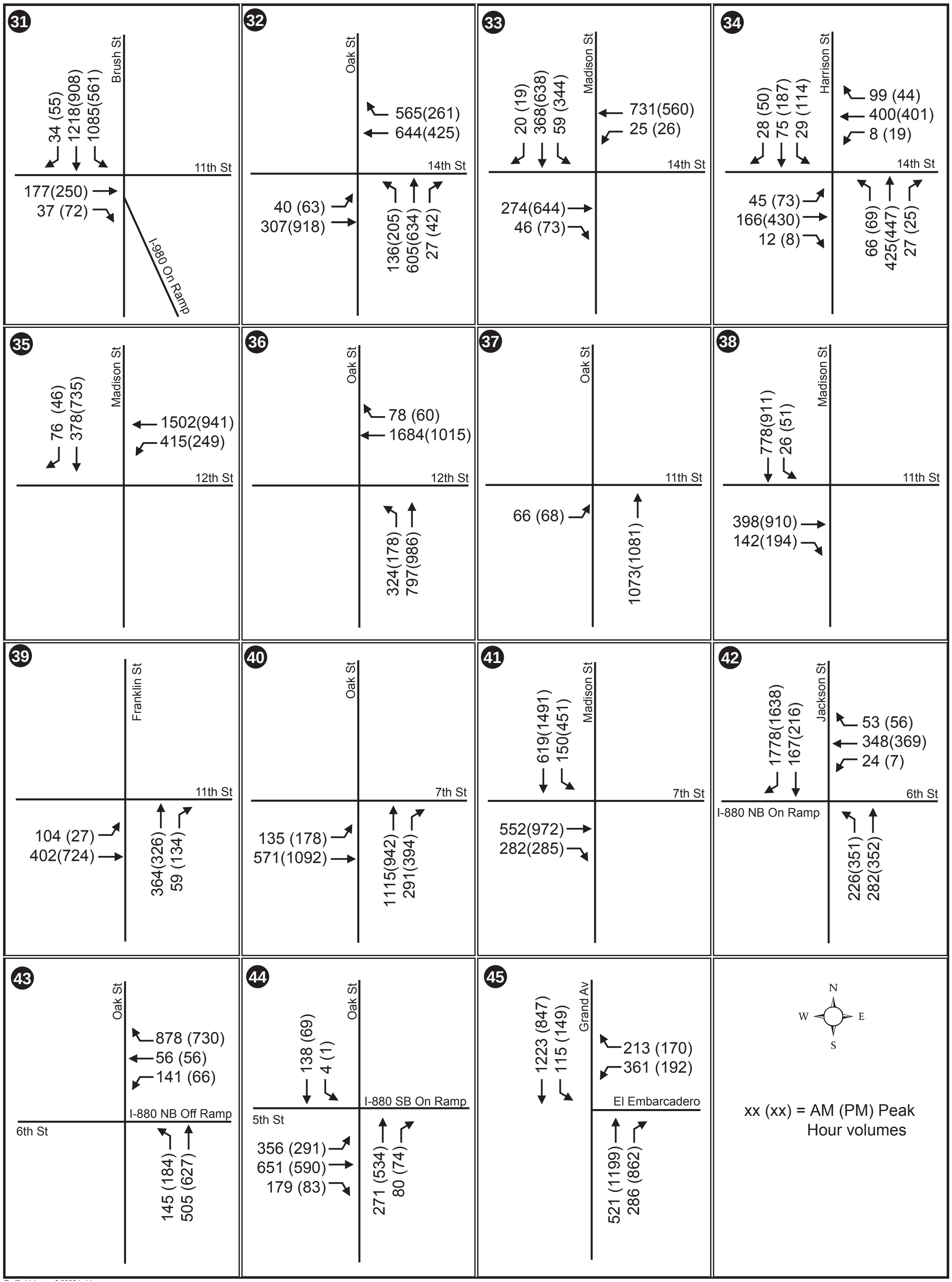
Figure IV.L-16a
Near Term (2015) Plus Project (Phase I) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

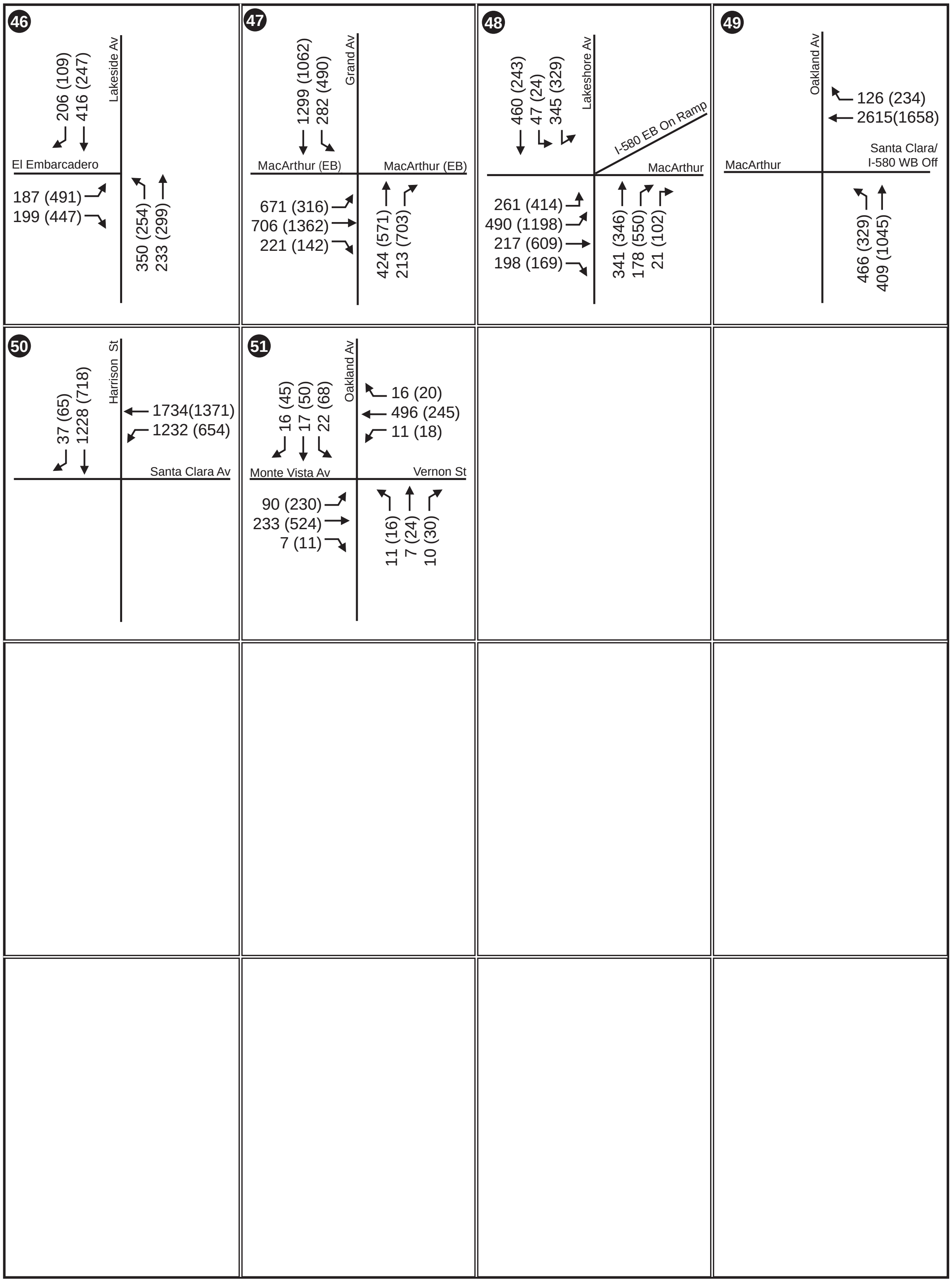
Figure IV.L-16b
Near Term (2015) Plus Project (Phase I) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-16c
Near Term (2015) Plus Project (Phase I) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-16d

Near Term (2015) Plus Project (Phase I) Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-12
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE (LOS)

No.	Intersection	Traffic Control[a]	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	TWSC	D	28.3	B	14.2	D	30.8	B	14.2
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	C	32.8	F	>120	D	38.8	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.5	E	59.3	C	28.6	**E**	**76.6**
4	Broadway / 27th Street	Signal	B	16.0	C	20.3	B	16.2	C	21.0
5	Telegraph Ave. / 27th St.	Signal	B	19.5	D	37.9	B	19.8	D	45.4
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	10.7	B	12.3	B	10.8	B	13.4
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	13.4	B	11.7	B	13.8	B	11.7
45	Grand Avenue / El Embarcadero	Signal	C	20.0	F	>120	B	19.8	F	>120
46	Lakeshore Avenue / El Embarcadero	Signal	B	17.4	B	17.3	B	17.4	B	18.0
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.3	F	>120	D	41.0	F	>120
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	27.7	F	>120	C	27.7	F	>120
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	E	59.7	B	16.4	**E**	**65.4**	B	16.6
50	Harrison Street / MacArthur Blvd. (WB)	Signal	D	46.6	B	17.9	D	48.9	B	17.9
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	14.7	C	21.3	C	15.6	D	25.4
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	23.2	B	17.1	C	23.9	B	17.4
9	Telegraph Avenue / West Grand Avenue	Signal	C	26.6	D	36.3	C	27.7	D	42.6
10	Broadway / Grand Avenue	Signal	C	20.9	B	18.0	C	21.3	B	18.7
11	Webster St. / Grand Ave.	Signal	C	29.8	C	25.6	C	31.2	C	25.9
12	Harrison St. / Grand Ave.	Signal	C	29.6	F	84.9	D	37.9	**F**	**97.9**
13	Harrison St. / 21st Street	Signal	A	7.2	B	15.0	A	9.4	C	23.1
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.7	B	11.4	B	10.1	C	15.6
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.6	B	11.8	B	11.9	B	13.6
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.0	B	11.6	B	14.1	B	12.3
17	Webster St. / 21st St.	Signal	B	13.5	B	18.7	B	14.2	B	18.6
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.1	A	9.9	B	10.9

See next page for table footnotes.

TABLE IV.L-12 (Continued)
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE (LOS)

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
19	Broadway / 21st Street	Signal	B	10.3	B	11.3	B	10.6	B	11.4
20	Telegraph Ave. / 20th St.	Signal	B	12.1	B	11.7	B	12.3	B	11.5
21	Broadway / 20th Street	Signal	B	13.8	B	19.9	B	13.9	C	20.0
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.9	B	13.7	B	14.6
23	Webster St. / 20th St.	Signal	C	24.2	C	22.5	C	22.0	C	22.5
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	26.5	C	20.9	D	36.8	**F**	**90.3**
25	Kaiser Ctr. Access Road / 20th Street[c]	SSSC	A	9.8	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	B	18.3	C	24.2	B	17.6	C	24.1
27	Lakeside Dr. / 20th St.[d]	Signal	--	--	--	--	**--**	**--**	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	6.2	A	9.1	A	6.2	A	9.2
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	29.1	C	25.3	C	29.1	C	25.3
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.3	B	17.3	C	21.3	B	17.3
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	D	37.9	B	16.3	D	37.9	B	16.3
32	Oak Street / 14th Street	Signal	C	24.3	D	45.2	C	24.7	D	45.1
33	Madison St. / 14th St.	Signal	B	10.1	B	10.8	B	10.1	B	10.8
34	Harrison St. / 14th St.	Signal	A	9.5	B	10.0	A	9.5	B	10.0
35	Madison St. / 12th St.	Signal	A	8.4	A	7.8	A	8.4	A	8.2
36	Oak Street / 12th Street	Signal	B	13.7	B	13.4	B	13.7	B	13.4
37	Oak Street / 11th Street	SSSC	B	10.9	B	11.1	B	10.9	B	11.1
38	Madison St. / 11th St.	Signal	B	12.2	B	10.3	B	12.2	B	10.1
39	Franklin St. / 11th St.	Signal	B	14.1	B	14.6	B	14.0	B	14.6
40	Oak Street / 7th Street	Signal	A	9.5	B	15.1	A	9.5	B	15.1
41	Madison St. / 7th St.	Signal	A	9.1	B	15.1	A	9.1	B	15.9
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	B	18.0	B	13.0	B	18.5	B	13.0
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	117.5	F	>120	F	119.1	F	>120

Bold indicates significant impact.

[a] SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection
[b] The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.
[c] The Project would eliminate this intersection.
[d] After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2009.

Average delay at some intersections would decrease under Near-Term (2015) plus Project (Phase I) conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table IV.L-12, the following intersections would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I) conditions:

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street / Bay Place (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS E in AM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in PM peak hour)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

The Project (Phase I) would not result in a significant impact at the following intersections:

- #42: Jackson Street / 6th Street / I-880 Northbound On-Ramp (AM / PM). Although the intersection would operate at LOS F during the both the AM and PM peak hours under both Near-Term (2015) without Project conditions and Near-Term (2015) plus Project (Phase I) conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.

- #44: Oak Street / 5th Street / I-880 Southbound On-Ramp (AM / PM). Although the intersection would operate at LOS F during both the AM and PM peak hours under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would not cause an increase in average intersection delay greater than two seconds or an increase in critical movement delay greater than four seconds (in the AM peak hour), or an increase in v/c ratio of more than two percent, i.e., not above the three percent threshold (in the PM peak hour).

- #45: Grand Avenue / El Embarcadero (PM). Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of three percent, i.e., not above the threshold of significance.

- #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp (PM). Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of three percent, i.e., not above the threshold of significance.

- #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM). Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than two percent, i.e., not above the three percent threshold.

Impacts due to the Project (Phase I) at the remaining intersections above are discussed below.

Impact TRANS-3a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection operates with a v/c ratio of 1.18 under Near-Term (2015) without Project Conditions and would operate with a v/c ratio of 1.25 under Near-Term (2015) plus Project (Phase I) Conditions for the PM peak hour. Because the increase in v/c ratio would be 7 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-3a: Implement Mitigation Measure TRANS-1a.

After implementation of this measure, conditions at this intersection (located within the Downtown area) would remain at an unacceptable LOS, and the Project impact would not be mitigated. As discussed for Impact TRANS-1a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, this impact is significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3b: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (2015), which would operate at an unacceptable LOS E during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-3b: Implement Mitigation Measure TRANS-1b.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

As discussed for Mitigation Measure TRANS-1b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion. As a result, this impact is conservatively deemed significant and unavoidable.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3c: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-3c: Implement the following measures at the Harrison Street / Grand Avenue intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

- 2070L Type Controller
- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane along Grand Avenue. As these improvements would result in substantial secondary impacts such as pedestrian / bicycle safety and driver visibility issues, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3d: Phase I of the proposed Project, when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (2015). (Significant)

Mitigation Measure TRANS-3d: Implement Mitigation Measure TRANS-1c.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant. If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I) Conditions (under Alternative

Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I) impacts at this location would be Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-3e: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour at *Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp)* (2015), which would operate at an unacceptable LOS E during the AM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-3e: Implement the following measures at the Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp intersection:

- Restripe the northeast Oakland Avenue approach from the current configuration of one shared through-left lane and two through lanes to one exclusive left-turn lane, one shared through-left lane, and one through lane.
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps

- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS C in the AM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Roadway Impacts

Impact TRANS-4: Phase I of the proposed Project, when added to projected 2015 traffic levels, would worsen level of service conditions on area roadway segments. (Significant on road segment described below under Impact TRANS-4a)

Table IV.L-13 summarizes peak hour LOS for the study roadway segments under Near-Term (2015) plus Project (Phase I) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-13, the Non-Caltrans roadway segments on eastbound Grand Avenue (#9, Harrison Street to El Embarcadero), and on northbound Harrison Street / Oakland Avenue (#10, I-580 to 27th Street) would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions. However, the Project impact on the Grand Avenue

TABLE IV.L-13
NEAR-TERM (2015) PLUS PROJECT (PHASE I) ROADWAY SEGMENT LEVELS OF SERVICE

					Near-Term (2015) without Project Conditions						Near-Term (2015) plus Project (Phase I) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Capacity (veh/h)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	**SR 260 (Posey / Webster Tubes)**	NB	2	3,400	E	3,386	1.00	D	2,906	0.85	E	3,389	1.00	D	2,907	0.86
	from Alameda city limits to I-880	SB	2	3,400	C	2,108	0.62	D	2,950	0.87	C	2,109	0.62	D	2,958	0.87
2	**I-880**	EB	4	8,000	B	3,303	0.41	B	3,234	0.40	B	3,344	0.42	B	3,241	0.41
	from Market Street to I-980	WB	4	8,000	B	3,939	0.49	B	3,610	0.45	B	3,944	0.49	B	3,646	0.46
3	**I-880**	EB	4	8,000	D	5,705	0.71	D	6,401	0.80	D	5,711	0.71	D	6,441	0.81
	from Oak Street to 5th Avenue	WB	4	8,000	D	6,312	0.79	D	5,727	0.72	D	6,357	0.79	D	5,735	0.72
4	**I-980**	NB	3	6,000	B	1,821	0.30	C	3,973	0.66	B	1,836	0.31	C	4,070	0.68
	from 27th Street to 29th Street	SB	3	6,000	D	5,280	0.88	B	2,208	0.37	D	5,333	0.89	B	2,218	0.37
Non-Caltrans Facilities																
5	**Broadway**	NB	2	1,800	B	606	0.34	C	1,042	0.58	B	617	0.34	C	1,114	0.62
	from 19th Street to Grand Avenue	SB	2	1,800	A	517	0.29	B	710	0.39	B	551	0.31	B	717	0.40
6	**Telegraph Avenue**	NB	2	1,800	B	576	0.32	B	879	0.49	B	578	0.32	B	890	0.49
	from 20th Street to 27th Street	SB	2	1,800	B	779	0.43	B	672	0.37	B	779	0.43	B	674	0.37
7	**West Grand Avenue**	EB	2	1,800	C	1,241	0.69	B	841	0.47	D	1,300	0.72	B	844	0.47
	from Telegraph Ave. to S. Pablo Ave.	WB	2	1,800	B	791	0.44	C	1,011	0.56	B	796	0.44	C	1,046	0.58
8	**Grand Avenue**	EB	2	1,800	B	803	0.45	B	891	0.49	B	877	0.49	B	891	0.49
	from Broadway to Harrison Street	WB	2	1,800	B	758	0.42	C	917	0.51	B	758	0.42	C	917	0.51
9	**Grand Avenue**	EB	2	1,800	B	807	0.45	F	1,998	1.11	B	807	0.45	F	2,060	1.14
	from Harrison St. to El Embarcadero	WB	2	1,800	D	1,455	0.81	C	1,014	0.56	E	1,584	0.88	C	1,038	0.58
10	**Harrison Street / Oakland Avenue**	NB	2	1,800	D	1,453	0.81	F	1,939	1.08	D	1,480	0.82	**F**	**2,054**	**1.14**
	from I-580 to 27th Street	SB	2	1,800	C	1,225	0.68	B	821	0.46	D	1,301	0.72	B	835	0.46
11	**Harrison Street**	NB	3	2,700	B	922	0.34	B	1,326	0.49	B	957	0.35	C	1,490	0.55
	from 27th Street to Grand Avenue	SB	3	2,700	B	1,057	0.39	A	666	0.25	B	1,144	0.42	A	682	0.25
12	**Harrison Street**	NB	2	1,800	B	559	0.31	C	947	0.53	B	569	0.32	C	952	0.53
	from 20th Street to 14th Street	SB	2	1,800	B	570	0.32	A	342	0.19	B	570	0.32	A	351	0.20

Bold indicates significant impact.

SOURCE: AECOM, 2009.

segment would be less than significant because the addition of Project-generated traffic (Phase I) would not cause an increase in v/c ratio greater than the three percent threshold of significance.

Impact TRANS-4a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-4a: Implement Mitigation Measure TRANS-2b.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2b, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Intersection Impacts

Impact TRANS-5: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-5a through TRANS-5j)

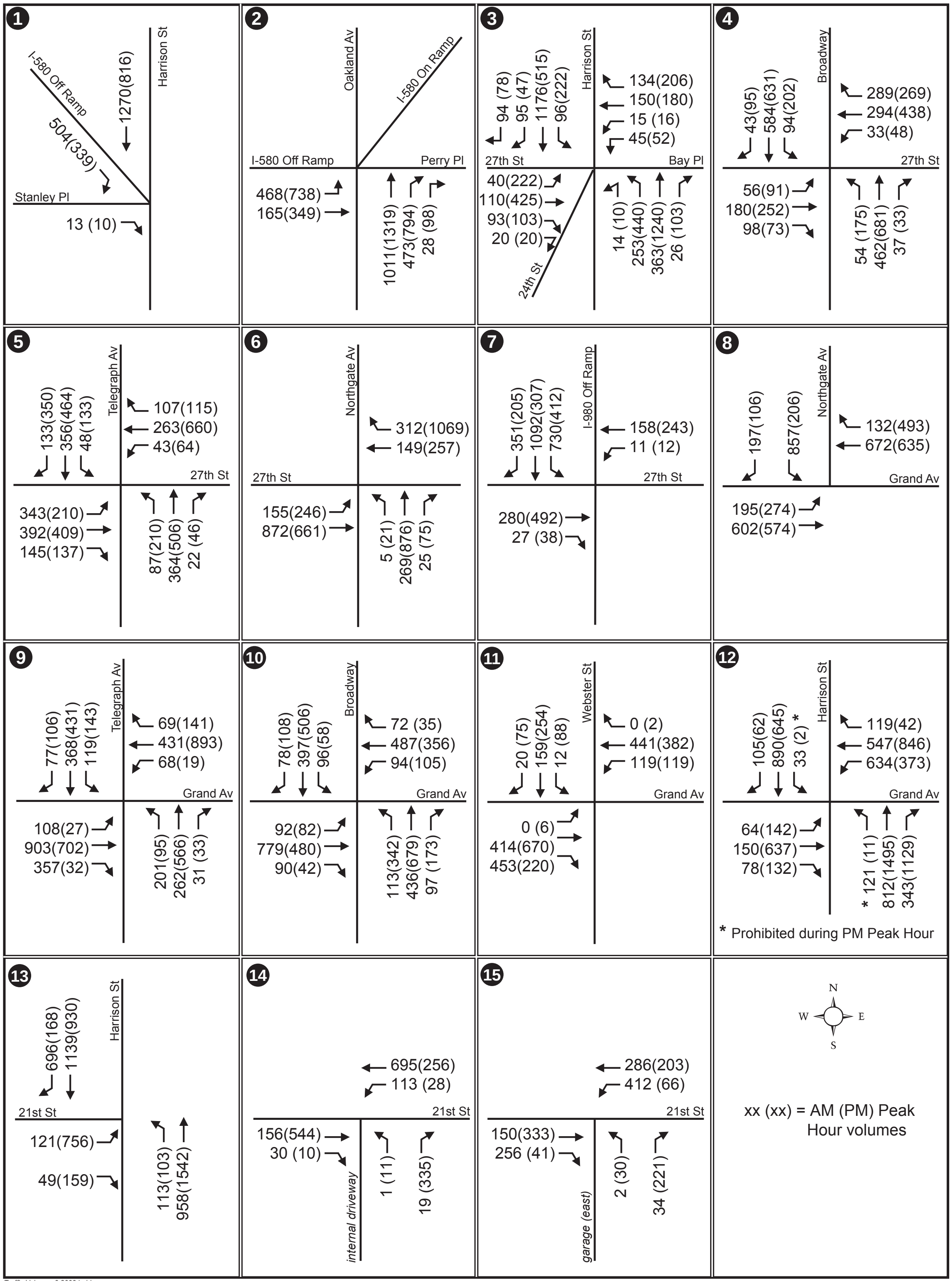
Near-Term (2015) plus Project (Phase I and Phase II) Conditions traffic volumes are illustrated in **Figure IV.L-17**. **Table IV.L-14** summarizes the peak hour LOS at the 51 study intersections under Near-Term (2015) plus Project (Phase I and Phase II) Conditions.

Average delay at some intersections would decrease under Near-Term (2015) plus Project (Phase I and II) Conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table IV.L-14, the following intersections would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I and Phase II) Conditions:

Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (LOS E in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street / Bay Place (LOS F in PM peak hour)

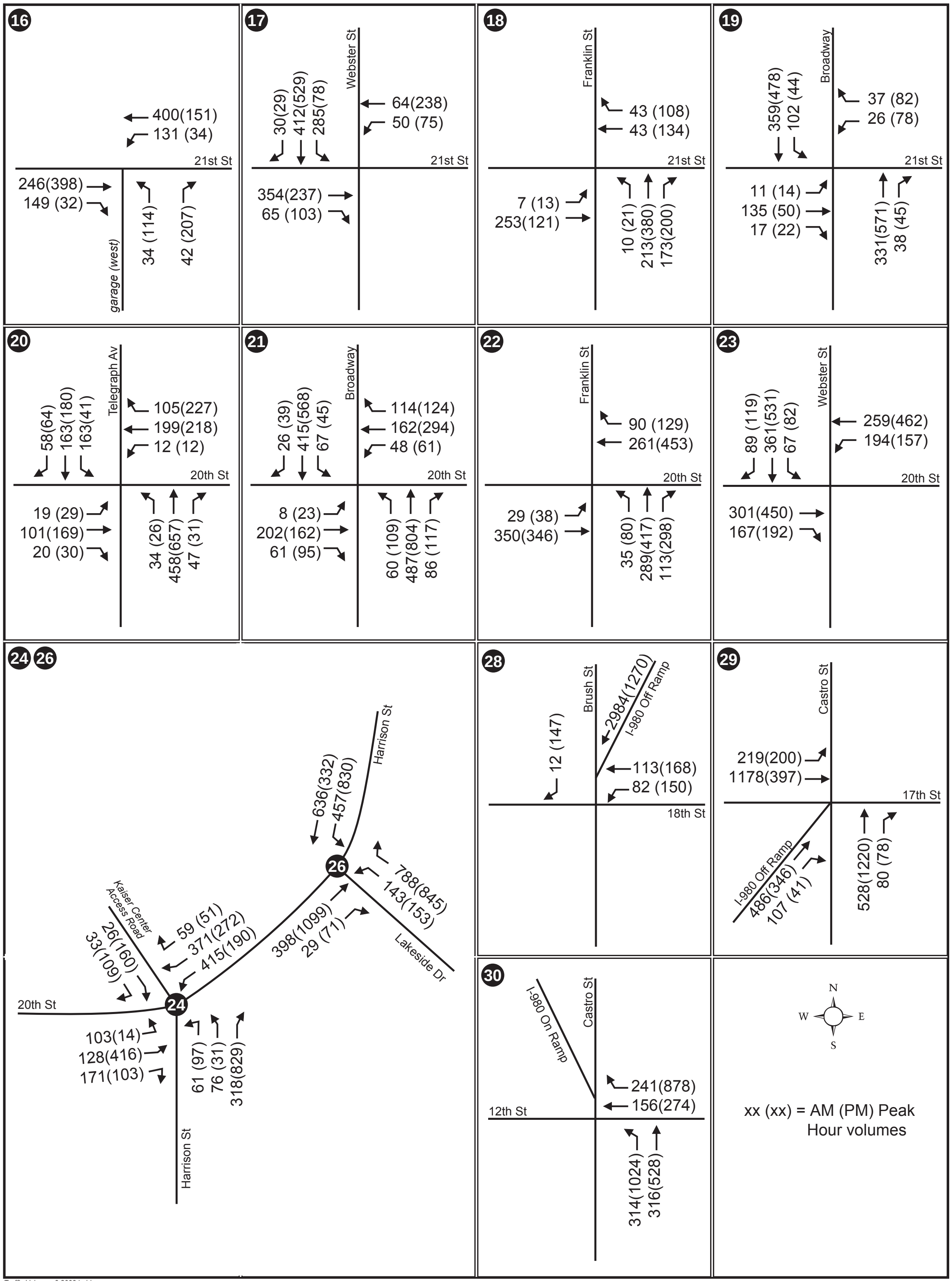


SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-17a

Near Term (2015) Plus Project (Phase I&II) Traffic Volumes AM (PM) Peak Hour

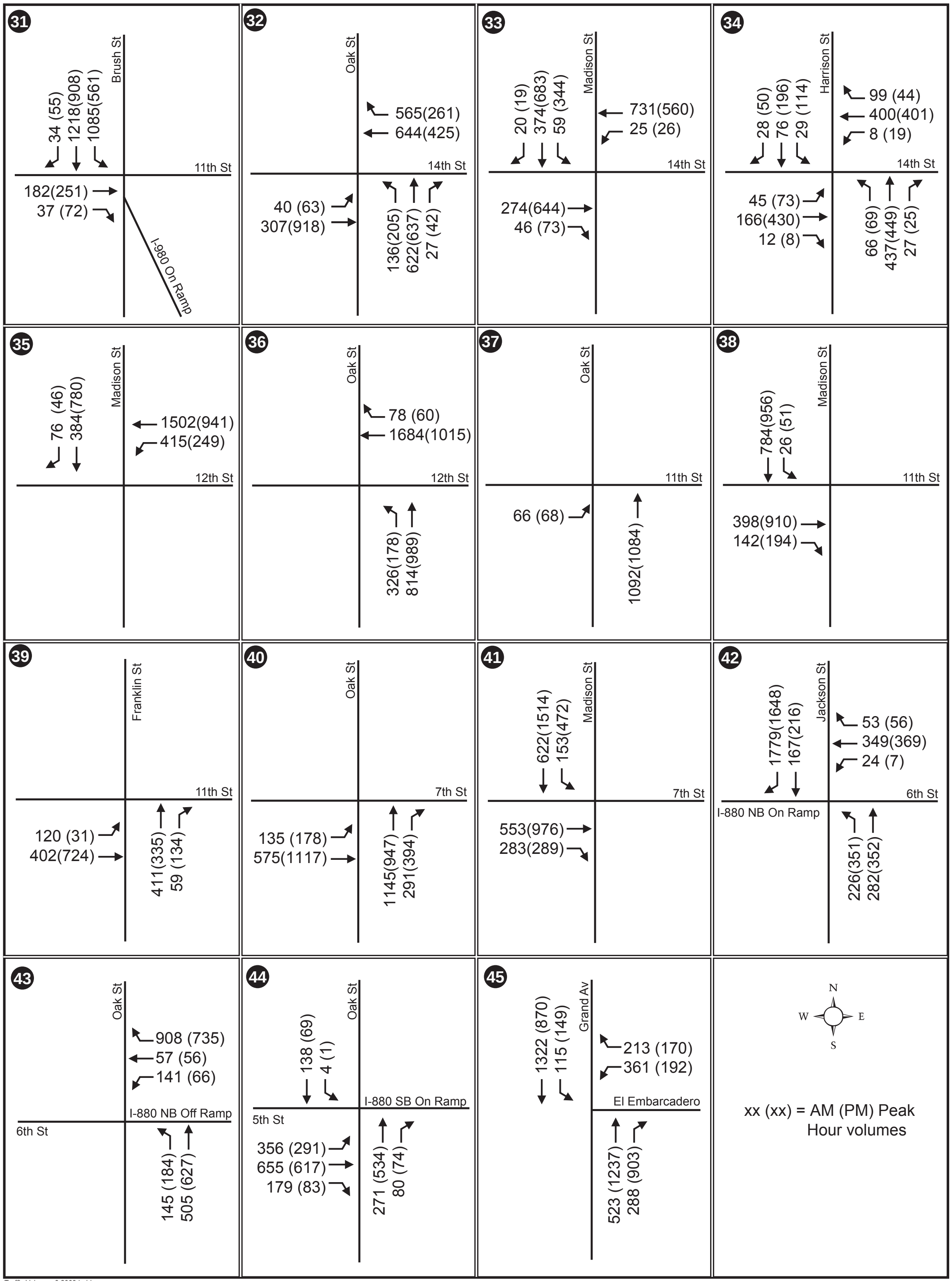


SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-17b

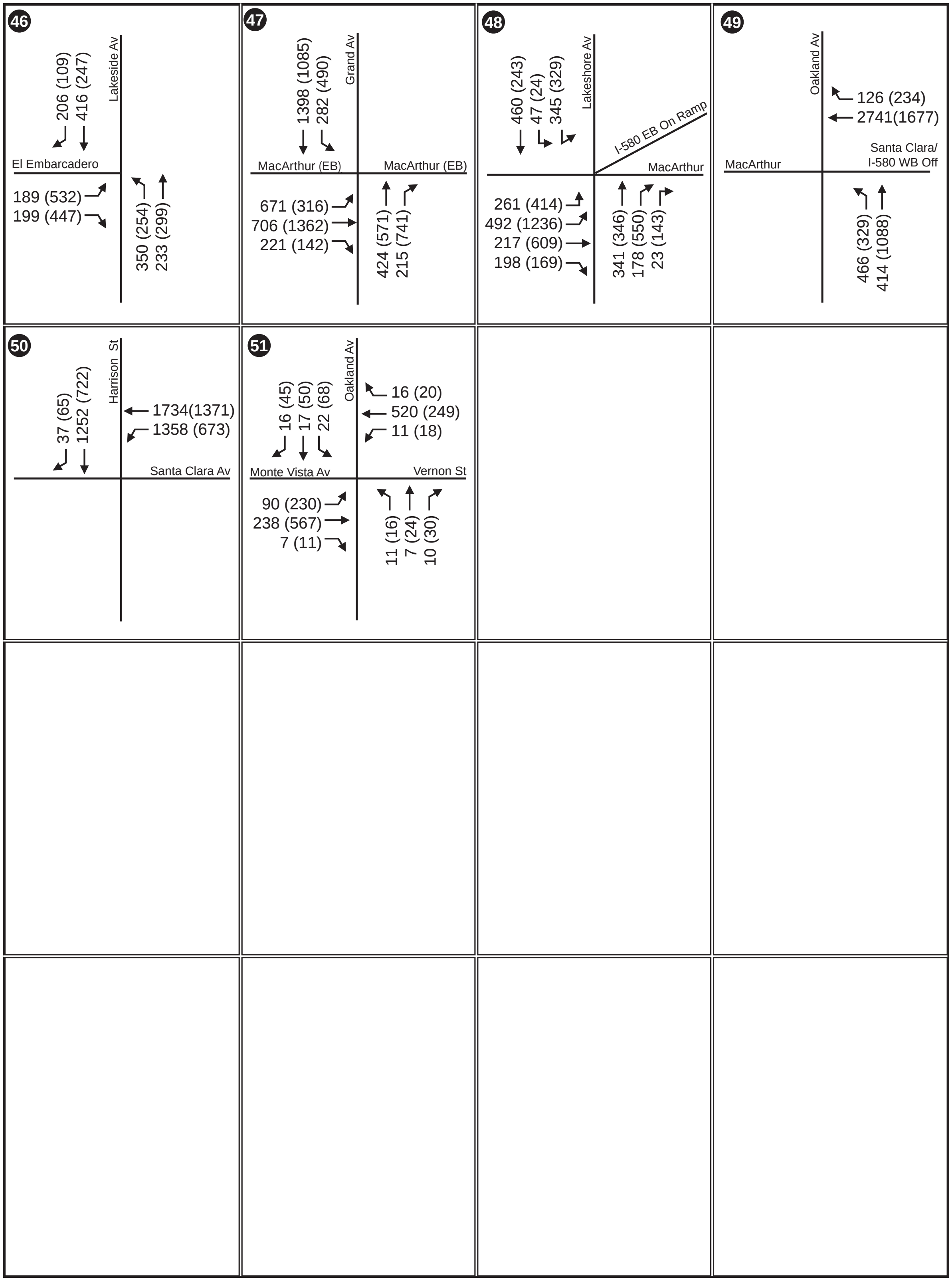
Near Term (2015) Plus Project (Phase I&II) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-17c
Near Term (2015) Plus Project (Phase I&II) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-17d

Near Term (2015) Plus Project (Phase I&II) Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-14
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	SSSC	D	28.3	B	14.2	E	45.4	B	14.6
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	C	32.8	F	>120	D	45.8	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.5	E	59.3	C	33.3	**F**	**102.1**
4	Broadway / 27th Street	Signal	B	16.0	C	20.3	B	16.6	C	22.7
5	Telegraph Avenue / 27th Street	Signal	B	19.5	D	37.9	B	19.6	**E**	**60.9**
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	10.7	B	12.3	B	11.2	B	16.6
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	13.4	B	11.7	B	14.6	B	11.7
45	Grand Avenue / El Embarcadero	Signal	C	20.0	F	>120	B	19.8	**F**	**>120**
46	Lakeshore Avenue / El Embarcadero	Signal	B	17.4	B	17.3	B	17.4	B	19.0
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.3	F	>120	D	41.1	**F**	**>120**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	27.7	F	>120	C	27.7	**F**	**>120**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	E	59.7	B	16.4	**F**	**82.7**	B	17.0
50	Harrison Street / MacArthur Blvd. (WB)	Signal	D	46.6	B	17.9	D	52.0	B	18.1
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	14.7	C	21.3	C	17.1	D	33.3
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	23.2	B	17.1	C	24.7	B	17.8
9	Telegraph Avenue / West Grand Avenue	Signal	C	26.6	D	36.3	C	29.6	D	52.4
10	Broadway / Grand Avenue	Signal	C	20.9	B	18.0	C	21.9	C	20.4
11	Webster St. / Grand Ave.	Signal	C	29.8	C	25.6	C	31.2	C	26.3
12	Harrison St. / Grand Ave.	Signal	C	29.6	F	84.9	D	52.4	**F**	**115.1**
13	Harrison St. / 21st St.	Signal	A	7.2	B	15.0	B	10.2	D	51.3
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.7	B	11.4	B	10.2	D	34.6
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.6	B	11.8	B	13.2	C	17.1
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.0	B	11.6	C	16.8	B	13.2
17	Webster St. / 21st St.	Signal	B	13.5	B	18.7	B	14.9	B	18.6

See next page for table footnotes.

TABLE IV.L-14 (Continued)
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.1	A	9.8	B	10.7
19	Broadway / 21st Street	Signal	B	10.3	B	11.3	B	10.9	B	11.4
20	Telegraph Ave. / 20th St.	Signal	B	12.1	B	11.7	B	12.5	B	11.3
21	Broadway / 20th Street	Signal	B	13.8	B	19.9	B	14.0	C	20.2
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.9	B	14.4	B	14.8
23	Webster St. / 20th St.	Signal	C	24.2	C	22.5	C	21.5	C	23.1
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	26.5	C	20.9	D	38.6	**F**	**93.6**
25	Kaiser Ctr. Access Rd. / 20th Street[c]	SSSC	A	9.8	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	B	18.3	C	24.2	B	17.1	C	26.0
27	Lakeside Dr. / 20th St.[d]	Signal	--	--	--	--	--	--	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	6.2	A	9.1	A	6.2	A	9.3
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	29.1	C	25.3	C	30.0	C	25.3
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.3	B	17.3	C	21.3	B	17.3
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	D	37.9	B	16.3	D	37.8	B	16.3
32	Oak Street / 14th Street	Signal	C	24.3	D	45.2	C	25.3	D	45.1
33	Madison St. / 14th St.	Signal	B	10.1	B	10.89	B	10.1	B	10.9
34	Harrison St. / 14th St.	Signal	A	9.5	B	10.0	A	9.6	B	10.1
35	Madison St. / 12th St.	Signal	A	8.4	A	7.8	A	8.4	A	8.4
36	Oak Street / 12th Street	Signal	B	13.7	B	13.4	B	13.8	B	13.4
37	Oak Street / 11th Street	SSSC	B	10.9	B	11.1	B	11.0	B	11.1
38	Madison St. / 11th St.	Signal	B	12.2	B	10.3	B	12.1	B	10.0
39	Franklin St. / 11th St.	Signal	B	14.1	B	14.6	B	13.7	B	14.5
40	Oak Street / 7th Street	Signal	A	9.5	B	15.1	A	9.7	B	15.2
41	Madison St. / 7th St.	Signal	A	9.1	B	15.1	A	9.2	B	17.2
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	B	18.0	B	13.0	C	20.1	B	13.1
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	117.5	F	>120	**F**	**>120**	**F**	**>120**

Bold indicates significant impact.

[a] SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection
[b] The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.
[c] The Project would eliminate this intersection.
[d] After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2009.

5. Telegraph Avenue / 27th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in PM peak hour)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

The Project would not result in a significant impact at the following intersection:

- #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM)
  Although the side-street service level at this unsignalized intersection would degrade from LOS D to LOS E during the AM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions, the intersection would not satisfy the California MUTCD peak-hour signal warrant.

- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)
  Although the intersection would operate at LOS F during the PM peak hour under both Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.

Impacts due to the Project at the remaining intersections above are discussed below.

Impact TRANS-5a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection operates with a v/c ratio of 1.18 under Near-Term (2015) without Project Conditions and would operate with a v/c ratio of 1.35 under Near-Term (2015) plus Project (Phase I and II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 17 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5a: Implement Mitigation Measure TRANS-1a.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (2015). (Significant)

> **Mitigation Measure TRANS-5b:** Implement Mitigation Measure TRANS-1b.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

As discussed for Mitigation Measure TRANS-1b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion. As a result, this impact is conservatively deemed significant and unavoidable.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5c: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at *Intersection #5 (Telegraph Avenue / 27th Street)* (2015). (Significant)

> **Mitigation Measure TRANS-5c:** Implement the following measures at the Telegraph Avenue / 27th Street intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

- Redesigned the signal plan to give the northbound left-turn movement protected-permitted phasing.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

Significance after Implementation of Mitigation: Less than significant.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5d: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-5d: Implement Mitigation Measure TRANS-3c.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5e: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (2015). (Significant)

Mitigation Measure TRANS-5e: Implement Mitigation Measure TRANS-1c.

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant. If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Near-Term (2015) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Phase I and II) impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5f: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880*

***Southbound On-Ramp)* (2015), which would operate at an unacceptable LOS F during both peak hours under Near-Term (2015) without Project Conditions. (Significant)**

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic during the PM peak hour was instead evaluated. The intersection would operate with a v/c ratio of 1.60 under Near-Term (2015) without Project Conditions and 1.66 under Near-Term (2015) plus Project (Phase I and II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5f: Implement Mitigation Measure TRANS-1d.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1d, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5g: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 0.94 under Near-Term (2015) without Project Conditions and 1.00 under Near-Term (2015) plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5g: Implement Mitigation Measure TRANS-1e.

After implementation of this measure, the intersection (located outside the Downtown area) would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than significant under Near-Term (2015) without Project conditions, mitigating the Project's impacts at this intersection.

Significance after Implementation of Mitigation: Less than significant.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5h: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp)* (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.31 under Near-Term (2015) without Project Conditions and 1.37 under Near-Term (2015) plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5h: Implement Mitigation Measure TRANS-1f.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1f, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5i: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)* (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.19 under Near-Term (2015) without Project Conditions and 1.24 under Near-Term (2015) plus Project (Phase I and Phase II) Conditions for the PM peak hour. Because the increase in v/c ratio would be 5 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-5i: Implement the following measures at the Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane along Lakeshore Avenue. However, this improvement could present safety issues for pedestrians in the east crosswalk and would conflict with improvements currently being constructed as part of the Lakeshore Avenue Complete Streets Project, which would install a bulbout on the southeast corner of the intersection. Therefore, there are no feasible measures to completely mitigate the Project's impacts and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-5j: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp)* (2015). (Significant)

Mitigation Measure TRANS-5j: Implement Mitigation Measure TRANS-3e.

After implementation of the mitigation measure, the intersection would operate at LOS C in the AM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Near-Term (2015) plus Project (Phase I) Conditions.

Roadway Impacts

Impact TRANS-6: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would worsen level of service conditions on area roadway segments. (Significant at intersections described below under Impacts TRANS-6a and TRANS-6b)

Table IV.L-15 summarizes peak hour LOS for the study roadway segments under Near-Term (2015) plus Project (Phase I and Phase II) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-15, the Non-Caltrans roadway segments on eastbound Grand Avenue (#9, Harrison Street to El Embarcadero), and on northbound Harrison Street / Oakland Avenue (#10, 27th Street to I-580) would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and II) Conditions.

TABLE IV.L-15
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE

					Near-Term (2015) without Project Conditions						Near-Term (2015) plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Capacity (veh/h)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	**SR 260 (Posey / Webster Tubes)** from Alameda city limits to I-880	NB	2	3,400	E	3,386	1.00	D	2,906	0.85	E	3,391	1.00	D	2,909	0.86
		SB	2	3,400	C	2,108	0.62	D	2,950	0.87	C	2,110	0.62	D	2,951	0.87
2	**I-880** from Market Street to I-980	EB	4	8,000	B	3,303	0.41	B	3,234	0.40	B	3,397	0.42	B	3,251	0.41
		WB	4	8,000	B	3,939	0.49	B	3,610	0.45	B	3,952	0.49	B	3,696	0.46
3	**I-880** from Oak Street to 5th Avenue	EB	4	8,000	D	5,705	0.71	D	6,401	0.80	D	5,720	0.72	D	6,495	0.81
		WB	4	8,000	D	6,312	0.79	D	5,727	0.72	D	6,416	0.80	D	5,747	0.72
4	**I-980** from 27th Street to 29th Street	NB	3	6,000	B	1,821	0.30	C	3,973	0.66	B	1,857	0.31	C	4,206	0.70
		SB	3	6,000	D	5,280	0.88	B	2,208	0.37	E	5,433	0.91	B	2,235	0.37
Non-Caltrans Facilities																
5	**Broadway** from 19th Street to Grand Avenue	NB	2	1,800	B	606	0.34	C	1,042	0.58	B	646	0.36	C	1,195	0.66
		SB	2	1,800	A	517	0.29	B	710	0.39	B	582	0.32	B	724	0.40
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	2	1,800	B	576	0.32	B	879	0.49	B	582	0.32	C	913	0.51
		SB	2	1,800	B	779	0.43	B	672	0.37	B	793	0.44	B	680	0.38
7	**West Grand Avenue** from Telegraph Ave. to S. Pablo Ave.	EB	2	1,800	C	1,241	0.69	B	841	0.47	D	1,368	0.76	B	848	0.47
		WB	2	1,800	B	791	0.44	C	1,011	0.56	B	804	0.45	C	1,094	0.61
8	**Grand Avenue** from Broadway to Harrison Street	EB	2	1,800	B	803	0.45	B	891	0.49	C	972	0.54	C	911	0.51
		WB	2	1,800	B	758	0.42	C	917	0.51	B	774	0.43	C	919	0.51
9	**Grand Avenue** from Harrison St. to El Embarcadero	EB	2	1,800	B	807	0.45	F	1,998	1.11	B	811	0.45	**F**	**2,139**	**1.19**
		WB	2	1,800	D	1,455	0.81	C	1,014	0.56	E	1,683	0.93	C	1,061	0.59
10	**Harrison Street / Oakland Avenue** from I-580 to 27th Street	NB	2	1,800	D	1,453	0.81	F	1,939	1.08	D	1,511	0.84	**F**	**2,211**	**1.23**
		SB	2	1,800	C	1,225	0.68	B	821	0.46	D	1,462	0.81	B	861	0.48
11	**Harrison Street** from 27th Street to Grand Avenue	NB	3	2,700	B	922	0.34	B	1,326	0.49	B	995	0.37	C	1,680	0.62
		SB	3	2,700	B	1,057	0.39	A	666	0.25	B	1,313	0.49	A	709	0.26
12	**Harrison Street** from 20th Street to 14th Street	NB	2	1,800	B	559	0.31	C	947	0.53	B	581	0.32	C	958	0.53
		SB	2	1,800	B	570	0.32	A	342	0.19	B	585	0.33	A	360	0.20

Bold indicates significant impact.

SOURCE: AECOM, 2009.

Impact TRANS-6a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on *Segment #9 (Grand Avenue from Harrison Street to El Embarcadero)* (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-6a: Implement Mitigation Measure TRANS-2a.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would not be an impact under Near-Term (2015) plus Project (Phase I) Conditions.

Impact TRANS-6b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)* (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)

Mitigation Measure TRANS-6b: Implement Mitigation Measure TRANS-2b.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2b, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Near-Term (2015) plus Project (Phase I) Conditions.

Cumulative (2030) without Project Traffic Conditions

This section evaluates traffic operations at the study intersections under Cumulative (2030) without Project Conditions, for which traffic volumes were forecasted using the June 2007 release of the ACCMA Travel Demand Model, with refinements to the volume forecasts within the City of Oakland to allow for more accurate representation of projected travel demand within city limits. The model was calibrated and validated to Spring 2007 travel conditions (the most up-to-date conditions possible using ABAG Projections 2005 land use data) within Oakland. More information on model assumptions surrounding land use and other developments in the Project vicinity is included in **Appendix G.6**.

Planned Roadway and Intersection Geometry Changes

The same roadway and intersection geometry changes assumed to be in place for Near-Term (2015) without Project Conditions were also assumed in place for Cumulative (2030) without Project Conditions.

Cumulative (2030) without Project Intersection Operating Conditions

Growth factors between the ACCMA Travel Demand Model's traffic volumes for base (2005) and future (2030) conditions were calculated for each intersection approach. These growth factors were applied to Existing Conditions traffic volumes to derive Cumulative (2030) without Project Conditions traffic volumes. The volumes were then compared to the City of Oakland Measure DD Implementation Project Environmental Impact Report approved in April 2008 to ensure consistency. Cumulative (2030) without Project Conditions traffic volumes at the 51 study intersections are illustrated in **Figure IV.L-18**.

The following study intersections would operate at unacceptable conditions under Cumulative (2030) without Project Conditions:

Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 EB Off-Ramp (LOS F in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS E in AM peak hour, and LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS F in AM peak hour, and LOS E in PM peak hour)
5. Telegraph Avenue / 27th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in AM peak hour, and LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in PM peak hour)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)
50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (LOS F in AM peak hour)
51. Oakland Avenue / Monte Vista Avenue / Vernon Street (LOS F in PM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in AM and PM peak hours)
32. Oak Street / 14th Street (LOS F in PM peak hour)
40. Oak Street / 7th Street (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

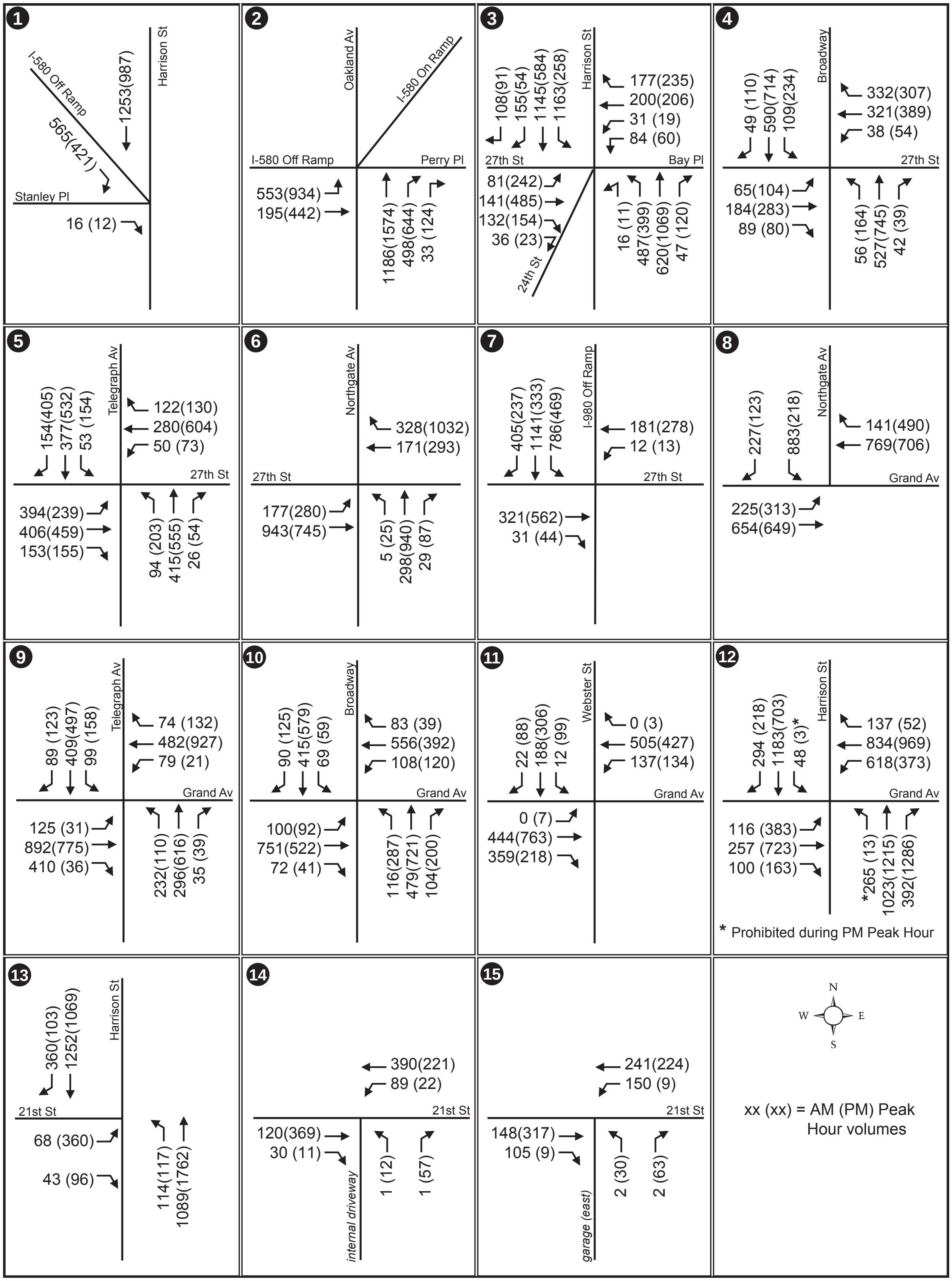
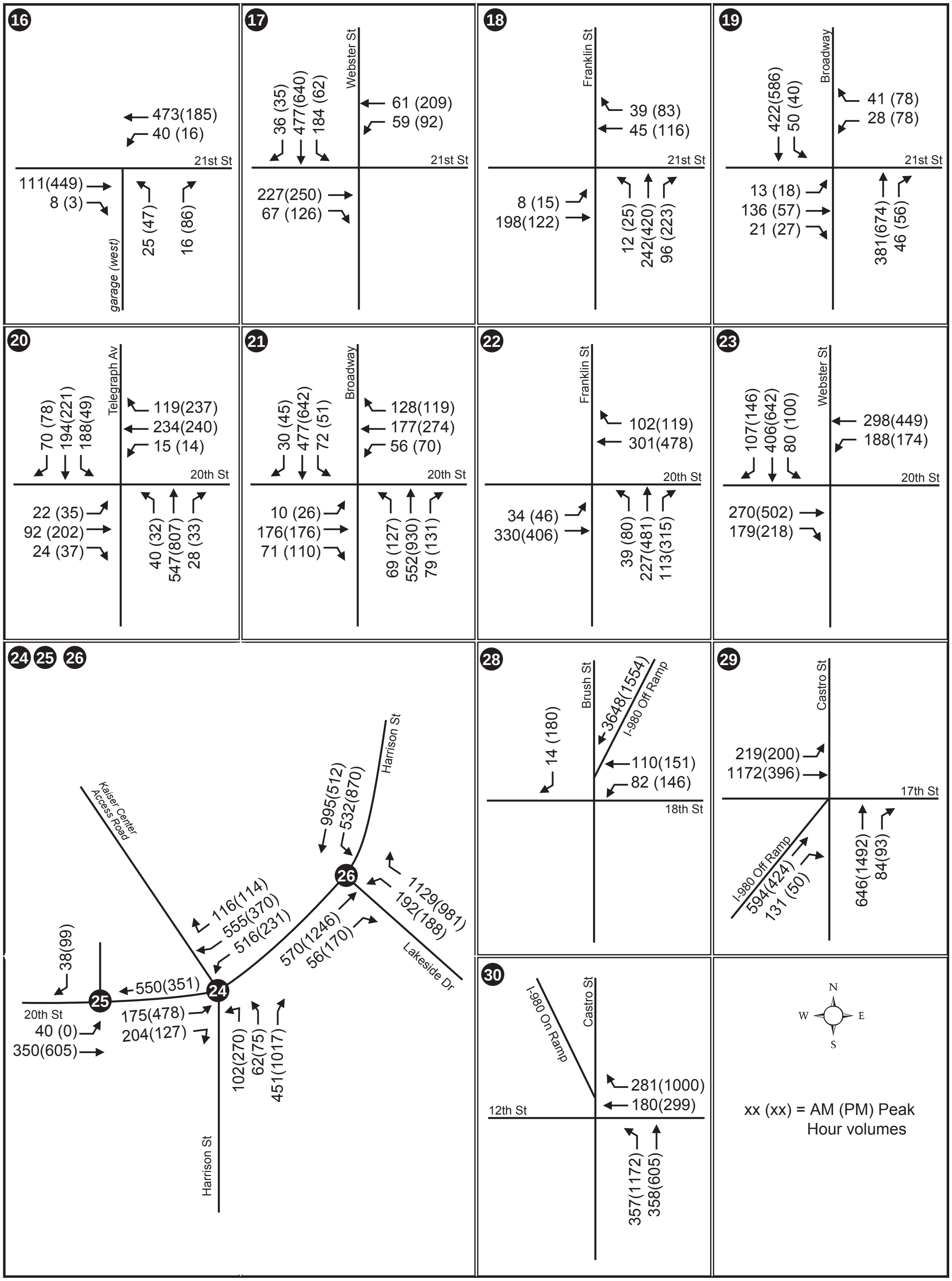


Figure IV.L-18a
Cumulative (2030) Without Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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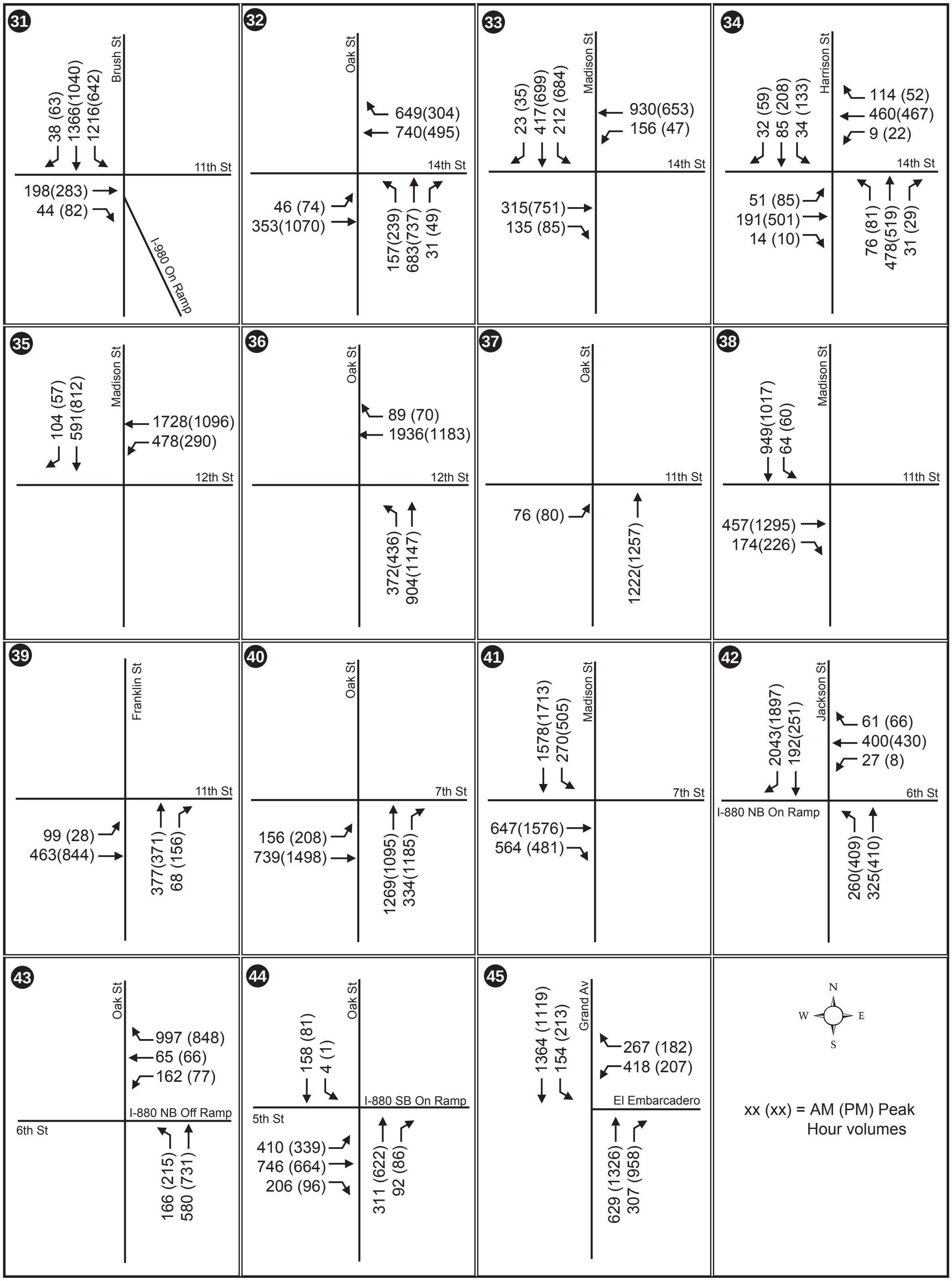
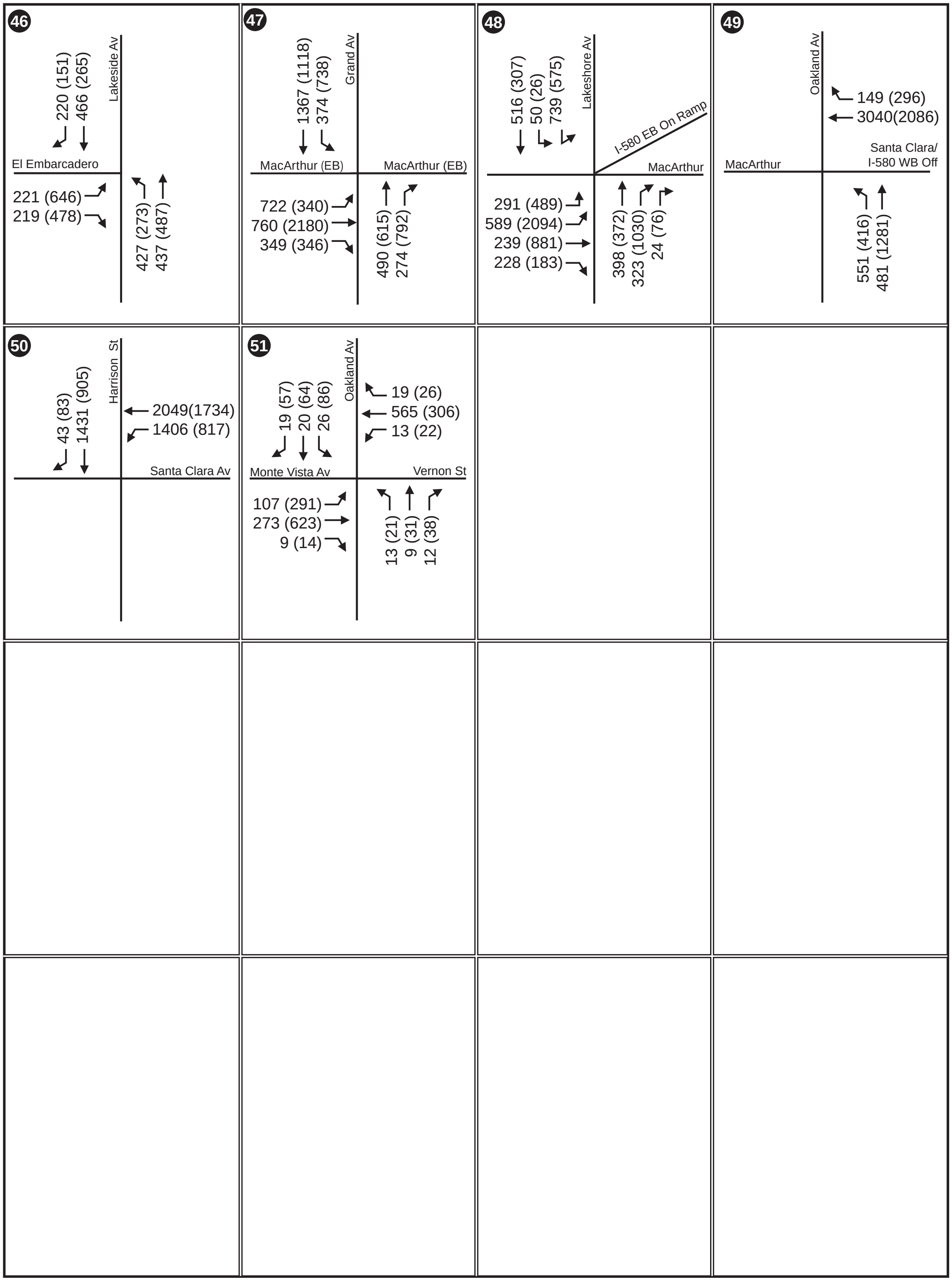
Figure IV.L-18b
Cumulative (2030) Without Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-18c
Cumulative (2030) Without Project Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

Kaiser Oakland . 206213

Figure IV.L-18d

Cumulative (2030) Without Project Traffic Volumes
AM (PM) Peak Hour

For some peak hours, intersection delays at Intersection #45 (Grand Avenue / El Embarcadero) and Intersection #46 (Lakeshore Avenue / El Embarcadero) are lower in Near-Term (2015) without Project Conditions than in Existing Conditions because the Existing Conditions analysis uses counts conducted before the Measure DD improvements were constructed. As construction of the improvements at these locations and adjacent roadways is still ongoing, drivers have yet to adjust to new traffic patterns and travel behavior. Once all construction is complete and drivers have adjusted, however, volumes are expected to be reduced, particularly along Lakeshore Avenue, which is being reduced to one travel lane in each direction.

Average delay at some intersections would decrease under Cumulative (2030) without Project Conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

Cumulative (2030) without Project Roadway Operating Conditions

A roadway facility operating at LOS F indicates that the facility is over-capacity (i.e., v/c ratio is greater than 1.00). The following four of the 11 roadway segments would operate at LOS F under Cumulative (2030) without Project Conditions; detailed calculations for the roadway segment analysis are included in **Appendix G.9**:

- Caltrans roadways
  1. SR 260 (Posey / Webster Tubes), from Alameda city limits to I-880 (*northbound, AM and PM peak hours; southbound, PM peak hour*)
  4. I-980, from 27th Street to 29th Street (*southbound, AM peak hour*)
- Non-Caltrans roadways
  9. Grand Avenue, from Harrison Street to El Embarcadero (*eastbound, PM peak hour*)
  10. Harrison Street, from I-580 to 27th Street (*northbound, PM peak hour*)

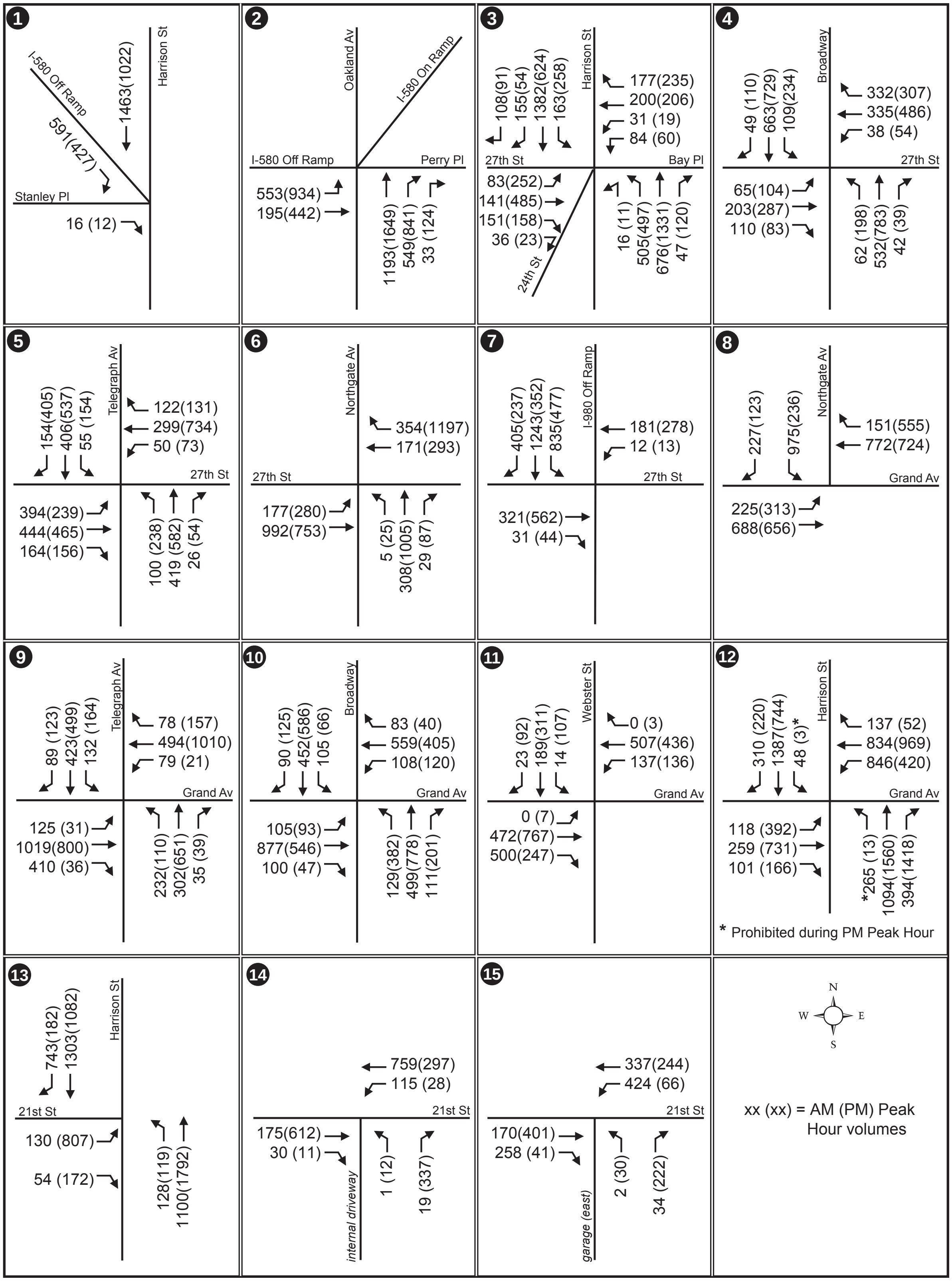
Cumulative (2030) plus Project (Phase I and Phase II) Conditions

Intersection Impacts

Impact TRANS-7: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-7a through TRANS-7l)

Cumulative (2030) plus Project (Phase I and Phase II) Conditions traffic volumes are illustrated in **Figure IV.L-19**. **Table IV.L-16** summarizes the peak hour LOS at the 51 study intersections under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Average delay at some intersections would decrease under Cumulative (2030) plus Project (Phase I and Phase II) Conditions due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.



SOURCE: AECOM

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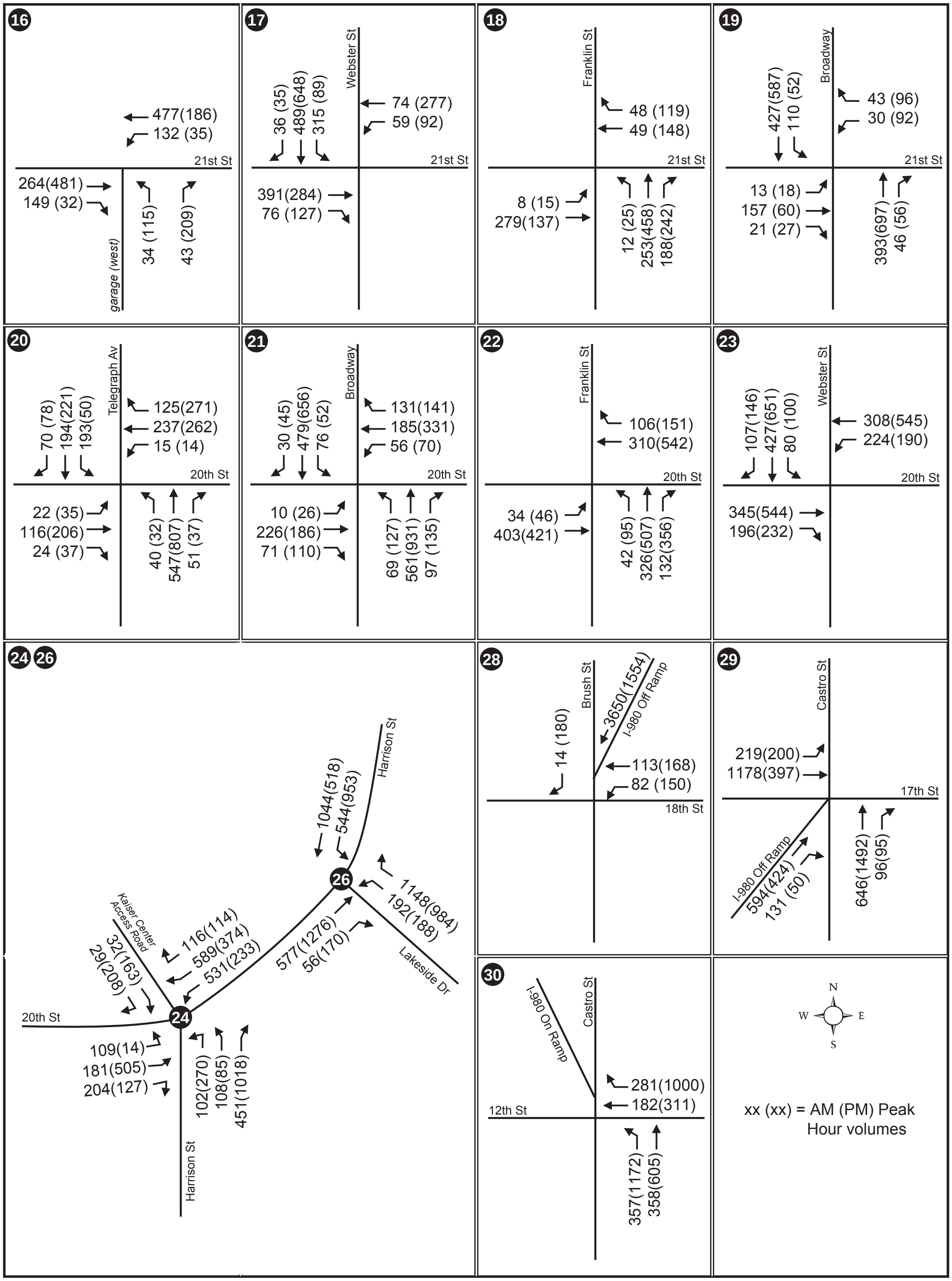
Figure IV.L-19a
Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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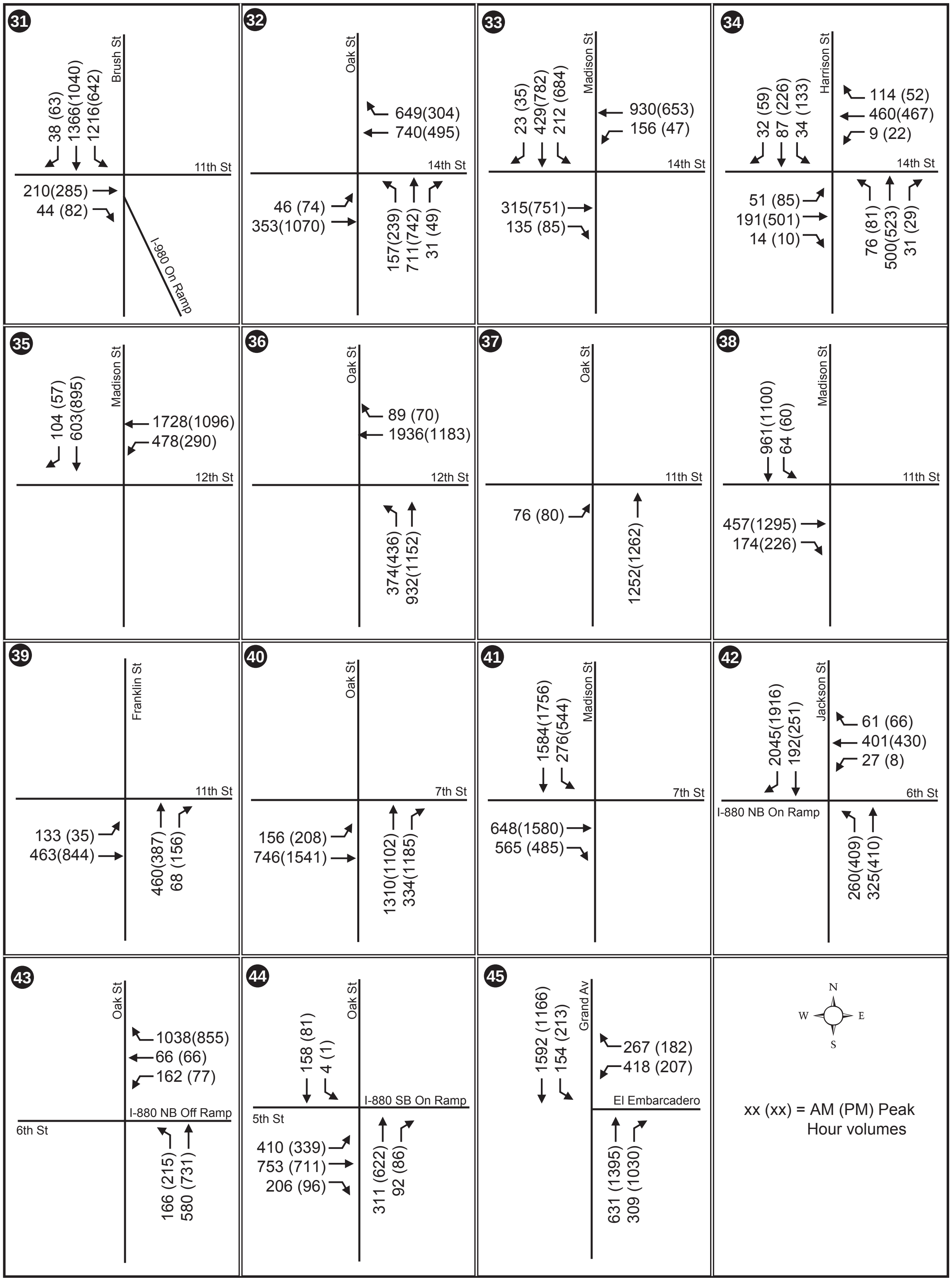
Figure IV.L-19b

Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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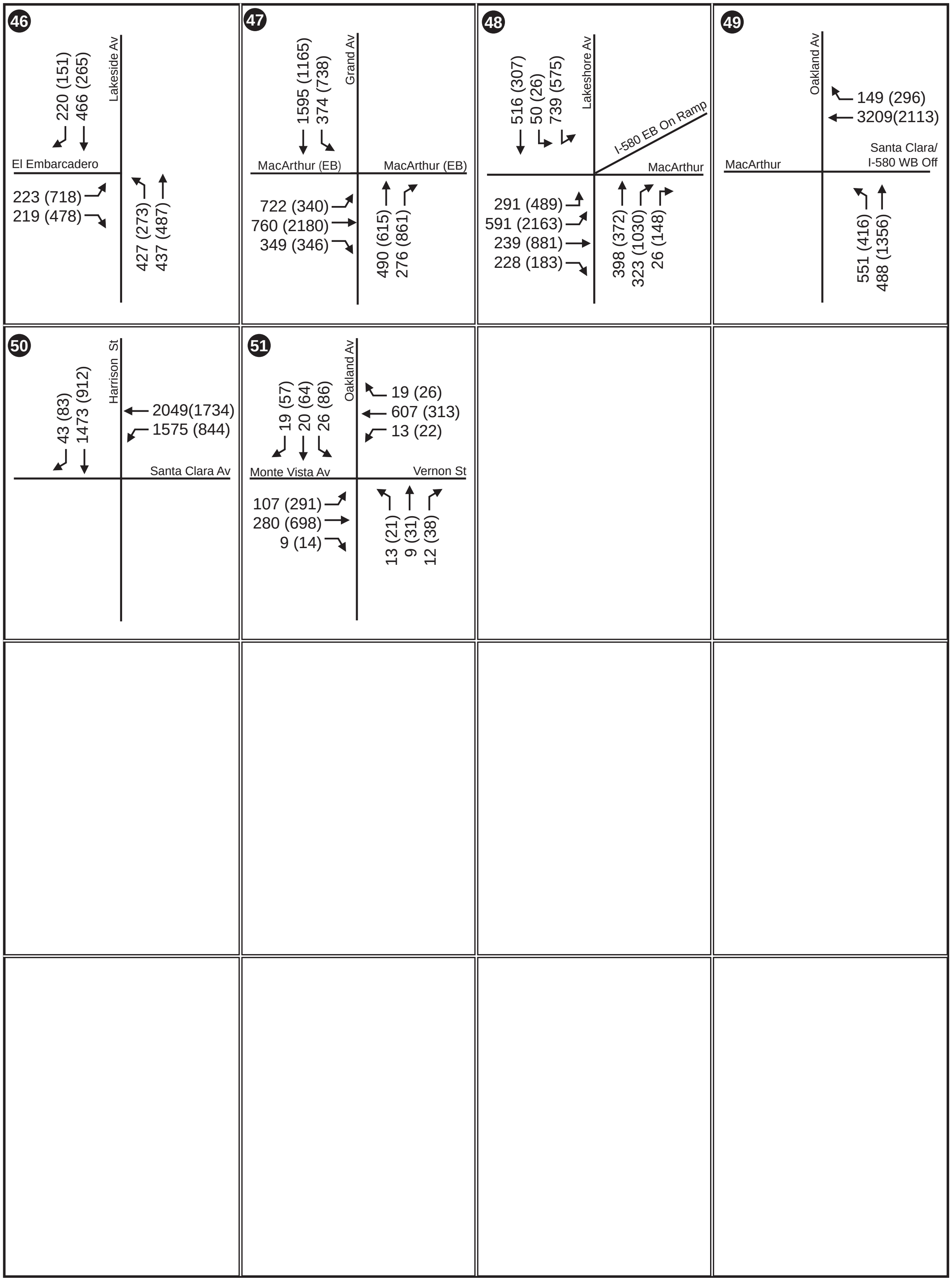
Figure IV.L-19c
Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour



SOURCE: AECOM

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Figure IV.L-19d
Cumulative (2030) Plus Project (Phase I & II) Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-16
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

			Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	TWSC	F	68.7	C	20.6	F	>120	C	21.8
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	E	65.9	F	>120	**F**	**83.7**	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	F	97.0	E	78.9	**F**	**>120**	**F**	**>120**
4	Broadway / 27th Street	Signal	B	17.5	C	32.2	B	18.2	D	39.4
5	Telegraph Avenue / 27th Street	Signal	C	20.5	E	67.9	C	20.9	**F**	**103.0**
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	12.3	B	15.8	B	13.3	C	28.6
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	15.7	B	12.1	B	18.2	B	12.1
45	Grand Avenue / El Embarcadero	Signal	C	23.4	F	>120	C	23.9	**F**	**>120**
46	Lakeshore Avenue / El Embarcadero	Signal	C	23.3	C	26.0	C	23.3	D	36.5
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	E	68.3	F	>120	E	68.6	**F**	**>120**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	F	94.5	F	>120	F	94.4	**F**	**>120**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	F	>120	C	21.0	**F**	**>120**	C	28.3
50	Harrison Street / MacArthur Blvd. (WB)	Signal	F	83.2	C	21.3	**F**	**102.1**	C	21.5
51	Oakland Avenue / Monte Vista Avenue	AWSC	C	22.9	F	61.2	D	29.3	**F**	**88.8**
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	26.8	C	20.5	C	29.9	C	22.3
9	Telegraph Avenue / West Grand Avenue	Signal	C	31.5	D	52.6	D	40.5	E	71.4
10	Broadway / Grand Avenue	Signal	C	22.5	C	21.4	C	24.4	D	35.9
11	Webster St. / Grand Ave.	Signal	C	29.9	C	29.4	C	31.6	C	30.9
12	Harrison St. / Grand Ave.	Signal	F	93.8	F	>120	**F**	**>120**	**F**	**>120**
13	Harrison St. / 21st St.	Signal	A	7.5	B	19.9	B	11.5	**F**	**98.7**
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	12.4	B	12.3	B	10.5	E	48.8
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	13.6	B	12.9	B	14.0	C	20.1
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.8	B	12.7	C	18.8	B	14.9
17	Webster St. / 21st St.	Signal	B	14.4	B	19.2	B	15.6	B	19.0

See next page for table footnotes.

TABLE IV.L-16 (Continued)
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE

			Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.0	A	9.8	B	10.8
19	Broadway / 21st Street	Signal	B	10.8	B	12.4	B	11.6	B	12.7
20	Telegraph Ave. / 20th St.	Signal	B	13.1	B	13.0	B	13.5	B	13.1
21	Broadway / 20th Street	Signal	B	14.5	C	34.5	B	14.7	D	35.4
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.8	B	14.1	B	14.5
23	Webster St. / 20th St.	Signal	C	24.0	C	24.6	C	21.3	C	25.0
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	25.7	D	42.3	E	74.0	**F**	**>120**
25	Kaiser Ctr. Access Rd. / 20th Street[c]	SSSC	B	10.5	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	C	21.3	D	49.0	C	20.9	E	58.4
27	Lakeside Dr. / 20th St.[d]	Signal	--	--	--	--	--	--	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	7.6	A	8.4	A	7.6	A	8.6
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	E	58.0	D	43.9	E	61.1	D	44.3
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	20.9	B	19.0	C	20.9	B	19.2
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	E	58.5	B	17.4	E	58.3	B	17.4
32	Oak Street / 14th Street	Signal	D	44.7	F	89.8	D	46.2	F	89.7
33	Madison St. / 14th St.	Signal	B	19.6	B	19.3	B	19.5	B	19.2
34	Harrison St. / 14th St.	Signal	A	9.8	B	10.7	A	9.9	B	10.8
35	Madison St. / 12th St.	Signal	A	9.7	A	10.0	A	9.7	B	10.2
36	Oak Street / 12th Street	Signal	B	14.7	B	16.0	B	14.8	B	16.1
37	Oak Street / 11th Street	SSSC	B	11.4	B	11.7	B	11.5	B	11.8
38	Madison St. / 11th St.	Signal	B	11.6	B	11.7	B	11.4	B	11.4
39	Franklin St. / 11th St.	Signal	B	14.2	B	14.1	B	13.9	B	14.1
40	Oak Street / 7th Street	Signal	B	11.5	F	92.3	B	11.9	F	92.6
41	Madison St. / 7th St.	Signal	B	13.2	C	32.9	B	13.4	D	41.1
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	C	26.5	B	15.7	C	30.5	B	15.9
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	>120	F	>120	**F**	**>120**	**F**	**>120**

Bold indicates significant impact.

[a] SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection
[b] The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.
[c] The Project would eliminate this intersection.
[d] After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2009.

As shown in Table IV.L-16, the following intersections would operate at unacceptable conditions under Cumulative (2030) plus Project (Phase I and Phase II) Conditions:

Outside Downtown Area

1. Harrison Street / Stanley Place / I-580 EB Off-Ramp (LOS F in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in AM and PM peak hours)
3. Harrison Street / 27th Street / 24th Street (LOS F in AM and PM peak hours)
5. Telegraph Avenue / 27th Street (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in AM peak hour, and LOS F in PM peak hour)
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in AM and PM peak hours)
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)
50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (LOS F in AM peak hour)
51. Oakland Avenue / Monte Vista Avenue / Vernon Street (LOS F in PM peak hour).

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in AM and PM peak hours)
13. Harrison Street / 21st Street (LOS F in PM peak hour)
24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)
32. Oak Street / 14th Street (LOS F in PM peak hour)
40. Oak Street / 7th Street (LOS F in PM peak hour)
42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

The Project (Phase I and II) would not result in a significant impact at the following intersections:

- <u>#1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM)</u>
  Although the side-street service level at this unsignalized intersection would operate at LOS F during the AM peak hour under Near-Term (2030) plus Project (Phase I and Phase II) Conditions, the intersection would not satisfy the California MUTCD peak-hour signal warrant.

- <u>#32: Oak Street / 14th Street (PM)</u>. Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.

- <u>#40: Oak Street / 7th Street (PM)</u>. Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.

- <u>#42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)</u>. Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the addition of Project-generated traffic would cause an increase in v/c ratio of no more than one percent, i.e., not above the three percent threshold.

- <u>#51: Oakland Avenue / Monte Vista Avenue / Vernon Street (PM)</u>. Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the intersection is expected to be already meet the peak hour signal warrant under Cumulative (2030) without Project Conditions. Therefore, the Project would not result in a significant impact at this intersection.

Impacts due to the Project at the remaining intersections above are discussed below.

Impact TRANS-7a: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.43 under Cumulative (2030) without Project Conditions and 1.59 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 16 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7a: Implement Mitigation Measure TRANS-1a.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7b: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

> **Mitigation Measure TRANS-7b:** Implement Mitigation Measure TRANS-1b, and also prohibit westbound left turns during the AM peak hour (in addition to the PM peak hour).

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in the AM peak hour. In the PM peak hour, the intersection would operate at an unacceptable LOS E, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the Project's impacts at this intersection.

As discussed for Mitigation Measure TRANS-1b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion as well as safety concerns. As a result, this impact is conservatively deemed significant and unavoidable.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable. If the specific implementation approach described for Mitigation Measure TRANS-1b is determined feasible by the City (or if there are other feasible options), then the impact at this location would be Less than Significant. Otherwise, impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a conservatively deemed significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7c: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #5 (Telegraph Avenue / 27th Street)* (2030). (Significant)

> **Mitigation Measure TRANS-7c:** Implement Mitigation Measure TRANS-5c.

After implementation of the mitigation measure, the intersection would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the Project's impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would still remain a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7d: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.32 under Cumulative (2030) without Project Conditions and 1.45 under Cumulative (2030) plus Project (Phase I and II) Conditions in the AM peak hour. Because the increase in v/c ratio would be 13 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

> **Mitigation Measure TRANS-7d:** Implement Mitigation Measure TRANS-3c, and also prohibit southbound left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches.

These measures alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7e: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour at *Intersection #13 (Harrison Street / 21st Street)* (2030). (Significant)

> **Mitigation Measure TRANS-7e:** Implement the following measures at the Harrison Street / 21st Street intersection:
>
> - Prohibit eastbound right turns from 21st Street to Harrison Street during the PM peak period, which will increase capacity on the critical eastbound left-turn movement

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

  – 2070L Type Controller
  – GPS communication (clock)
  – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  – City Standard ADA wheelchair ramps
  – Full actuation (video detection, pedestrian push buttons, bicycle detection)
  – Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  – Countdown Pedestrian Signals
  – Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  – Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

The vehicles making these right-turn movements during the PM peak hour would be expected to find alternative routes with less delay and more capacity, such as westbound 21st Street to southbound Webster Street. To help enforce the prohibition, extinguishable message signs should be installed on the eastbound approach. However, these measures alone would not be sufficient to mitigate the Project's impacts at this intersection.

After implementation of this measure, conditions at this intersection would remain at an unacceptable LOS, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound right-turn lane at Harrison Street / Grand Avenue to reduce the spillback queuing that ultimately causes the delays at this intersection. As these improvements would result in substantial secondary impacts such as pedestrian / bicycle safety and driver visibility issues, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (2030). (Significant)

Mitigation Measure TRANS-7f: Implement Mitigation Measure TRANS-1c.

After implementation of the mitigation measure, the intersection (located within the Downtown area) would operate at an acceptable LOS E in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant. If Alternative Measure DD were instead implemented (as described in the Alternative Measure DD Intersection Configuration Analysis section), and if the mitigation measures for the Project (Phase I) impacts at this intersection under Cumulative (2030) plus Project (Phase I and II) Conditions (under Alternative Measure DD) are determined feasible by the City, then the impact at this location would be Less than Significant. Alternatively, if the mitigation measures are determined infeasible by the City, the Project (Cumulative Phase I and II) impacts at this location would be Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain an less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7g: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880 SB On-Ramp)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.17 in the AM peak hour and 1.86 in the PM peak hour under Cumulative (2030) without Project Conditions and would operate with a v/c ratio of 1.18 in the AM peak hour and 1.93 in the PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Because the increase in v/c ratio during the PM peak hour would be 7 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7g: Implement Mitigation Measure TRANS-1d.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1d, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7h: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.10 under Cumulative (2030) without Project Conditions and 1.16 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7h: Implement Mitigation Measure TRANS-1e.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as an additional northbound through lane along Grand Avenue. As these improvements would counteract the recent geometric improvements at this intersection as part of Measure DD, there are no feasible measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7i: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.88 under Cumulative (2030) without Project Conditions and 1.94 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7i: Implement Mitigation Measure TRANS-1f.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-1f, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7j: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.91 under Cumulative (2030) without Project Conditions and 1.96 under Cumulative (2030) plus Project (Phase I and II) Conditions in the PM peak hour. Because the increase in v/c ratio would be 5 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-7j: Implement Mitigation Measure TRANS-5i.

This measure alone would not be sufficient to completely mitigate the Project's impacts at this intersection, but as discussed for Impact TRANS-5i, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7k: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the AM peak hour at *Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp)* (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 0.95 under Cumulative (2030) without Project Conditions and 0.99 under Cumulative (2030) plus Project (Phase I and II) Conditions in the AM peak hour. Because the maximum increase in v/c ratio would be 4 percent, which is above the three percent threshold of significance, the Project would result in a significant impact at this intersection.

> **Mitigation Measure TRANS-7k:** Implement Mitigation Measure TRANS-3e.

After implementation of the mitigation measure, the intersection (located outside the Downtown area) would operate at an unacceptable LOS E in the AM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the Project's impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If only Phase I of the Project were built, this intersection would not be an impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-7l: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at *Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue)* (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

> **Mitigation Measure TRANS-7l:** Implement the following measures at the Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:

  – 2070L Type Controller
  – GPS communication (clock)
  – Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  – City Standard ADA wheelchair ramps
  – Full actuation (video detection, pedestrian push buttons, bicycle detection)
  – Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  – Countdown Pedestrian Signals
  – Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  – Signal timing plans for the signals in the coordination group.

The Project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection (located within the Downtown area) would remain unacceptable, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as additional lanes on both the Harrison Street and MacArthur Boulevard (Westbound) approaches. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this intersection would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Roadway Impacts

Impact TRANS-8: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would worsen level of service conditions on area roadway segments. (Significant at intersections described below under Impacts TRANS-8a to TRANS-8c)

Table IV.L-17 summarizes peak hour LOS for the study roadway segments under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Detailed calculations for the roadway segment analysis are included in **Appendix G.9**.

As shown in Table IV.L-17, the following roadway segments would operate at LOS F under Cumulative (2030) plus Project (Phase I and Phase II) Conditions:

- Caltrans Facilities
  - #1: SR 260 (Posey/Webster Tubes) from Alameda city limits to I-880 (Northbound, AM and PM peak hours; and Southbound, PM peak hour)
  - #3: I-880 from Oak Street to 5th Avenue (Westbound, AM peak hour; and Eastbound PM peak hour)
  - #4: I-980 from 27th Street to 29th Street (Southbound, AM peak hour)
- Non-Caltrans Facilities
  - #9: Grand Avenue from Harrison Street to El Embarcadero (Westbound, AM peak hour; and Eastbound, PM peak hour)
  - #10: Harrison Street / Oakland Avenue from 27th Street to Grand Avenue (Southbound, AM peak hour; and Northbound, PM peak hour)

The Project would not result in a significant impact on the following segments because the addition of Project-generated traffic would not cause an increase in v/c ratio greater than the three percent threshold of significance:

- #1: SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880
- #4: I-980 from 27th Street to 29th Street

TABLE IV.L-17
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE

					Cumulative (2030) without Project Conditions						Cumulative (2030) plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Capacity (veh/hr)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
1	**SR 260 (Posey / Webster Tubes)**	NB	2	3,400	F	4,084	1.20	F	3,885	1.14	F	4,089	1.20	F	3,888	1.14
	from Alameda city limits to I-880	SB	2	3,400	E	3,327	0.98	F	4,329	1.27	E	3,329	0.98	F	4,330	1.27
2	**I-880**	EB	4	8,000	B	3,835	0.48	B	3,394	0.42	B	3,929	0.49	B	3,411	0.43
	from Market Street to I-980	WB	4	8,000	C	4,441	0.56	C	4,031	0.50	C	4,454	0.56	C	4,117	0.51
3	**I-880**	EB	4	8,000	E	7,390	0.92	E	7,920	0.99	E	7,405	0.93	**F**	**8,014**	**1.00**
	from Oak Street to 5th Avenue	WB	4	8,000	E	7,925	0.99	E	7,217	0.90	**F**	**8,029**	**1.00**	E	7,237	0.90
4	**I-980**	NB	3	6,000	B	2,300	0.38	D	4,806	0.80	B	2,336	0.39	D	5,039	0.84
	from 27th Street to 29th Street	SB	3	6,000	F	6,653	1.11	C	3,009	0.50	F	6,806	1.13	C	3,036	0.51
Non-Caltrans Facilities																
5	**Broadway**	NB	2	1,800	B	699	0.39	C	1,207	0.67	B	739	0.41	D	1,360	0.76
	from 19th Street to Grand Avenue	SB	2	1,800	B	595	0.33	B	823	0.46	B	660	0.37	B	837	0.46
6	**Telegraph Avenue**	NB	2	1,800	B	688	0.38	C	1,080	0.60	B	694	0.39	C	1,114	0.62
	from 20th Street to 27th Street	SB	2	1,800	B	897	0.50	B	779	0.43	C	911	0.51	B	787	0.44
7	**West Grand Avenue**	EB	2	1,800	D	1,427	0.79	C	962	0.53	E	1,554	0.86	C	969	0.54
	from Telegraph Ave. to S. Pablo Ave.	WB	2	1,800	C	910	0.51	C	1,160	0.64	C	923	0.51	C	1,243	0.69
8	**Grand Avenue**	EB	2	1,800	C	924	0.51	D	1,269	0.71	C	1,093	0.61	D	1,289	0.72
	from Broadway to Harrison Street	WB	2	1,800	D	1,393	0.77	C	1,199	0.67	D	1,409	0.78	C	1,201	0.67
9	**Grand Avenue**	EB	2	1,800	C	936	0.52	F	2,284	1.27	C	940	0.52	**F**	**2,425**	**1.35**
	from Harrison St. to El Embarcadero	WB	2	1,800	E	1,782	0.99	D	1,326	0.74	**F**	**2,010**	**1.12**	D	1,373	0.76
10	**Harrison Street / Oakland Avenue**	NB	2	1,800	E	1,718	0.95	F	2,342	1.30	E	1,776	0.99	**F**	**2,614**	**1.45**
	from I-580 to 27th Street	SB	2	1,800	E	1,571	0.87	C	987	0.55	**F**	**1,808**	**1.00**	C	1,027	0.57
11	**Harrison Street**	NB	3	2,700	B	1,276	0.47	C	1,650	0.61	B	1,349	0.50	D	2,004	0.74
	from 27th Street to Grand Avenue	SB	3	2,700	C	1,361	0.50	B	924	0.34	C	1,617	0.60	B	967	0.36
12	**Harrison Street**	NB	2	1,800	B	643	0.36	D	1,362	0.76	B	665	0.37	D	1,373	0.76
	from 20th Street to 14th Street	SB	2	1,800	B	720	0.40	A	399	0.22	B	735	0.41	A	417	0.23

Bold indicates significant impact.

SOURCE: AECOM, 2009.

The Project's potential impacts on each of the remaining segments are discussed below:

Impact TRANS-8a: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on *Segment #3 (I-880 from Oak Street to 5th Avenue)* (2030). (Significant)

It should also be noted that, in each case, while the Project would cause the segment to operate to LOS F (because the traffic volumes would exceed the 8,000 vehicles hourly capacity), the increase in v/c ratio would be only one percent, and rounded to the hundredths place (per standard practice). The v/c ratio is 1.00, which is LOS E.

> **Mitigation Measure TRANS-8a:** There are no feasible measures to mitigate the Project's impact, given the existing alignment and constraints due to lack of right-of-way for both the roadway on the west end of the channel and possibly for support columns above the Union Pacific right-of-way. The segment of I-880 from Oak Street to 5th Avenue consists of two four-lane aerial structures, with the segment immediately west of Lake Merritt Channel bordered on the north by the Laney College parking lot and on the south by industrial uses. The aerial structure continues east of the channel, crossing over the existing Union Pacific railroad right-of-way. Increasing capacity on the freeway would likely require increasing the number of travel lanes. Also, any proposed mitigation measure would also require Caltrans project approval. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-8b: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #9 (Grand Avenue from Harrison Street to El Embarcadero)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

> **Mitigation Measure TRANS-8b:** Implement Mitigation Measure TRANS-2a.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2a, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Impact TRANS-8c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-8c: Implement Mitigation Measure TRANS-2b.

After implementation of this measure, conditions would remain at an unacceptable LOS, and the Project impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the Project's impacts on this segment, but as discussed for Impact TRANS-2b, there are no feasible mitigation measures to completely mitigate the Project's impacts. Therefore, the Project impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If only Phase I of the Project were built, this roadway segment would still remain a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I) Conditions.

Site Access and Circulation

Vehicular access to the Project Site would be provided via 21st Street, which offers two separate entrances to the Kaiser Center Garage and additional access to an internal garage entrance via the Access Road adjacent to the existing Kaiser Center Tower. Given the location of the Project, most vehicles would be expected to use the northwest entrance, which offers the most convenient access to the Project. 21st Street provides convenient east-west access from major arterials including Harrison Street, Lakeside Drive, Webster Street, Franklin Street, and Broadway.

While the Project would increase traffic on roadways in the vicinity, there is currently substantial capacity on these roadways, some of which offer three to four travel lanes. Localized areas in the immediate vicinity of the Project, such as 21st Street, would see increases in traffic volumes as a result of Project-generated traffic, but most of these Project trips would not be using 21st Street as a through-route, and only use it for access between major collectors (Franklin Street, Webster Street) or arterials (Harrison Street) and the Kaiser Center Garage. Both the Access Road and reversed porte cochere adjacent to the existing Kaiser Center Tower provide for circulation within the site reducing the need for Project-generated traffic to use lower-capacity roadways immediately adjacent to the site (such as 21st Street) for circulation.

The Project Site is accessible from adjacent roadways and would not result in less than two emergency access routes for streets exceeding 600 feet in length (the Kaiser Center Access Road is less than 600 feet in length and is accessible from both directions of Harrison Street, 20th Street, and 21st Street).

Impact TRANS-9: The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)

The proposed configuration of loading docks as shown in Figure IV.L-11a would consist of one dock on the southeast corner of the site on the Access Road and one dock on the northwest corner of the site adjacent to the West Exit of the Kaiser Center Garage on 21st Street. There is a potential for conflict between loading operations and garage access, as well as pedestrians in the sidewalk on the south side of 21st Street. The proposed loading area on the north side of the Project Site along 21st Street requires trucks to back into the loading docks, potentially inhibiting pedestrian access along the sidewalk and vehicular access along 21st Street.

> **Mitigation Measure TRANS-9:** Prohibit delivery and service vehicles from accessing the loading docks during the AM and PM peak periods in order to minimize the impact of loading operations on access for the Kaiser Center Garage. The section of the Access Road from Harrison Street / 20th Street to the garage entrance should be restricted to delivery and service vehicles during off-peak hours. During off-peak periods, the Access Road approach onto Harrison Street / 20th Street should be separated off by bollards or other removable barriers to prevent passenger vehicles from crossing the site and expand pedestrian space in this immediate area. Adequate additional site management staff should be made available to direct loading maneuvers to improve the safety of pedestrians, bicyclists, and drivers during deliveries into and out of this dock. Concurrent with the submittal of a Final Development Plan, the Project Applicant shall prepare and submit a loading dock plan and operational analysis which demonstrates there are no conflicts with vehicular, pedestrian, and bicycle access to or adjacent to the site for City review and approval. The Project Applicant shall implement the approved plan.

Significance after Implementation of Mitigation: Less than Significant.

Pedestrian and Bicycle Impacts

Pedestrian Impacts

Project Pedestrian Improvements

The Project proposes new landscaping along the whole of the south, west, and north edges of the Project Site, creating an enhanced pedestrian realm and serving as a buffer protecting pedestrians from traffic along Webster Street and 20th Street. The reconfiguration of the Access Road at the intersection of Harrison Street / 20th Street also improves safety for pedestrians and reduces the potential for conflict at this location by eliminating the unusual “Y” configuration where the left-turn movement from eastbound 20th Street is a yield movement and not under signal control.

The proposed new roof garden access at the southeast corner of the Project Site would improve pedestrian circulation in and around the site, as pedestrians heading to and from the two towers would be able to use the sixth-floor lobbies to access the roof garden and proceed to street level. Instead of walking along 20th Street and Webster Street, pedestrians and the general public would be able to use the new access to reach the roof garden and enter the towers via the sixth-floor lobbies.

Project Pedestrian Trips

Transit trips generated by the Project Site are expected to result in the majority of the additional pedestrian traffic generated by the Project in the immediate vicinity of the site. As shown in Table IV.L-20 (in the *Transit* discussion further below), the Project would generate 453 BART trips and 135 AC Transit trips in the AM peak hour and 440 BART trips and 131 AC Transit trips in the PM peak hour. The majority of this pedestrian traffic would use 20th Street, which is the primary route connecting the Project Site to the 19th Street BART station and AC Transit bus stops for services along Broadway. In the AM peak period, this pedestrian traffic would be concentrated in platoons following the arrival of BART trains at the station, but would be more evenly distributed over time in the PM peak period, as transit passengers (both BART and AC Transit) generally arrive at a stop or station over a longer period of time.

As detailed in the Mode Split Memorandum provided in **Appendix G.5**, approximately four percent of all Project-generated trips would be walk-only pedestrian trips. This pedestrian traffic would be more evenly distributed than transit-related pedestrian traffic, and as such, would have a less substantial effect on the operations of pedestrian facilities.

Impact TRANS-10: The Project proposes vehicular site access out of an existing garage exit located along 21st Street (just east of Kaiser Plaza) which is currently designed in such a way that could be hazardous to pedestrians on the sidewalk. (Significant)

The proposed vehicular site access would use existing exits from the Kaiser Center Garage located along 21st Street: an East Exit just east of Kaiser Plaza, and a West Exit just east of the intersection of Webster Street / 21st Street. The wall on the West Exit adjacent to the exit lane is cut back to provide a sufficient sight distance triangle for drivers to check for pedestrians crossing the exit in the sidewalk. However, the East Exit as currently designed does not provide sufficient sight distance for drivers in vehicles exiting the garage to see pedestrians. With the expansion of the Kaiser Center Garage as part of the Proposed Project and the associated increase in garage traffic, this would represent a substantial hazard to pedestrians. Although installations of warning devices may alert pedestrians to arriving vehicles, they still do not permit the driver to see pedestrians.

> **Mitigation Measure TRANS-10:** The Project Applicant shall redesign the East Exit of the Kaiser Center Garage along 21st Street to allow for sufficient distance and visibility for drivers to see pedestrians and stop. Redesign options shall include sidewalk widening, wherever feasible. In the event that this is structurally infeasible, the Project Applicant shall install audible and visible warning devices such as bells and lights to alert pedestrians, and a speed hump to force drivers exiting the garage to slow down and be more alert.

Significance after Implementation of Mitigation: Less than Significant.

Potential Additional Recommended Conditions

As discussed previously, site observations concluded that existing pedestrian facilities generally are insufficient:

- The unobstructed width of sidewalk along the north side of 20th Street between the 19th Street BART Station and Harrison Street is substantially reduced to 5 to 6 feet at some locations due to various obstacles and barriers.
- Approximately 90 percent of pedestrians queuing at the intersection of Franklin Street / 20th Street during the AM peak were observed to cross illegally due to long wait times and low cross traffic volumes. Illegal crossing was also observed at other intersections and locations.
- Curbs at some intersections (northeast corner of Franklin Street / 20th Street and southwest corner of Webster Street / 20th Street) are constructed with unnecessarily large radii, encouraging high turning speeds for vehicles, increasing pedestrian crossing distances, and reducing pedestrian storage areas.

Given these concerns, and the fact that the Project will add a significant number of new pedestrian trips, the following "Recommended Conditions" should be considered to improve operations of pedestrian facilities in the immediate vicinity of the Project and are consistent with the City's Pedestrian Master Plan. Although not required by CEQA, these Recommended Conditions are recommended herein by City Staff to be included as Project specific conditions of approval. They are not necessary to address or mitigate any environmental impacts of the Project.
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Recommendation TRANS-1: Increase sidewalk capacity on the north side of 20th Street between Broadway and Harrison Street.

In order to improve pedestrian flow, it is recommended that the sidewalk capacity along the north side of 20th Street between Broadway and Harrison Street be increased as follows:

- **Between Broadway and Franklin Street, remove parking and widen the sidewalk.** Currently, a limited amount of metered on-street parking is provided just east of the BART station entrance (three spaces on the north side of 20th Street and two spaces on the south side of 20th Street). The section on the north side directly east of the entrance is used as a de facto "kiss-and-ride" zone in the mornings and pickup zone in the afternoon and evenings. Several employee shuttles from the office buildings at 180 Grand, 155 Grand and 1 Kaiser Plaza also use this curb space to load and offload passengers. However, circulation space is limited because the sidewalk begins to narrow 30 feet east of the entrance. This section of curb also includes an exit driveway for the existing building on the northeast corner of the intersection of Franklin Street / 20th Street.

In the AM peak periods, pedestrian traffic exiting the BART station via the escalator (located on the north side of the station entrance) conflicts with pedestrian traffic entering the station attempting to access the stairwell (located on the south side of the station entrance). Employees attempting to board the special shuttles also cross against opposing pedestrian traffic in order to reach the shuttle boarding area.

By removing parking and widening the sidewalk, circulation space directly east of the entrance could be increased.

Once the three parking spaces on the north side of 20th Street are removed, the existing bus stop serving AC Transit Lines 11, 59, 59A, and 805 would then be moved out to the new curb line, resulting in a larger unobstructed width on the main part of the sidewalk. The extended curb could align with the existing “bulbout” for the BART station entrance and 20th Street restriped to remove the misalignment in the pavement markings. A bulbout could also be provided at the northwest corner of Franklin Street / 20th Street in the east-west direction. This would not require removal of any parking as that section of curb is already marked red, but would significantly increase queuing space for pedestrians waiting to cross.

Removal of three spaces would have a negligible impact on overall parking conditions in the area. It is important to note that the schematic is only a conceptual illustration, and implementation of any or all of the improvements would require further analysis and design.

It should also be noted that there are several AC Transit stops in close proximity along westbound 20th Street between Telegraph Avenue and Harrison Street:

- North side of 20th Street between Telegraph Avenue and Broadway (three stops occupying the full length of block);
- Northwest corner of Franklin Street / 20th Street; and,
- Northeast corner of Wesbter Street / 20th Street.

While most AC transit services do not use all three stops, some consolidation of stops could also be considered to streamline service, reduce transit vehicle travel times, and improve passenger connections.

- **Between Franklin Street and Webster Street, widen the sidewalk.**

This section of 20th Street is proposed for Class 2 bicycle facilities (bicycle lanes), which would require removal of the exclusive westbound right-turn lane. Additional space obtained as part of those improvements could be set aside for sidewalk widening along the north side of 20th Street, which has an extremely limited unobstructed width due to building frontage.

If the westbound right-turn lane were removed, the intersection of Franklin Street / 20th Street would still operate at LOS B (14.0 seconds of intersection average delay) during the weekday AM peak hour and LOS B (14.7 seconds of intersection average delay during the weekday PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Without removal of the westbound right-turn lane, the intersection would operate at LOS B under both peak hours, with intersection average delay at 14.1 seconds during the weekday AM peak hour and 14.5 seconds during the weekday PM peak hour. Therefore, removal of the westbound right-turn lane would produce a negligible change in intersection operations and would not result in secondary impacts if implemented.

The northeast corner of Franklin Street / 20th Street could be redesigned so as to reduce the curb radius, shortening crossing distances for pedestrians and encouraging drivers to take their turns slower. A bulbout could also be provided at this corner to further reduce crossing distances.

- **Between Webster Street and Harrison Street, redesign the Project frontage to be pedestrian-friendly.** The portion of 20th Street abutting the site is split into two narrow paths as a result of landscaping and a slight grade from the edge of the existing buildings to the curb. The path closest to the curb is extremely narrow and is partially restricted by the AC Transit bus stop east of the intersection of Webster Street / 20th Street. The path closer to the existing building is restricted by outdoor cafe seating.

  The sidewalk could be redesigned to reduce or eliminate the grade difference and better position the landscaping so as to buffer the sidewalk from the roadway as opposed to divide the sidewalk in two. Given the wide curb lane, the sidewalk closest to the intersection with Webster Street could be widened in a similar fashion to the section of 20th Street between Broadway and Franklin Street. The existing bus stop would be moved out to the new curb line. This may, however, restrict some through capacity along westbound 20th Street, as vehicles could queue up behind stopped transit vehicles, unable to pass around them.

  Bulbouts could be provided at the northwest and northeast corners of this intersection in the east-west direction, shortening crossing distances and increasing queuing space on the major pedestrian route to and from BART.

Recommendation TRANS-2: Reduce cycle times of signals at the intersections of Franklin Street / 20th Street and Webster Street / 20th Street.

Due to long cycle lengths, one-way traffic, and relatively low traffic volumes, there is a high occurrence of pedestrians on the north side of 20th Street crossing Franklin Street and Webster Street illegally. Reducing the cycle length of these signals would shorten wait times for pedestrians attempting to cross, improving safety for all road users, including drivers, bicyclists, and pedestrians. Currently, these intersections operate with 80-second cycle lengths, but these could be reduced to 60- or 70-second cycle lengths to reduce waiting times for pedestrians attempting to cross.

Bicycle Impacts

Although the existing bikeway network is limited, the network improvements currently being constructed or undergoing design would make bicycling safer and a more attractive mode of transportation. Based on the four percent walk / bicycle / other mode share presented in the Mode Split Findings Memorandum (see **Appendix G.5**), the Project is expected to result in a minor increase in bicycle traffic on the roadway networks.

The existing Class 2 and Class 3 bicycle facilities in the vicinity of the Project have excess capacity to handle the increase in bicycles as a result of the Project. The Project proposes no features which would be unsafe to bicycle travel, and therefore, there would be no significant adverse impacts on bicycle conditions as a result of the Project.

Project Bicycle Facilities

Table IV.L-18 specifies the City of Oakland Municipal Code requirements for the provision of short- and long-term bicycle parking facilities, as well as shower and locker facilities, for the Proposed Project. The 136 long-term bicycle spaces should be secure and serve office workers who may leave their bicycles at the same location all day or overnight, and should be provided in the form of bicycle lockers or bicycle cages.

TABLE IV.L-18
BICYCLE FACILITY REQUIREMENTS

Facility / Land Use	Amount (KSF)[a]	Municipal Code Provision	Facility Requirement
Bicycle Parking			
Office	1,320	1 long-term space per 10 KSF 1 short-term space per 20 KSF	132 long-term spaces 66 short-term spaces
Retail	46	1 long-term space per 12 KSF 1 short-term space per 5 KSF	4 long-term spaces 9 short-term spaces
Total			136 long-term spaces 75 short-term spaces
Bicycle Showers and Lockers			
Office	1,320	2 showers per gender, plus one shower per gender for each 150 KSF above 150 KSF	10 showers per gender (20 total)
		4 lockers per shower	80 lockers
Retail	46	No locker or shower requirements (less than 150 KSF)	--
Total			10 showers per gender (20 total) 80 lockers

[a] KSF = 1,000 sq. ft.

SOURCE: AECOM, 2009.

The 75 short-term bicycle racks would accommodate visitors who leave their bikes for a reasonably short period of time and should be provided in areas that provide shelter and, ideally, a high level of passive security from surrounding pedestrians. Other visible security measures such as security cameras may also be considered.

Potential Additional Recommended Conditions

Project-generated vehicles would increase traffic volumes on roadways in the immediate vicinity of the Project Site, which could reduce the attractiveness of bicycling as a mode of transport for trips in this area. Although not required to mitigate a significant impact, the following recommendation should be considered to improve bicycle conditions in the immediate vicinity of the Project:

Recommendation TRANS-3: Construct the 20th Street bikeway between Broadway and Harrison Street.

> As discussed in the Existing Bicycle Conditions section, the section of 20th Street between Harrison Street and Franklin Street is proposed for Class 2 bicycle facilities (bicycle lanes). Given the high volumes expected on this roadway in Near-Term Conditions and Cumulative Conditions, in order to encourage use of alternative modes of travel such as bicycling and provide greater safety for bicyclists, it is recommended that this section of the bikeway network be completed.

AC Transit Travel Time

Travel time along the following corridors was evaluated in order to determine the impacts of Project-generated traffic on the operations of key AC Transit trunk lines in Downtown Oakland:

1. 11th Street (eastbound) from Brush Street to Oak Street
2. 12th Street (westbound) from Oak Street to Brush Street
3. 20th Street (eastbound) from Telegraph Avenue to Harrison Street
4. 20th Street (westbound) from Harrison Street to Telegraph Avenue
5. Broadway (southbound) from 27th Street to 20th Street
6. Broadway (southbound) from 20th Street to 11th Street
7. Broadway (northbound) from 11th Street to 20th Street
8. Broadway (northbound) from 20th Street to 27th Street
9. Grand Avenue between MacArthur Boulevard and Harrison Street – (westbound AM and eastbound PM)
10. Harrison Street between MacArthur Boulevard and Grand Avenue (southbound AM and northbound PM)
11. Telegraph Avenue between 20th Street and 27th Street (southbound AM and northbound PM)

Corridors #1 through #8 were analyzed in both directions during both the AM and PM peak hours. Corridors #9, #10, and #11 were analyzed for only one direction during each peak hour, as traffic on these segments is highly directional.

Table IV.L-19 and **Table IV.L-20** summarize the results of the travel time analysis for the AM and PM peak hours. Observations of corridor travel times were taken for Existing Conditions and travel time differentials obtained from the Synchro networks used in the intersection LOS analysis. A minimum of three field runs were conducted in each direction for each corridor in September 2008.

It should be noted that the travel times presented here only represent the time it takes automobiles to travel the length of the corridor. Obtaining a travel time estimate for transit vehicles traveling through corridors can be difficult considering that the travel time for transit vehicles is much more variable than that for automobiles. This variability is due to a wide variety of factors, but primarily involves schedule adherence and on-time performance. A transit vehicle that is already behind schedule can quickly get further behind schedule due to accumulating passenger demand at transit stops, resulting in longer than usual dwell times to allow passengers to board and alight. In addition, because transit vehicles must follow the same route, there is less flexibility than with automobiles in events such as accidents or unexpected congestion, increasing delays further. Given these considerations, the values in Table IV.L-19 and Table IV.L-20 should be viewed as the incremental increase in transit travel time from one analysis scenario to the next.

As shown in Table IV.L-19 and Table IV.L-20, the Project would increase peak hour travel times along most corridors, mostly as a result of increases in intersection average delay. Some corridors would see average travel time decrease slightly between existing and future-year scenarios and between baseline and Project scenarios, primarily as a result of geometry changes or better-performing movements at intersections. Travel time on westbound 20th Street, for example, is lower under Near-Term (2015) without Project Conditions than under Existing Conditions, partially as a result of reduced delays due to Measure DD modifications at this intersection.

The following corridors are expected to be most affected by the Project:

- Corridor #9: Grand Avenue EB (Harrison Street to MacArthur Boulevard) – PM; and,
- Corridor #10: Harrison Street between MacArthur Boulevard and Harrison Street – southbound AM and northbound PM.

Under Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the Project would cause an increase in corridor travel time of 37 seconds along Corridor #9 in the PM peak hour and increases of 257 seconds in the AM peak hour (southbound) and 165 seconds in the PM peak hour (northbound) directions along Corridor #10. Other corridors such as Broadway would also experience substantial increases in travel time in the future, but the Project’s contribution to these increases would be minimal.

TABLE IV.L-19
TRANSIT CORRIDOR TRAVEL TIMES – AM PEAK HOUR

		Corridor Travel Time (Incremental Increase in Seconds)						
No.	**Route**	**Existing Conditions**	**Existing plus Project (Phase I and Phase II) Conditions**	**Near-Term (2015) without Project Conditions**	**Near-Term (2015) plus Project (Phase I) Conditions**	**Near-Term (2015) plus Project (Phase I and Phase II) Conditions**	**Cumulative (2030) without Project Conditions**	**Cumulative (2030) plus Project (Phase I and Phase II) Conditions**
Weekday AM Peak Hour								
1	**11th Street EB** Brush Street to Oak Street	3:35	(- 1)	+ 3	+ 3	+ 1	+ 5	+ 4
2	**12th Street WB** Oak Street to Brush Street	3:19	+ 0	+ 3	+ 3	+ 3	+ 5	+ 5
3	**20th Street EB** Telegraph Avenue to Harrison Street	2:17	+ 23	+ 18	+ 10	+ 12	+ 25	+ 10
4	**20th Street WB** Harrison Street to Telegraph Ave.	1:40	+ 6	(- 23)	(- 13)	(- 11)	(- 23)	(- 5)
5	**Broadway SB** 27th Street to 20th Street	2:21	+ 4	+ 5	+ 6	+ 8	+ 10	+ 15
6	**Broadway SB** 20th Street to 11th Street	2:28	+ 0	+ 7	+ 8	+ 8	+ 16	+ 17
7	**Broadway NB** 11th Street to 20th Street	2:19	+ 0	+ 3	+ 5	+ 7	+ 19	+ 24
8	**Broadway NB** 20th Street to 27th Street	1:03	+ 1	+ 3	+ 3	+ 4	+ 7	+ 8
9	**Grand Avenue WB** MacArthur Blvd. to Harrison Street	3:30	+ 2	(- 3)	+ 0	+ 5	+ 15	+ 35
10	**Harrison Street SB** MacArthur Blvd. to Grand Avenue	3:28	+ 20	+ 77	+ 89	+ 107	+ 390	+ 647
11	**Telegraph Street SB** 27th Street to 20th Street	2:23	+ 2	+ 5	+ 5	+ 4	+ 4	+ 2

SOURCE: AECOM, 2009.

TABLE IV.L-20
TRANSIT CORRIDOR TRAVEL TIMES – PM PEAK HOUR

No.	Route	Corridor Travel Time: Existing Conditions	Existing plus Project (Phase I and Phase II) Conditions	Near-Term (2015) without Project Conditions	Near-Term (2015) plus Project (Phase I) Conditions	Near-Term (2015) plus Project (Phase I and Phase II) Conditions	Cumulative (2030) without Project Conditions	Cumulative (2030) plus Project (Phase I and Phase II) Conditions
Weekday PM Peak Hour								
1	**11th Street EB** Brush Street to Oak Street	4:40	+ 0	+ 2	+ 2	+ 2	+ 5	+ 5
2	**12th Street WB** Oak Street to Brush Street	3:28	+ 0	+ 3	+ 5	+ 5	+ 14	+ 14
3	**20th Street EB** Telegraph Avenue to Harrison Street	2:18	+ 28	(- 0)	+ 1	+ 2	+ 6	+ 5
4	**20th Street WB** Harrison Street to Telegraph Avenue	3:29	+ 9	(- 41)	(- 23)	(- 22)	(- 32)	(- 10)
5	**Broadway SB** 27th Street to 20th Street	2:18	+ 1	+ 2	+ 2	+ 3	+ 9	+ 11
6	**Broadway SB** 20th Street to 10th Street	2:58	+ 0	+ 45	+ 45	+ 44	+ 163	+ 164
7	**Broadway NB** 11th Street to 20th Street	3:33	+ 3	+ 80	+ 79	+ 80	+ 204	+ 209
8	**Broadway NB** 20th Street to 27th Street	1:45	+ 1	+ 42	+ 42	+ 44	+ 101	+ 104
9	**Grand Avenue EB** Harrison Street to MacArthur Blvd.	4:21	+ 37	+ 35	+ 51	+ 70	+ 138	+ 175
10	**Harrison Street NB** Grand Avenue to Perry Place	3:44	+ 133	+ 23	+ 81	+ 168	+ 79	+ 244
11	**Telegraph Street NB** 20th Street to 27th Street	2:03	+ 1	+ 0	+ 1	+ 1	+ 6	+ 9

SOURCE: AECOM, 2009.

Given that these are major corridors with significant vehicle traffic traveling to and from freeway ramps, transit vehicles on these routes already experience some delay during the peak periods and would continue to do so in Near-Term (2015) without Project Conditions and Cumulative (2030) without Project Conditions. As these are both key transit and vehicle corridors, diverting transit service off these roadways would be undesirable, even though doing so would likely improve travel times.

It should be noted, however, that some of the major vehicle corridors for Project-generated trips do not coincide with the transit corridors in Downtown Oakland. Broadway is the major north-south transit corridor in Downtown Oakland, but most Project-generated traffic heading to and from I-880 and Alameda would use Madison Street and Oak Street, which do not have transit service at all. Even on 20th Street, which carries a significant amount of east-west transit traffic and is directly adjacent to the Project Site, as well as for Jackson Street and the 11th Street / 12th Street couplet, the increase in traffic would be minimal. Furthermore, outside of the peak periods, the effect of the Project on transit travel times in these corridors is expected to be minimal, as most employees would arrive in the AM peak period and leave in the PM peak period.

Mitigation: None required.

Although not required to mitigate a significant impact, the following recommended improvements should be considered to improve transit conditions in the immediate vicinity of the Project:

Recommendation TRANS-4: Improve bus waiting areas on 20th Street directly adjacent to the Project Site.

As discussed in Recommendation TRANS-1, it is recommended that the sidewalk be widened at certain locations to improve pedestrian flow and reduce sidewalk congestion. As part of these proposed improvement measures, the two bus stops on the north side of 20th Street just east of Webster Street and west of Franklin Street would be moved out to the new curb line to open up sidewalk space. Currently, however, the stops are designed as simple benches, without shelters or other covered waiting areas.

It is therefore recommended that when these bus stops are relocated that the stops be redesigned as shelters featuring amenities for waiting passengers such as the following:

- A large, visible system map (currently only a small area map is provided for the immediate vicinity surrounding the stop) and comprehensive area map showing bus stop locations for other lines in the area;
- Bus schedules; and,
- Real-time arrival information.
- Wayfinding signage to transit facilities should also be provided on major pedestrian routes, such as 20th Street to and from the 19th Street BART Station.

Construction Period Impacts

Impact TRANS-11: Potential short-term construction impacts generated by the Proposed Project would include the impacts associated with the delivery of construction materials

and equipment, removal of construction debris, and parking for construction workers. (Less than Significant).

Table IV.L-21 provides a summary of Project construction traffic activity. During the construction period, temporary and intermittent transportation impacts would result from truck movements as well as construction worker vehicles traveling to and from the Project Site. The construction-related traffic would result in a temporary reduction to the capacities of Project area streets because of the slower movements and larger turning radii of construction trucks compared to passenger vehicles. Truck traffic that occurs during the peak commute hours (7:00 a.m. to 9:00 a.m., and 4:00 p.m. to 6:00 p.m.) could result in worse levels of service and higher delays at local intersections than during off-peak hours. Also, if parking of construction workers' vehicles cannot be accommodated within the Project Site, it would temporarily increase parking occupancy levels in the area. Project construction could also adversely affect the operations of AC Transit, and bicycle and pedestrian circulation.

TABLE IV.L-21
SUMMARY OF PROJECT CONSTRUCTION TRAFFIC ACTIVITY

Construction Activity	South Tower (Phase I)	North Tower (Phase 2)
Construction Vehicle Type / Number of Trips		
Off Haul Trucks (excavation materials)	3,100 truck loads	100 truck loads
Debris Box Trucking	260 loads	300 loads
Delivery Trucks	5,500 trucks	6,000 trucks
Passenger Vehicles (incl. construction employees)	140 cars per day average, 250 cars peak	140 cars per day average, 250 cars peak
Mobile Cranes	Intermittent use	Intermittent use
Construction Traffic Routes		
Interstate 580 [a]	To Harrison Street to job site	To Harrison Street to job site
Interstate 880	To Harrison Street to job site	To Harrison Street to job site
Interstate 980	To 27th Street to Harrison Street to job site	To 27th Street to Harrison Street to job site
Staging Areas/Lane or Street Closures		
Street	Close one lane (no parking) of 20th Street and one lane (parking) of Webster Street	Close one lane (parking) of Webster Street and one lane (parking) of 21st Street
Sidewalk	Close 20th Street and Webster Street sidewalks (adjacent to Project Site)	Close Webster Street and 21st Street sidewalks (adjacent to Project Site)
Construction Workers/Day		
Average number of workers	212	212
Peak	380	380
Parking	Existing onsite garage or surface lots in the vicinity	Existing onsite garage or surface lots in the vicinity
Estimated Cut/Fill; Mass Excavation	31,000 cubic yards	Minimal (existing building demolition)
Number of Truck Trips (Off Haul) (subset of *Construction Vehicle Type/Number of Trips*, above)		
Demolition Debris	800 truck loads	1,000 truck loads
Excavated Material	3,100 trucks	100 trucks

[a] Trucks over 9,000 pounds gross weight are prohibited from using Interstate 580 between Grand Avenue in Oakland and the city limits of the San Leandro, which means that only construction workers would use northbound I-580 to access the job site.

SOURCE: Turner Construction, 2009

Implementation of SCA TRANS-1 would ensure that construction period impacts are reduced to a less-than-significant level and require consultation with AC Transit about construction activity.

Mitigation: None required.

Planning-Related Non-CEQA Issues

The following section discusses transportation-related planning issues that do not constitute physical environmental impacts under CEQA, but that are evaluated to inform decision makers and the public about these issues.

Transit Impacts

This discussion evaluates the Project's potential to do any of the following:

- Increase the average ridership on AC Transit lines by three percent at bus stops where the average load factor in place would exceed 125 percent over a peak 30- minute period;
- Increase traffic congestion resulting in substantially increased travel times for AC Transit buses; or,
- Increase the peak hour average ridership on BART by three percent where the passenger volume would exceed the standing capacity of BART trains.

Based on the 30 percent transit mode share assumed for the trip generation analysis, the Project (Phase I and Phase II) would generate about 588 transit trips in the weekday AM peak hour and 571 transit trips in the weekday PM peak hour. Given that the Project would consist primarily of office space, these trips would almost exclusively be inbound during the AM peak hour and outbound during the PM peak hour. The expected distribution of transit trips was developed based on the trip distributions derived from the ACCMA Travel Demand Model.

For origins and destinations with both BART and AC Transit service, the split of Project-generated new transit riders on BART and AC Transit was based on a transit mode split of 7 percent AC Transit and 23 percent BART (for a total transit share of 30 percent) presented in the *Downtown Transportation and Parking Plan* (2003) for the Old Oakland / Metro Center / County Center Downtown subareas. The results of this analysis are summarized in **Table IV.L-22**.

AC Transit Loading

As shown in Table IV.L-22, the most substantial increase in transit ridership as a result of the Project would occur on the NL route, which would carry about 30 new riders in both the AM and PM peak hours. With 15-minute headways, this increase in ridership is equivalent to about eight new riders per bus. Given that the peak direction for the NL is westbound (towards Downtown Oakland and San Francisco) in the AM peak period and eastbound in the PM peak period, the Project would increase ridership in the "reverse commute" direction, which has substantial capacity to accommodate additional riders.

TABLE IV.L-22
PROJECT WEEKDAY PEAK-HOUR TRANSIT TRIPS

	Transit Routes				
	AM Peak Hour		PM Peak Hour		
Origin / Destination	**BART**	**AC**	**BART**	**AC**	**Transit Routes**
San Francisco	122	31	119	30	BART, NL
Hayward / Fremont	118	29	114	29	BART, 1, 1R, 40
West Oakland	39	26	38	25	BART, 13, 14, 19, NL
East Oakland	54	23	52	22	BART, 1, 1R, 11, 14, 18, 40, NL
North Oakland / Berkeley / Albany / El Cerrito / Richmond	62	26	60	26	BART, 1, 1R, 15, 18, 51, 72, 72R, 72M, 88
Walnut Creek / Pleasant Hill	59	0	57	0	BART
Total	**454**	**135**	**440**	**132**	

SOURCE: AECOM, 2009.

The Project would also cause increases of 20 to 30 passengers in the AM and PM peak hours to and from other origins and destinations, but these areas are served by multiple AC Transit bus lines. Project transit ridership would likely only result in a maximum increase of two to three passengers per bus on these lines.

Given this increase in AC Transit ridership, it is not expected that the Project would increase the average ridership on AC Transit lines by three percent at bus stops where the average load factor in place would exceed 125 percent over a peak 30-minute period

Mitigation: None required.

BART Loading

As shown in **Table IV.L-22**, the most substantial increase in transit ridership as a result of the Project would occur on the San Francisco and Fremont corridors of the BART network, which would see increases of about 120 passengers each in both the AM and PM peak hours. The existing peak hour capacity utilization—i.e., the ratio of ridership to capacity—for BART trains serving 19th Street Station is summarized in **Table IV.L-23**, given across a series of stations in and around Downtown Oakland for each line and direction. A capacity utilization over 100 percent would indicate exceedance of the standing capacity of the train.

Based on BART fleet statistics, the maximum capacity of a BART car was assumed to be 150 passengers, with an average of 68 to 72 seats in each car. Therefore, cars would have only standing room available at about 45 to 48 percent capacity utilization.

**TABLE IV.L-23
EXISTING BART TRAIN CAPACITY UTILIZATION**

Line	Train Length (cars)	As Train Enters	Half-Hour Capacity Utilization AM Peak Hour 8:00-8:30	AM Peak Hour 8:30-9:00	PM Peak Hour 5:00-5:30	PM Peak Hour 5:30-6:00
Fremont – Richmond	6	Lake Merritt	82%	72%	20%	24%
		Oakland City Center / 12th Street	74%	65%	22%	26%
		19th Street	54%	52%	49%	63%
		MacArthur	36%	37%	54%	68%
Richmond – Fremont	6	MacArthur	59%	63%	35%	46%
		19th Street	35%	33%	30%	38%
		Oakland City Center / 12th Street	29%	28%	45%	58%
		Lake Merritt	22%	20%	59%	77%
		Fruitvale	19%	16%	64%	80%
Richmond – Colma	8-9	MacArthur	50%	58%	14%	19%
		19th Street	53%	62%	15%	19%
		Oakland City Center / 12th Street	52%	62%	19%	22%
		West Oakland	49%	59%	24%	26%
Colma – Richmond	8-9	Oakland City Center / 12th Street	21%	24%	41%	58%
		19th Street	15%	16%	43%	59%
		MacArthur	11%	12%	45%	60%
		Ashby	11%	9%	39%	54%
Pittsburg / Bay Point – Daly City	9-10	19th Street	61%	76%	14%	19%
		Oakland City Center / 12th Street	59%	74%	16%	24%
		West Oakland	56%	72%	20%	30%
Daly City – Pittsburg / Bay Point	9-10	Oakland City Center / 12th Street	11%	15%	43%	77%
		19th Street	8%	10%	41%	73%
		MacArthur	7%	8%	43%	76%
		Rockridge	6%	7%	41%	74%

SOURCE: BART, 2007; AECOM, 2007.

It should be noted that the data presented from Table IV.L-23 is from 2007 and does not completely account for service changes that took place in January 2008. However, the 2008 service changes primarily affected line terminals (service to SFO was reinstated on the Pittsburg / Bay Point line instead of the Dublin / Pleasanton line, and the Richmond line was extended to Millbrae), and did not affect peak hour frequencies at the core of the system (San Francisco, Oakland, and Berkeley). Therefore, the overall effect of these service changes on train capacity utilization in Downtown Oakland, which is part of the core of the system, would be minimal.

As shown in Table IV.L-23, the Fremont – Richmond trains in the AM peak period and the Richmond – Fremont trains in the PM peak period exhibit the highest capacity utilization (approximately 80 percent). This is due to the relatively shorter trains as compared to those on other lines. BART's other lines generally operate eight- to ten-car trains during the peak periods, but the Fremont – Richmond and Richmond – Fremont services operate with six-car trains. Given these considerations, it was determined that the most critical increase in BART ridership as a result of the Project would occur on these trains, warranting additional analysis.

Under Existing plus Project (Phase I and Phase II) Conditions, ridership would increase by about 30 passengers per train for these lines during the peak hours, or about five passengers per car. At most, this is equivalent to a three percent increase in capacity utilization for these lines, bringing maximum capacity utilization on Fremont – Richmond trains in the AM peak hour to 85 percent and on Richmond – Fremont trains in the PM peak hour to 83 percent. However, the Project would not cause BART passenger volumes to exceed the standing capacity of trains.

Trains on other lines would see similar increases, but because they currently operate at well under 100 percent capacity utilization, these trains have capacity to accommodate additional Project-generated riders without exceeding standing capacity.

Mitigation: None required.

BART Faregate Queuing

Faregate queuing is most critical during the AM peak period exiting 19th Street Station, because passengers disembark from trains at approximately the same time, within the span of a few seconds. Queuing during the PM peak period is less critical because passengers entering the station tend to be more uniformly distributed over a span of several minutes leading up to the arrival of their train.

Based on the schedule of arrivals at 19th Street Station, the maximum queues occur when the Fremont – Richmond and SFO – Pittsburg / Bay Point trains arrive at the station at the same time as a result of the timed transfer at Oakland City Center / 12th Street Station. This timed transfer is scheduled to occur at the Oakland City Center / 12th Street station every 15 minutes and results in both trains also being scheduled to arrive at the 19th Street station at the same time. Observations of faregate queuing at the 19th Street Station during the peak period verified that the maximum queues occurred during this period.

It is assumed that all Project-generated BART ridership would use the faregate array leading to the station entrance at the northeast corner of the intersection of Broadway / 20th Street. Located at the northeastern corner of the station, this is the most convenient faregate array for access to the Kaiser Center block. There are actually two separate arrays of faregates at the north end of the station:

- The northeast array, which consists of a total of five faregates, which are configured to provide three exit faregates during the AM peak period; and,
- The northwest array, which consists of a total of three faregates, which are configured to provide two exit faregates during the AM peak period.

Observations indicate that the majority of passengers exiting and entering on the north end of the station use the northeast array, which is more conveniently located for access to the offices in and around the Kaiser Center area. The northwest array is not well-utilized, likely because there is substantially less office space west of Broadway. Observations indicated that the maximum queues at the northeast array are about 12 people in length at each of the three exit faregates and the maximum delays experienced by passengers waiting in the queues are about 16 to 18 seconds. This situation is defined as the “peak queuing scenario” for the 19th Street Station.

It should be noted, however, that queues of any significance only formed when both the Richmond-bound train and the Pittsburgh / Bay Point-bound train actually arrive at the same time. While the timed transfer schedules both trains to arrive at the same time, this scenario rarely occurs given fluctuations in arrival and departure times at Oakland City Center / 12th Street Station. Accordingly, when these two trains arrive at 19th Street Station even thirty seconds to one minute apart, the queues generated at the faregates are significantly shorter in length.

In addition, the maximum observed queue delay is not equivalent to the average queue delay. Because of the large volume of passengers over a short span of time, it is difficult to obtain a measure of average queue delay based simply on visual observations. However, average queue delay is expected to be significantly lower than maximum queue delay, considering that passengers who arrive at the faregates before or after the peak queues would experience little to no queue delay at all.

Based on the estimates of Project BART ridership in Table IV.L-22, the Project would add about 45 passengers during the peak queuing scenario (30 passengers from the Fremont – Richmond train and 15 passengers from the SFO – Pittsburg / Bay Point train). Based on a BART faregate capacity of 25 passengers per minute and assuming that these additional Project-generated riders all arrive at the faregates at the same time, the Project would theoretically increase the maximum faregate queues by 15 passengers to 27 passengers in length. The service time required to handle the additional 15 passengers is about 36 seconds, increasing the theoretical maximum queue delays to 52 to 54 seconds.

However, this methodology represents an extremely conservative model of faregate delay, as it assumes that all Project-generated riders arrive at the array at the same time, which doesn’t take into account (1) the walking speed of the passenger; (2) the walking distance (i.e., location of the train doors in relation to concourse level access points and locations of stairs and escalators in relation to the faregate arrays); and (3) the means of concourse access (i.e., stair vs. escalator).

Because of these factors, it is likely that the Project would increase maximum queue delay by five to ten seconds at the most, but still keeping the maximum queue delay well under the one minute performance standard of the City of Oakland. Average queue delay would increase by even less, because it is much less than the maximum queue delay.

In addition, the northwest array is currently substantially under-utilized because it offers less convenient access to the northeast station entrance. Maximum queue delays at this array were observed to be several seconds, and many exiting passengers experienced no queue delay at all. If passengers find queues at the northwest array to be problematic, they will likely use the northeast array, which will offer quicker service times for minimal additional walking distance. With increasing use of BART's contactless smart card technology (i.e., the EZ Rider Card) among regular passengers, the potential for queue delays would also be substantially reduced.

Furthermore, the direction of faregates can also be modified to accommodate additional passenger demand. Given the lighter passenger demand entering 19th Street Station in the AM peak hour, an additional exit faregate at the array could be provided by simply switching one of the two entry faregates to the exit direction.

Mitigation: None required.

Intersection Queuing Analysis

Queuing analysis was carried out for all of the "with project" scenarios using the Synchro software. The software calculates the expected queue using a formula that extrapolates the length of queue based on two cycle lengths. This methodology provides reasonable results for locations operating in the LOS A through D, but can misrepresent conditions as intersection operations approach capacity. In these instances, the software output denotes the condition with a letter / symbol adjacent to the analysis output worksheet.

Signalized intersections operating at unacceptable conditions as shown in Table IV.L-10, Table IV.L-12, Table IV.L-14, and Table IV.L-16 were selected for evaluation as the Project is expected to have its largest effect on 95th percentile queues at these intersections. In all cases, the storage capacity is taken as the distance to the nearest intersection, major driveway, or pedestrian crossing.

Instances where the Project trips would add 25 or more feet to the baseline (without project) 95th percentile queue if the baseline 95th percentile queue was already over the available storage length, or where Project trips would extend the queue over the available storage length, were identified. The findings are summarized below and detailed analysis and tables are provided in **Appendix G.7** of this EIR.

Existing plus Project (Phase I and II) Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – Grand Avenue NER.

Near-Term (2015) plus Project (Phase I) Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #12: Harrison Street / Grand Avenue (PM) – Harrison Street NBR;

- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – Grand Avenue NER; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – Lakeshore Avenue NETR.

Near-Term (2015) plus Project (Phase I and II) Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #5: Telegraph Avenue / 27th Street (PM) – Telegraph Avenue NBL and 27th Street WBT;
- Intersection #12: Harrison Street / Grand Avenue (PM) – Harrison Street NBR and SBTR;
- Intersection #42: Jackson Street / 6th Street / I-880 NB On-Ramp (PM) – Jackson Street SBR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – Grand Avenue NER;
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – Lakeshore Avenue NETR; and,
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (AM) – MacArthur Boulevard (WB) NWTR.

Cumulative (2030) plus Project (Phase I and II) Conditions

- Intersection #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM) – I-580 EB Off-Ramp EBR;
- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (AM / PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (AM / PM) – Harrison Street SBTR (AM) and NBTR (PM);
- Intersection #5: Telegraph Avenue / 27th Street (PM) – Telegraph Avenue NBL and SBL, and 27th Street WBT;
- Intersection #12: Harrison Street / Grand Avenue (AM / PM) – Harrison Street NBT / NBR (PM) and SBTR (AM / PM), and Grand Avenue WBL (AM);
- Intersection #13: Harrison Street / 21st Street (PM) – Harrison Street NBT;
- Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM) – Harrison Street NBLTR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (AM / PM) – Grand Avenue SWT (AM) and NER (PM);
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – Lakeshore Avenue NETR;

- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (AM) – MacArthur Boulevard (WB) NWTR; and,
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – Harrison Street SWT.

It should be noted, however, that most of these locations have already been proposed for mitigation measures as a result of intersection LOS impacts. These measures, which include optimization of signal timing and phasing and upgrading of traffic signal hardware, would mitigate some of the Project's intersection LOS impacts at these locations, and would generally improve 95th percentile queues. In cases where the proposed mitigation measures would not completely mitigate the Project's intersection LOS impacts, further improvements to reduce 95th percentile queues would generally be infeasible, as these are typically geometrically-constrained locations, or locations where further improvements would conflict with policies for other modes such as transit, pedestrians, or bicycles, or with ongoing planning efforts.

Mitigation: None required.

Although not required to mitigate a significant impact, the following recommended improvement should be considered to reduce queuing:

Recommendation TRANS-5: Close the Stanley Place approach at Intersection #1 (Harrison Street / Stanley Place / I-580 EB Off-Ramp).

> Closure of the Stanley Place minor approach would slightly reduce the 95th percentile queue under Cumulative (2030) plus Project (Phase I and II) Conditions, although not below a 25-foot increase over Cumulative (2030) without Project Conditions. This measure would have the added benefit of reducing delay for traffic using the I-580 Eastbound Off-Ramp and reducing the potential for collision by eliminating the conflict resulting from two adjacent minor-street approaches. Pedestrian access along the north side of Harrison Street would also be improved as a result.

The queues on the Kaiser Center Access Road approach at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) would be confined within the Project Site and would not cause spillback that would affect roadways outside the site.

Traffic Control

The California Manual on Uniform Traffic Control Devices (MUTCD) peak hour traffic signal warrant was satisfied at the following intersections under Project scenarios:

- Intersection #51: Oakland Avenue / Monte Vista Avenue / Vernon Street.

However, this intersection would already satisfy the MUTCD peak hour signal warrant under baseline scenarios. While the Project would add traffic to this intersection, the minor street approaches at this location would already operate with substantial levels of delay even without Project-generated traffic.

Mitigation: None required.

Collision History

Historical collision data were examined at study intersections for a recent period of six years and three months (October 1, 2002 to December 31, 2008). All collisions involving vehicles, bicycles, and/or pedestrians were noted, and collision rates (collisions per one million entering vehicles) were determined. Average daily traffic volumes are assumed to be ten times the PM peak hour volume. As shown in **Table IV.L-24**, the intersection of Brush Street / 18th Street / I-980 Westbound Off-Ramp has the highest collision rate, at 1.61 collisions per million entering vehicles, while the average rate for study intersections is 0.48 collisions per million entering vehicles.

In addition, the primary causal factors (e.g., right-of-way violation, unsafe speed, improper turning) of each incident were examined to determine the cause of the collisions. **Table IV.L-25** outlines the results for each intersection. Collision summary data can be found in **Appendix G.8**.

Mitigation: None required.

TABLE IV.L-24
INTERSECTION COLLISION SUMMARY

#	Intersection	Involved with Veh.	Bicycle[a]	Ped.[b]	Other[c]	Total	Inju-ries	Peak Hour Vol.	Colli-sion Rate[d]
1	Harrison/Stanley/I-580 Ramp	0	0	1	1	2	0	826	0.22
2	Oakland/Perry/I-580 Ramps	7	0	0	1	8	0	2,336	0.23
3	Harrison / 27th St./24th St.	27	0	0	2	29	8	3,048	0.65
4	Broadway / 27th St.	10	1	2	1	14	4	2,482	0.39
5	Telegraph Ave. / 27th St.	12	2	1	1	16	2	2,632	0.42
6/7	Northgate/27th/I-980 Ramp	38	1	0	2	41	26	3,962	0.71
8	Northgate / West Grand	7	0	0	0	7	3	1,864	0.34
9	Telegraph / West Grand	13	2	2	3	20	10	2,557	0.54
10	Broadway / Grand Ave.	10	1	0	1	12	12	2,332	0.35
11	Webster St. / Grand Ave.	5	0	0	0	5	1	1,468	0.23
12	Harrison St. / Grand Ave.	8	1	0	0	9	5	4,159	0.15
13	Harrison St. / 21st St.	7	0	0	0	7	0	2,514	0.19
17	Webster St. / 21st St.	2	0	0	1	3	1	888	0.23
18	Franklin St. / 21st St.	5	0	0	1	6	5	672	0.61
19	Broadway / 21st Street	6	0	1	1	8	8	1,013	0.54
20	Telegraph Ave. / 20th St.	10	0	1	1	12	3	1,248	0.66
21	Broadway / 20th Street	5	0	0	1	6	2	1,961	0.28
22	Franklin St. / 20th St.	10	1	0	1	12	2	1,209	0.68
23	Webster St. / 20th St.	2	0	0	0	2	0	1,401	0.10
24	Harrison St. / 20th St.	5	0	0	0	5	2	1,527	0.22
26	Harrison St. / Lakeside Dr.	8	0	0	0	8	3	2,492	0.29
27	Lakeside Dr. / 20th St.	3	0	0	0	3	0	1,568	0.13
28	Brush/18th/I-980 WB Ramp	41	0	0	0	41	19	1,397	1.61
29	Castro/17th/I-980 EB Ramp	32	0	0	0	32	10	1,903	0.92
30	Castro/12th/I-980 EB Ramp	35	0	0	0	35	4	2,310	1.04
31	Brush/11th/I-980 WB Ramp	10	0	0	1	11	3	1,580	0.48
32	Oak Street / 14th Street	5	0	0	0	5	3	2,127	0.16
33	Madison St. / 14th St.	9	0	0	2	11	1	1,893	0.40
34	Harrison St. / 14th St.	23	0	1	2	26	16	1,552	1.15
35	Madison St. / 12th St.	5	0	1	0	6	4	1,614	0.25
36	Oak Street / 12th Street	7	0	2	1	10	4	1,869	0.83
37	Oak Street / 11th Street	0	0	0	1	1	0	958	0.07
38	Madison St. / 11th St.	3	0	0	0	3	0	1,694	0.12
39	Franklin St. / 11th St.	5	0	0	2	7	1	1,003	0.48
40	Oak Street / 7th Street	7	0	0	1	8	4	2,160	0.25
41	Madison St. / 7th St.	13	0	0	0	13	5	2,640	0.34
42	Jackson/6th/I-880 NB Ramp	32	0	0	0	32	10	2,488	0.88
43	Oak/6th/I-880 NB Ramp	4	0	0	1	5	0	1,388	0.25
44	Oak/5th/I-880 SB Ramp	12	0	0	1	13	2	1,355	0.66
45	Grand / El Embarcadero	22	0	1	2	25	7	3,158	0.43
46	Lakeshore / El Embarcadero	15	1	1	0	17	2	2,563	0.36
47	Grand / MacArthur Blvd. (EB)	21	0	2	3	26	6	3,634	0.39
48	Lakeshore / MacArthur (EB)	40	2	1	10	53	6	3,414	0.85
49	Oakland / MacArthur (WB)	43	1	0	4	48	17	2,372	1.11
50	Harrison / MacArthur (WB)	21	0	0	4	25	2	2,057	0.67
51	Oakland / Monte Vista Ave.	0	0	0	0	0	0	917	0.00
	Average								**0.48**

[a] Detection (usually video detection) for bicycles is typically a consideration for intersections with collisions involving bicycles.
[b] Pedestrian countdown signals are typically a consideration for intersections with collisions involving pedestrians.
[c] Includes collisions with objects and collisions marked as "Not Stated," "Fixed Object," or "Unknown."
[d] Incident rates in collisions per million vehicles entering the intersection.

SOURCE: City of Oakland, October 2002-December 2008; AECOM, 2009.

TABLE IV.L-25
INTERSECTION COLLISION PRIMARY CAUSAL FACTORS

		Factors					
#	Intersection	Auto R/W Violation	Traffic Signals and Signs	Unsafe Speed	Other Hazardous Movement	Improper Turning	Unknown / Other / Not Stated
1	Harrison/Stanley/I-580 Ramp	0%	0%	50%	0%	50%	0%
2	Oakland/Perry/I-580 Ramps	0%	25%	38%	0%	38%	0%
3	Harrison/27th/24th	24%	17%	10%	3%	28%	17%
4	Broadway / 27th Street	36%	21%	14%	0%	7%	21%
5	Telegraph Ave. / 27th St.	0%	25%	25%	13%	19%	19%
6/7	Northgate/27th/I-980 Ramps	0%	63%	15%	0%	17%	5%
8	Northgate/West Grand	17%	0%	17%	17%	33%	17%
9	Telegraph/West Grand	35%	15%	10%	0%	15%	25%
10	Broadway / Grand Avenue	33%	50%	0%	0%	0%	17%
11	Webster / West Grand	20%	40%	0%	0%	40%	0%
12	Harrison St. / Grand Ave.	0%	22%	44%	0%	22%	11%
13	Harrison St. / 21st St.	0%	29%	14%	0%	14%	43%
17	Webster St. / 21st St.	0%	0%	0%	0%	67%	33%
18	Franklin St. / 21st St.	0%	0%	33%	0%	50%	17%
19	Broadway / 21st Street	25%	50%	0%	0%	13%	13%
20	Telegraph Ave. / 20th St.	8%	17%	8%	0%	25%	42%
21	Broadway / 20th Street	33%	33%	0%	0%	0%	33%
22	Franklin St. / 20th St.	8%	33%	0%	0%	25%	33%
23	Webster St. / 20th St.	0%	50%	0%	0%	50%	0%
24	Harrison St. / 20th St.	0%	0%	20%	20%	20%	40%
26	Harrison St. / Lakeside Dr.	0%	25%	38%	0%	13%	25%
27	Lakeside Dr. / 20th St.	0%	0%	67%	0%	33%	0%
28	Brush/18th/ I-980 WB Ramp	2%	56%	15%	0%	10%	17%
29	Castro/17th/ I-980 EB Ramp	3%	50%	3%	3%	13%	28%
30	Castro/12th/ I-980 EB Ramp	6%	29%	0%	14%	31%	20%
31	Brush/11th/ I-980 WB Ramp	0%	18%	0%	18%	45%	18%
32	Oak Street / 14th Street	20%	20%	20%	0%	20%	20%
33	Madison St. / 14th St.	0%	0%	18%	18%	45%	18%
34	Harrison St. / 14th St.	8%	62%	8%	0%	8%	15%
35	Madison St. / 12th St.	0%	67%	0%	0%	17%	17%
36	Oak Street / 12th Street	0%	71%	6%	6%	6%	12%
37	Oak Street / 11th Street	0%	0%	0%	0%	100%	0%
38	Madison St. / 11th St.	0%	67%	0%	0%	33%	0%
39	Franklin St. / 11th St.	0%	29%	43%	0%	14%	14%
40	Oak Street / 7th Street	0%	75%	13%	0%	13%	0%
41	Madison St. / 7th St.	0%	46%	23%	0%	23%	8%
42	Jackson/6th/ I-880 NB Ramp	3%	84%	6%	0%	3%	3%
43	Oak/6th/ I-880 NB Ramp	0%	20%	20%	20%	20%	20%
44	Oak/5th/ I-880 SB Ramp	0%	69%	0%	8%	15%	8%
45	Grand / El Embarcadero	12%	8%	44%	4%	4%	28%
46	Lakeshore / El Embarcadero	12%	35%	24%	0%	6%	24%
47	Grand / MacArthur (EB)	4%	15%	19%	0%	27%	35%
48	Lakeshore / MacArthur. (EB)	15%	26%	15%	2%	11%	30%
49	Oakland / MacArthur (WB)	4%	48%	10%	2%	15%	21%
50	Harrison / MacArthur (WB)	0%	54%	21%	0%	13%	13%

SOURCE: City of Oakland, January 2003-September 2007; AECOM, 2009.

Parking and Loading

Proposed Parking and Loading Supply

The Project would remove 155 spaces in the existing Kaiser Center Garage and construct 852 spaces for a net increase of 697 spaces in the Kaiser Center Garage, broken down by phase as follows:

- Phase I of the Project would construct 467 new spaces, but would not demolish any existing spaces, resulting in a net increase of 467 spaces; and,
- Phase II of the Project would demolish 155 existing spaces and construct 385 new spaces, resulting a net increase of 230 spaces.

After completion of the Project, the Kaiser Center Garage would have a capacity of 2,037 spaces and be operated as a single garage shared between the existing Kaiser Center tower and the Project.

For the purposes of this analysis, all existing spaces in the Kaiser Center Garage, including spaces that would be removed and replaced as part of the Project, are not considered part of the Project's proposed parking supply. The proposed parking supply is equivalent to the net new parking as a result of the Project—in this case, 697 spaces.

The Project proposes a total of six loading berths. Three loading berths would be located in a single dock on the north side of the Project Site, accessible via 21st Street, serving the North Tower. An additional three berths would be located in a single dock on the east side of the Project Site, with access from the Access Road running through the Kaiser Center block. These berths would serve the South Tower and are shown in Figures IV.L-11a and L-11b.

Parking Supply and Demand Evaluation

The Court of Appeal has held that parking is not part of the permanent physical environment, that parking conditions change over time as people change their travel patterns, and that unmet parking demand created by a project need not be considered a significant environmental impact under CEQA unless it would cause significant secondary effects.[9] Similarly, the December 2009 amendments to the State CEQA Guidelines (which were effective March 18, 2010) removed parking from the State's Environmental Checklist (Appendix G of the State CEQA Guidelines) as an environmental factor to be considered under CEQA. Parking supply/demand varies by time of day, day of week, and seasonally. As parking demand increases faster than the supply, parking prices rise to reach equilibrium between supply and demand. Decreased availability and increased costs result in changes to people's mode and pattern of travel. However, the City of Oakland, in its review of the proposed project, wants to ensure that the project's provision of additional parking spaces along with measures to lessen parking demand (by encouraging the use of non-auto travel modes) would result in minimal adverse effects to project occupants and visitors, and that any secondary effects (such as on air quality due to drivers searching for parking spaces) would be minimized. As such, although not required by CEQA, parking conditions are evaluated in this document.

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9 San Franciscans Upholding the Downtown Plan v. the City and County of San Francisco (2002) 102 Cal.App.4th 656.

Parking deficits may be associated with secondary physical environmental impacts, such as air quality and noise effects, caused by congestion resulting from drivers circling as they look for a parking space. However, the absence of a ready supply of parking spaces, combined with available alternatives to auto travel (e.g., transit service, shuttles, taxis, bicycles or travel by foot), may induce drivers to shift to other modes of travel, or change their overall travel habits. Any such resulting shifts to transit service, in particular, would be in keeping with the City's "Transit First" policy.

Additionally, regarding potential secondary effects, cars circling and looking for a parking space in areas of limited parking supply is typically a temporary condition, often offset by a reduction in vehicle trips due to others who are aware of constrained parking conditions in a given area. Hence, any secondary environmental impacts that might result from a shortfall in parking in the vicinity of the proposed project are considered less than significant.

This [EIR] evaluates if the project's estimated parking demand (both project-generated and project-displaced) would be met by the project's proposed parking supply or by the existing parking supply within a reasonable walking distance (five minutes or approximately 900 feet) of the project site. Project-displaced parking results from the project's removal of standard on-street parking, City or Redevelopment Agency owned/controlled parking and/or legally required off-street parking (non-open-to-the-public parking which is legally required).

A consideration when evaluating the Project's proposed parking supply is the City of Oakland Municipal Code requirements for off-street parking. It should be noted that code requirements are not used to determine parking impacts; a comparison of parking supply versus estimated parking demand (discussed later) is used to determine potential impacts. An estimate of parking demand was obtained through use of the Institute of Transportation Engineers' *Parking Generation* (Third Edition). **Table IV.L-26** summarizes vehicle parking code requirements and estimated parking demand for the Project. Because the proposed retail space is assumed to be a one-to-one replacement of existing retail space at the Project Site, the proposed retail space is omitted from the code requirement and demand calculations.

TABLE IV.L-26
PARKING CODE REQUIREMENTS AND DEMAND

			Parking Demand		
Land Use[a]	**Size (KSF)**[b]	**Code Requirement**	**ITE**	**Downtown Transportation and Parking Plan**	**Spaces Proposed (Net)**
Office					
South Tower (Phase I)	552	0	1,325	773	467
North Tower (Phase II)	768	0	1,843	1,075	230
Total	1,320	0	3,168	1,848	697

[a] For office use (Land Use 701 – Office Building, Urban):
Average Peak Period Parking Demand: 2.40 vehicles per 1,000 sq. ft. GFA
[b] KSF = 1,000 sq. ft.

SOURCE: City of Oakland *Municipal Code* 17.116.080; Institute of Transportation Engineers (ITE), *Parking Generation* (3rd Edition), 2003; AECOM, 2009.

According to the City of Oakland Municipal Code, the Project is not required to provide any off-street parking because of its location in a C-55 / S-17 zoning district.

According to national Institute of Transportation Engineers (ITE) statistics, land uses similar in size and type to the Proposed Project would generate a parking demand of 3,168 spaces. The available capacity on-site and in the surrounding area would be about 1,610 spaces:

- 697 spaces are proposed as the Project's net new parking supply;
- 419 spaces in average existing capacity available at the Kaiser Center Garage, based on occupancy data as of July 2010 (Table IV.L-7, page IV.L-35); and,
- 494 spaces in average existing capacity available at off-street parking facilities in the vicinity of the Project, based on occupancy surveys as of October 2008 (Table IV.L-7, all facilities other than the Kaiser Center Garage).

Based on this available capacity and ITE parking demand estimates, the Project would result in a parking shortfall of about 1,558 spaces[10].

It should be noted, however, that the estimated parking demand rate of 2.4 vehicles per 1,000 square feet represents an average for suburban locations where private automobiles are the primary mode of travel, and is therefore not entirely applicable for areas with comprehensive transit service such as Downtown Oakland. The *Downtown Transportation and Parking Plan*, compiled by Dowling Associates for the City of Oakland Redevelopment Agency and the Community and Economic Development Agency (CEDA) in October 2003, recommended off-street parking ratios of 1.4 vehicles per 1,000 square feet for locations in Downtown outside of the City Center area, within two blocks of BART. Based on these calculations, the Project would generate a parking demand of about 1,848 spaces, which would still result in a shortfall of about 238 spaces.[11]

Given the wide availability of high-quality transit alternatives such as BART and AC Transit, however, the Project is not expected to result in substantial effects on parking conditions in the vicinity of the Project Site. In fact, providing more parking could instead increase the automobile mode share for Project-generated trips and facilitate increased vehicle trips or increased frequency of auto use, and would counteract the City's Transit First policy and TDM programs implemented by the Project sponsor or future tenants within the Project buildings. See page IV.L-42 for a discussion of the City of Oakland's SCA TRANS-1 (Parking and Transportation Demand Management), which requires that prior to issuance of a final inspection of the building permit, the applicant shall submit for review and approval by the Planning and Zoning Division a TDM plan containing strategies to reduce on-site parking demand and single occupancy vehicle travel.

The City of Oakland Municipal Code has specific requirements for parking stall size (18 feet by 8.5 feet for regular stalls, and 16 feet by 7.5 feet for compact stalls). The code limits the amount of compact spaces to 33 percent of the total parking supply.

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[10] 3,160 – [697 + 419 + 494] = 1,558.
[11] 1,848 – [697 + 419 + 494] = 238.

Based on preliminary site plans, the Project's parking supply would need to meet the code requirements on parking stall dimensions and supply of compact spaces. If the Project's proposed parking supply does not satisfy code requirements, the Project sponsor would be required to obtain a variance from CEDA.

Loading Supply Evaluation

While the City of Oakland does not provide specific thresholds of significance with regards to loading, a shortfall in the provision of loading berths could result in delivery and service vehicles double-parking and obstructing circulation in the area, leading to an increased potential for collisions. Given these considerations, the Project's proposed supply of loading berths was compared against the loading supply requirements from the City of Oakland Municipal Code. Because the proposed retail space is assumed to be a one-to-one replacement of existing retail space at the Project Site, the proposed retail space is omitted from the code requirement and demand calculations.

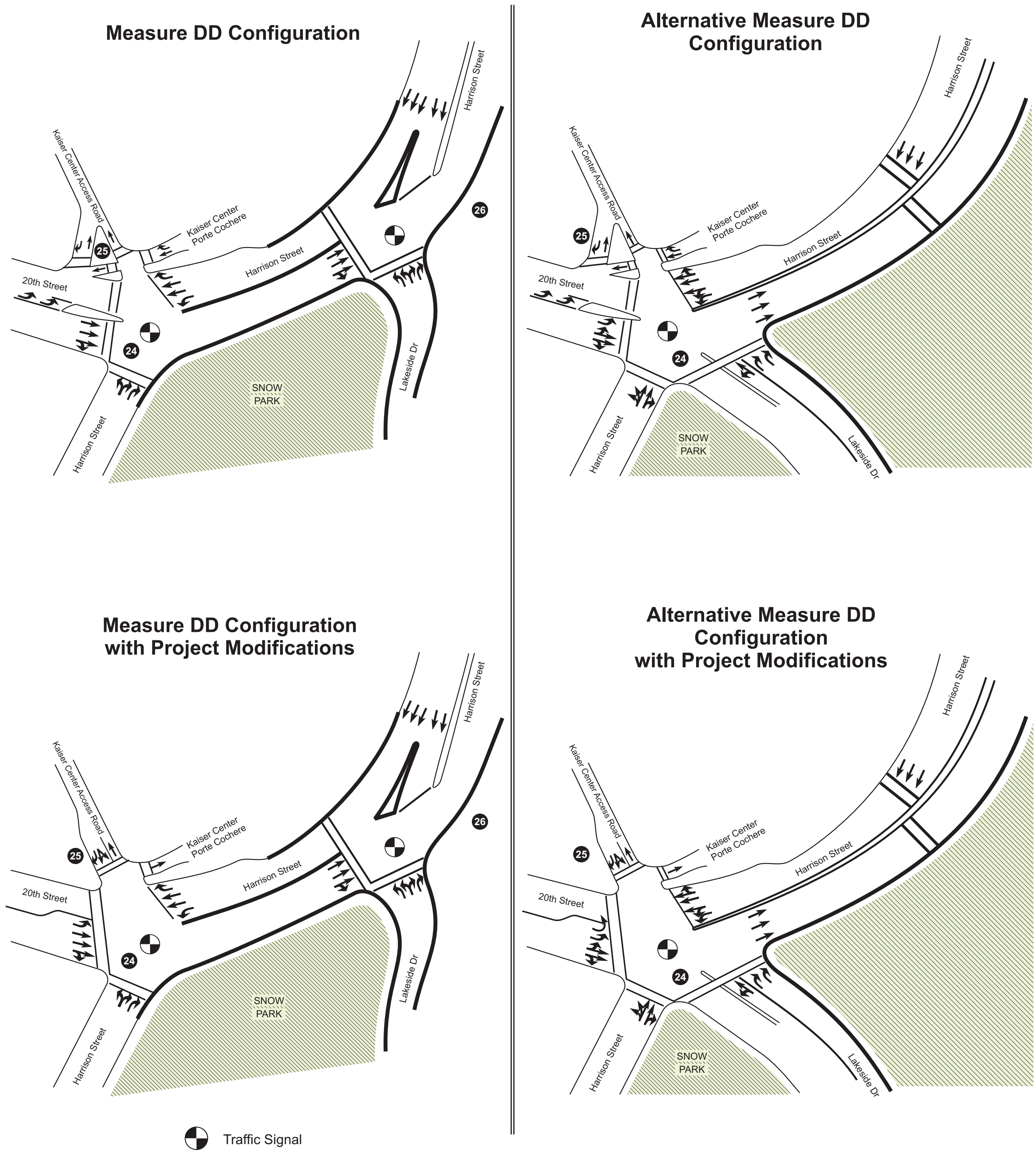
Based on the Project's gross area of office space, the Project is required to provide three loading berths for each phase of the development—a total of six berths. Because the Project is proposing three berths for each tower, the Project's proposed supply of loading berths would meet code requirements.

The design of the proposed spaces must meet the code requirements on loading berth dimensions (33 feet long, 12 feet wide, and 14 feet high). If the Project's proposed loading berth designs do not satisfy code requirements, the Project sponsor would be required to obtain a variance from CEDA.

Alternative Measure DD Intersection Configuration Analysis

This section discusses a possible alternative configuration for the Harrison Street / Lakeside Drive / 20th Street "triangle" directly adjacent to the Kaiser Center block and summarizes findings concerning intersection delay and queuing for both the Measure DD configuration and the alternative configuration ("Alternative Measure DD").

As discussed in the Near-Term (2015) without Project Conditions analysis, Measure DD proposes improvements to the Harrison Street / Lakeside Drive / 20th Street "triangle" which are not yet constructed. These improvements include the removal of the 20th Street leg of the triangle, which would then be converted to open space as part of an expanded Snow Park. The intersection of Harrison Street / Lakeside Drive would be reconfigured into a "T" intersection (this would require the realignment of Lakeside Drive). These improvements would enhance pedestrian access to Lake Merritt by simplifying routes for pedestrians and reducing the number of crossings. These proposed changes are illustrated in **Figure IV.L-20**.



SOURCE: AECOM

Figure IV.L-20
Alternative Measure DD Configuration

However, because of the proximity of the intersections of Harrison Street / 20th Street and Harrison Street / Lakeside Drive under the Measure DD configuration and the resulting potential for queuing impacts, a preliminary microsimulation analysis of the roadways and intersections in the immediate vicinity of the Project was conducted. The microsimulation analysis concluded the following:

- Substantial queuing would occur on the following movements with the Measure DD configuration:
  - All movements on the northbound approach on Harrison Street at 20th Street;
  - All movements on the south eastbound approach (Kaiser Center Access Road) at Harrison Street / 20th Street; and,
  - Eastbound-through movement on Harrison Street at Lakeside Drive, leading to spillback queuing affecting throughput at Harrison Street / 20th Street.
- The removal of the eastern 20th Street leg at Harrison Street / 20th Street introduces traffic flow conflicts between northbound Harrison Street vehicles bound for Grand Avenue and I-580 and eastbound 20th Street vehicles attempting to access southbound Lakeside Drive to reach 11th / 12th Streets and I-880. This increases the potential for collisions as vehicles attempt to weave into the appropriate lane or make sudden lane changes and turning movements over short distances.

Based on the microsimulation analysis, the reconfiguration of the Harrison Street / Lakeside Drive / 20th Street Triangle as originally proposed by Measure DD would result in substantial queuing issues and weaving conflicts as detailed above. These issues would be further complicated by the addition of Project-generated traffic. However, with Mitigation Measure TRANS-1c (signal retiming of Intersection #24 [Harrison Street / 20th Street / Kaiser Center Access Road] there would be less than significant CEQA impact under all scenarios (Existing Plus Buildout, 2015 Plus Phase 1, 2015 Plus Buildout, 230 Plus Buildout).

To address the non-CEQA queuing and weaving conflicts, the transportation consultant for the EIR proposed that the Lakeside Drive section of the triangle be removed instead. A conceptual illustration of this alternative configuration is illustrated in Figure IV.L-20. The existing configuration (before any improvements) is illustrated in Figure IV.L-14.

Although the alternative configuration would require changes to lane striping and configuration and signal timing and phasing, it would provide the following benefits:

- Complete removal of one intersection from the roadway network, streamlining traffic flows. The reconfiguration as originally proposed by Measure DD would have removed the 20th Street section of the Triangle, but the intersection of Harrison Street / 20th Street would still have remained because of the presence of conflicting movements;
- Elimination of the intersection queuing and associated spillback queuing impacts at the intersection of Harrison Street / Lakeside Drive. The alternative configuration would result in about 600 feet of unobstructed queuing storage along the westbound Harrison Street approach to Lakeside Drive;

- Elimination of the weaving conflicts and potential for collisions discussed previously, as eastbound-through vehicles from 20th Street would no longer have to use Harrison Street to access Lakeside Drive;

- More effective placement of open space. The original proposal called for Snow Park to be expanded, but the new open space would still be separated from Lake Merritt by Lakeside Drive. The alternative configuration removes the Lakeside Drive section of the Triangle and allows existing open space abutting the Lake to be expanded to the west. This reduces the number of crosswalks by one for pedestrians attempting to access the lakeshore from 20th Street west of Harrison Street and enhances the attractiveness of the shoreline area as a lunchtime or recreational spot for employees in nearby office buildings;

- Improved options for Project-related traffic, as the alternative configuration with project modifications improves connections to Lakeside Drive for vehicles coming to and from the Access Road; and,

- Improved pedestrian access to the Lake by allowing for possible signalized midblock (pedestrian-actuated) crossings along Harrison Street between 20th Street and 21st Street and Lakeside Drive between 20th Street and Jackson Street.

It should be noted that the alternative configuration would also likely result in higher delays and worse level of service at the intersection of Harrison Street / 20th Street than the original reconfiguration. Given, however, that it would produce the benefits described above, particularly the improvement of non-auto access to open space—a primary goal of Measure DD—it was recommended that a supplementary analysis be conducted assuming the alternative configuration for the following scenarios:

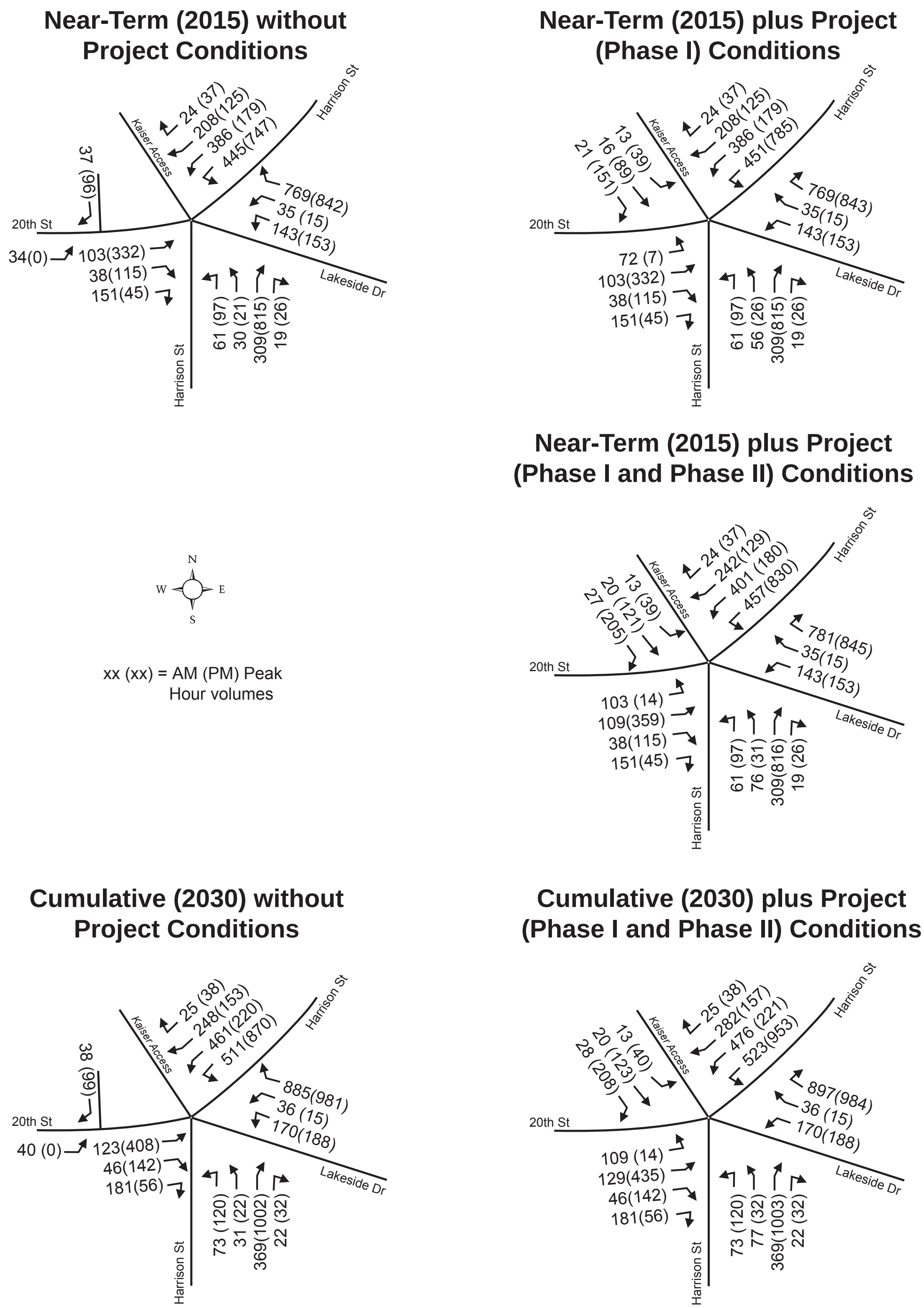
- Near-Term (2015) without Project Conditions;
- Near-Term (2015) plus Project (Phase I) Conditions;
- Near-Term (2015) plus Project (Phase I and Phase II) Conditions;
- Cumulative (2030) without Project Conditions; and,
- Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Additionally, a Cumulative (2030) plus Project (Phase I) Conditions is presented in the supplementary Phase I Only, South Tower Only analysis in **Appendix H** to this EIR.

Intersection Operations

Near-Term (2015) without Project Conditions

Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. **Table IV.L-27** summarizes the intersection level of service for the Alternative Measure DD configuration under Near-Term (2015) without Project Conditions. As shown in the table, the intersection of Harrison Street / 20th Street / Kaiser Center Access Road under the Alternative Measure DD configuration would operate comparably to the original Measure DD configuration in the AM peak hour, but worse in the PM peak hour. However, the intersection would still operate at acceptable levels of service (LOS E or better) under the Alternative Measure DD configuration during the PM peak hour.



SOURCE: AECOM

Figure IV.L-21
Alternative Measure DD Traffic Volumes
AM (PM) Peak Hour

TABLE IV.L-27
NEAR-TERM (2015) INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

			Near-Term (2015) without Project Conditions (Original Measure DD)				Near-Term (2015) without Project Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	26.5	C	20.9	C	28.6	E	58.2
26	Harrison Street / Lakeside Drive	Signal	B	18.3	C	24.2	--	--	--	--
	Combined Delay		D	44.8	D	45.1	C	28.6	E	58.2

Bold indicates intersections operating at LOS F.

[a] The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

It should be noted however, that the two configurations are not directly comparable on an intersection-by-intersection basis. For drivers passing through both intersections at Harrison Street / 20th Street / Kaiser Center Access Road and Harrison Street / Lakeside Drive, for example, the Alternative Measure DD configuration would result in less average delay during the AM peak hour and only slightly worse average delay during the PM peak hour.

Cumulative (2030) without Project Conditions

Table IV.L-28 summarizes the intersection level of service for the Alternative Measure DD configuration under Cumulative (2030) without Project Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. +

As shown in the table, the intersection of Harrison Street / 20th Street / Kaiser Center Access Road under the Alternative Measure DD configuration would operate worse in both the AM and PM peak hour. The intersection would operate at unacceptable conditions during the PM peak hour.

For drivers passing through both intersections at Harrison Street / 20th Street / Kaiser Center Access Road and Harrison Street / Lakeside Drive, the Alternative Measure DD configuration would result in less average delay during the AM peak hour, but worse average delay during the PM peak hour.

TABLE IV.L-28
CUMULATIVE (2030) INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

			Cumulative (2030) without Project Conditions (Original Measure DD)				Cumulative (2030) without Project Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	25.7	D	42.3	D	39.8	**F**	**107.4**
26	Harrison Street / Lakeside Drive	Signal	C	21.3	D	49.0	--	--	--	--
	Combined Delay		D	47.0	**F**	**91.3**	D	39.8	**F**	**107.4**

Bold indicates significant impact.

[a] The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

Near-Term (2015) plus Project (Phase I) Conditions

Table IV.L-29 summarizes the intersection level of service for the Alternative Measure DD configuration under Near-Term (2015) plus Project (Phase I) Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. As shown in the table, the following intersection would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD):

TABLE IV.L-29
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

			Near-Term (2015) without Project Conditions (Alternative Measure DD)				Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	28.6	E	58.2	D	39.4	**F**	**97.5**
25	Kaiser Ctr. Access Rd. / 20th Street [b]	SSSC	A	9.8	B	10.1	--	--	--	--

Bold indicates significant impact.

[a] The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

[b] The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2009.

- Within Downtown (LOS F)
  - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

Potential impacts at each of the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-1 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I): Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation Measure ALT DD TRANS-1: In addition, the Project applicant shall add an additional lane and reconfigure the northbound Harrison Street approach as a shared left-through lane (to westbound 20th Street and Kaiser Center Access Road) and two exclusive right-turn lanes (one lane to northbound Harrison Street, the other to northbound Harrison Street and eastbound 20th Street / Lakeside Drive). This would require curb setback of about 10 feet and a corresponding reduction in park space and removal of up to five on-street parking spaces along the west side of Snow Park.

In addition, the left turns from the Kaiser Center Access Road to eastbound 20th Street / Lakeside Drive would need to be prohibited in order to allow the northbound movement along Harrison Street to run concurrently with the Access Road phase.

To implement these measures, the Project Applicant shall submit to City of Oakland's Transportation Services Division for review and approval a PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction.

The Project Applicant shall fund, prepare, and install the approved plans and improvements.

Also, implement Mitigation Measure TRANS-1c.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable; if additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.

After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Table IV.L-30 summarizes the intersection level of service for the Alternative Measure DD configuration under Near-Term (2015) plus Project (Phase I and Phase II) Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. As shown in the table, the following intersection would operate at unacceptable conditions under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD):

- Within Downtown (LOS F)
  - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

TABLE IV.L-30
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II)
INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

			Near-Term (2015) without Project Conditions (Alternative Measure DD)				Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Outside Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	28.6	E	58.2	D	49.7	**F**	**111.6**
25	Kaiser Ctr. Access Rd. / 20th Street[b]	SSSC	A	9.8	B	10.1	--	--	--	--

Bold indicates significant impact.

[a] The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

[b] The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2009.

Potential impacts at each of the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-2 - Project with Alternative Measure DD - Near-Term (2015) plus Project (Phase I and Phase II), Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection

would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation Measure ALT DD TRANS-2: Implement Mitigation Measure ALT DD TRANS-1 and Mitigation Measure TRANS-1c.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable; if additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project (2015) plus Project (Phase I and Phase II) impacts at this location would be Significant and Unavoidable.

Cumulative (2030) plus Project (Phase I and Phase II) Conditions

Table IV.L-31 summarizes the intersection level of service for the Alternative Measure DD configuration under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Figure IV.L-21 summarizes intersection volumes for the Alternative Measure DD Configuration for all scenarios. As shown in the table, the following intersection would operate at unacceptable conditions under Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD):

- Within Downtown (LOS F)
  - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

TABLE IV.L-31
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II)
INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

			Cumulative (2030) without Project Conditions (Alternative Measure DD)				Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	D	39.8	**F**	**107.4**	E	69.0	**F**	**>120**
25	Kaiser Ctr. Access Rd. / 20th Street [b]	SSSC	B	10.5	B	10.1	--	--	--	--

Bold indicates significant impact.

[a] The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

[b] The Project would combine this intersection with Intersection #24.

SOURCE: AECOM, 2009.

Potential impacts at the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-3- Project with Alternative Measure DD - Cumulative (2030) plus Project (Phase I and Phase II) Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure ALT DD TRANS-3: Implement Mitigation Measure ALT DD TRANS-1 and Implement Mitigation Measure TRANS-1c.

Significance after Implementation of Mitigation: Conservatively Deemed Significant and Unavoidable; if additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Cumulative (2030) Plus Project (Phase I and Phase II) impacts at this location would be Significant and Unavoidable.

Microsimulation Analysis

A microsimulation analysis was conducted to better determine the operational performance of the Alternative Measure DD Configuration. Selected measures of effectiveness (MOEs) were then compared against the original Measure DD Configuration.

As shown in **Table IV.L-32**, which summarizes the movement delay for the original Measure DD Configuration and Alternative Measure DD Configuration, the northbound Harrison Street, eastbound 20th Street, and southbound Kaiser Center Access Road approaches to the intersection of Harrison Street / 20th Street / Kaiser Center Access Road would perform poorly (LOS F) under either configuration.

Queuing Conditions

As shown in **Table IV.L-33** and **Table IV.L-34**, which summarize the 95th percentile queues by lane for the original Measure DD Configuration and Alternative Measure DD Configuration, queues on the northbound Harrison Street approach at Harrison Street / 20th Street / Kaiser Center Access Road exceed available storage capacity in the PM peak hour for all Near-Term and Cumulative scenarios, regardless of configuration. Under the original Measure DD Configuration, queues on the eastbound Harrison Street approach at Harrison Street / Lakeside Drive exceed or approach the available storage capacity. The lack of storage between the two key intersections in the original Measure DD Configuration causes spillback queuing along northbound Harrison Street and eastbound 20th Street, hampering throughput on the northbound Harrison Street and

TABLE IV.L-32
MICROSIMULATED MOVEMENT DELAY – ALTERNATIVE MEASURE DD

No.	Intersection	Mvmt.	Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions				Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.	LOS	Del.
24	Harrison Street / 20th Street / Kaiser Center Access Road	EBL[a]	--	--	--	--	E	84.8	**F**	**>120**	**F**	**>120**	**F**	**>120**	--	--	--	--	**F**	**>120**	**F**	**>120**
		EBT	B	17.3	E	82.3	C	24.4	**F**	**>120**	D	48.7	**F**	**>120**	B	19.7	E	92.5	E	113.5	**F**	**>120**
		EBR	B	11.9	B	16.0	B	12.6	C	21.4	B	16.1	C	24.5	A	10.0	B	14.6	D	45.9	C	22.5
		EBR2	A	7.5	B	14.0	B	13.6	B	19.7	B	17.3	B	18.3	A	9.0	B	12.7	E	103.2	C	20.2
	EB: EB 20th St.	WBL2	D	51.3	E	88.6	D	43.2	E	78.0	D	48.4	E	80.3	C	26.6	E	97.4	D	52.5	E	93.1
	WB: SB Harrison St.	WBL	D	49.2	D	38.3	D	52.4	B	13.6	E	56.2	B	13.6	C	29.8	B	19.4	D	54.5	C	29.1
	NB: NB Harrison St.	WBT	D	40.8	D	36.9	D	44.6	C	32.3	E	61.6	D	42.2	D	45.9	D	36.0	E	101.4	D	48.4
	NW: WB 20th St. *SB: Kaiser Center Access Road*	WBR	D	46.7	C	26.7	D	41.2	B	17.3	D	38.5	C	29.1	C	29.8	C	24.2	E	71.5	C	29.5
		NBL	D	54.4	**F**	**>120**	D	52.2	**F**	**>120**	E	74.2	**F**	**>120**	E	90.3	**F**	**>120**	**F**	**>120**	**F**	**>120**
		NBT	E	56.5	**F**	**>120**	D	46.3	**F**	**>120**	E	70.7	**F**	**>120**	E	96.0	**F**	**>120**	**F**	**>120**	**F**	**>120**
		NBR	E	55.8	**F**	**>120**	D	49.6	**F**	**>120**	E	83.4	**F**	**>120**	E	91.6	**F**	**>120**	**F**	**>120**	**F**	**>120**
		NBR2	D	35.6	**F**	**>120**	D	44.9	**F**	**>120**	E	80.6	**F**	**>120**	E	114.2	**F**	**>120**	**F**	**>120**	**F**	**>120**
		NWL	C	33.1	D	36.9	D	37.1	E	100.8	D	38.7	E	59.0	C	31.6	D	45.9	E	57.7	**F**	**>120**
		NWT	C	25.3	C	28.5	D	42.0	**F**	**>120**	C	33.6	D	49.6	C	27.2	D	37.9	D	54.2	**F**	**>120**
		NWR	A	9.4	B	17.5	A	9.2	B	18.9	A	10.0	B	15.2	B	10.1	B	16.0	B	10.8	C	33.6
		SBL[a]	--	--	--	--	D	40.6	**F**	**>120**	E	59.1	**F**	**>120**	--	--	--	--	E	104.5	**F**	**>120**
		SBT[a]	--	--	--	--	D	54.8	**F**	**>120**	E	56.0	**F**	**>120**	--	--	--	--	E	56.7	**F**	**>120**
		SBR[a]	--	--	--	--	A	9.6	**F**	**>120**	A	10.0	**F**	**>120**	--	--	--	--	B	16.4	**F**	**>120**
		All	C	33.3	**F**	**>120**	D	35.2	**F**	**>120**	D	52.8	**F**	**>120**	C	32.6	**F**	**>120**	E	84.0	**F**	**>120**
25	Kaiser Center Access Road / 20th Street	SBR[b]	A	2.4	A	3.2	--	--	--	--	--	--	--	--	A	2.3	A	2.5	--	--	--	--

Bold indicates approaches operating at LOS F.

[a] Movement is only present in Project scenarios.
[b] Movement is only present in baseline scenarios.

SOURCE: AECOM, 2009.

TABLE IV.L-33
MICROSIMULATED 95TH PERCENTILE QUEUES – ORIGINAL MEASURE DD

				95th Percentile Queue (ft)									
				Near-Term (2015) without Project Conditions		Near-Term (2015) plus Project (Phase I) Conditions		Near-Term (2015) plus Project (Phase I and Phase II) Conditions		Cumulative (2030) without Project Conditions		Cumulative (2030) plus Project (Phase I and Phase II) Conditions	
No.	**Intersection**	**Mvmt.**	**Storage**	**AM Pk. Hr.**	**PM Pk. Hr.**	**AM Pk. Hr.**	**PM Pk. Hr.**	**AM Pk. Hr.**	**PM Pk. Hr.**	**AM Pk. Hr.**	**PM Pk. Hr.**	**AM Pk. Hr.**	**PM Pk. Hr.**
24	Harrison Street / 20th Street / Kaiser Center Access Road	EBL[a]	100	--	--	**108**	17	**109**	91	--	--	**115**	22
		EBT	375	58	132	50	308	59	**418**	71	111	59	210
		EBT	375	62	131	47	373	58	**462**	71	123	63	364
		EBTR	375	110	120	86	**541**	120	**555**	112	122	114	**551**
	EB: EB 20th St.	WBL	200	119	103	108	90	108	107	119	101	110	98
	WB: SB Harrison St.	WBT	200	50	66	110	67	105	86	71	104	120	98
	NB: NB Harrison St.	WBT	200	41	69	99	74	80	90	88	110	109	95
	SB: Kaiser Center Access Road	WBR	125	46	43	76	57	53	50	62	78	87	73
		NBLTR	575	95	**672**	130	**>1,000**	151	**>1,000**	165	**>1,000**	213	**>1,000**
		NBR	575	55	**671**	70	**>1,000**	59	**>1,000**	111	**>1,000**	122	**>1,000**
		SBT[a]	150	--	--	43	147	67	**215**	--	--	63	**290**
		SBR[a]	50	--	--	**57**	**83**	**59**	**108**	--	--	**58**	**87**
25	Kaiser Center Access Rd. / 20th St.	SBR[b]	160	48	72	--	--	--	--	50	61	--	--
26	Harrison Street / Lakeside Drive	EBT	150	87	**162**	84	**169**	84	**163**	95	144	101	**151**
		EBT	150	97	**158**	111	**160**	106	**151**	119	**165**	120	**162**
	EB: NB Harrison St.	EBTR	150	112	145	131	148	122	142	134	145	132	143
	WB: SB Harrison St.	WBL	250	202	240	**283**	**294**	147	**348**	236	**422**	223	**435**
	NB: NB Lakeside Dr.	WBL	250	220	**264**	**514**	**300**	**434**	**376**	**263**	**432**	**494**	**450**
		WBT	250	205	140	**452**	155	**498**	189	**462**	**274**	**435**	**386**
		WBT	250	45	53	**359**	56	**311**	45	**335**	81	**303**	79
		WBT	250	54	64	57	76	29	79	102	102	66	84
		NBL	460	73	70	137	62	78	84	103	99	135	117
		NBLR	460	176	149	191	171	183	138	210	210	228	209
		NBR	820	137	123	158	137	144	119	185	187	201	176

Bold indicates exceedance of storage capacity.

a Movement is only present in Project scenarios.
b Movement is only present in baseline scenarios.

SOURCE: AECOM, 2009.

TABLE IV.L-34
MICROSIMULATED 95TH PERCENTILE QUEUES – ALTERNATIVE MEASURE DD

				95th Percentile Queue (ft)									
				Near-Term (2015) without Project Conditions		Near-Term (2015) plus Project (Phase I) Conditions		Near-Term (2015) plus Project (Phase I and Phase II) Conditions		Cumulative (2030) without Project Conditions		Cumulative (2030) plus Project (Phase I and Phase II) Conditions	
No.	**Intersection**	**Mvmt.**	**Storage**	**AM Peak Hour**	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**	**AM Peak Hour**	**PM Peak Hour**
24	Harrison Street / 20th Street / Kaiser Center Access Road	EBL[a]	100	--	--	**124**	**130**	**153**	**107**	--	--	**133**	**118**
		EBT	375	71	121	83	**576**	**512**	**599**	72	133	**570**	**563**
		EBT	375	71	120	72	**567**	350	**580**	93	131	**459**	**556**
		EBR	375	88	130	130	164	144	207	104	121	173	310
	EB: EB 20th St.	WBL	600	218	254	263	226	265	228	237	289	300	249
	WB: SB Harrison St.	WBL	600	236	262	276	236	288	241	281	281	307	253
	NB: NB Harrison St.	WBL	600	248	160	334	160	319	173	314	178	327	190
	NW: WB 20th St.	WBTR	200	**224**	191	**276**	188	**257**	**219**	**259**	**203**	**271**	**225**
	SB: Kaiser Center Access Road	NBLTR	575	233	**>1,000**	222	**>1,000**	317	**>1,000**	354	**>1,000**	**628**	**>1,000**
		NBR	575	242	**>1,000**	210	**>1,000**	329	**>1,000**	365	**>1,000**	**628**	**>1,000**
		NWT	800	172	162	183	325	169	195	159	204	213	514
		NWR	475	187	234	156	279	187	223	179	221	218	379
		NWR	475	195	237	163	277	190	221	186	232	227	331
		SBLT[a]	150	--	--	46	**259**	61	**261**	--	--	102	**268**
		SBR[a]	50	--	--	47	**109**	**62**	**108**	--	--	**54**	**100**
25	Kaiser Center Access Rd. / 20th St.	SBR[b]	50	**51**	**70**	--	--	--	--	40	**54**	--	--

Bold indicates exceedance of storage capacity.

[a] Movement is only present in Project scenarios.
[b] Movement is only present in baseline scenarios.

SOURCE: AECOM, 2009.

eastbound 20th Street approaches at Harrison Street / 20th Street / Kaiser Center Access Road. These queues then stretch back to upstream intersections, affecting Harrison Street / 19th Street and Webster Street / 20th Street. Likewise, queues on the westbound Harrison Street approach to Harrison Street / Lakeside Drive also exceed the available storage capacity, causing spillback into the upstream intersection at Harrison Street / 21st Street.

Conclusions

Based on the results of the microsimulation analysis, the following conclusions were drawn with regard to the original Measure DD Configuration and Alternative Measure DD Configuration:

- Both configurations have significant queuing issues on the northbound Harrison Street and eastbound 20th Street approaches to the intersection of Harrison Street / 20th Street / Kaiser Center Access Road. This queuing affects throughput at the upstream intersections of Harrison Street / 19th Street (in the northbound direction), Webster Street / 20th Street (in the eastbound direction), and Harrison Street / 21st Street (in the southbound direction);

- The original Measure DD Configuration suffers from the "bottleneck" on the critical segments of Harrison Street: eastbound between 20th Street and Lakeside Drive and westbound between Lakeside Drive and 21st Street. In the Alternative Measure DD Configuration, this intersection is removed completely, increasing storage capacity and limiting spillback queuing and its effects on adjacent intersections;

  The Alternative Measure DD Configuration offers potential benefits which may be difficult to replicate under the Original DD Configuration. Installing midblock pedestrian crossings as shown on Figure IV.L-18, for example, would be possible under the Alternative Measure DD Configuration, as there is sufficient queuing space to accommodate vehicles queues during the pedestrian signal phase for the midblock crossing. A complete crossing across Harrison Street between 20th Street and 21st Street would need a pedestrian phase of 35 to 40 seconds, but the start of the pedestrian phase could be offset such that it minimizes queue lengths and / or "meters" traffic entering the intersections of Harrison Street / 20th Street / Kaiser Center Access Road and Harrison Street / 21st Street. The pedestrian phase could be allowed to run every cycle—facilitating pedestrian access across Harrison Street to and from Lake Merritt—without causing significant impacts to traffic flows.

  Given that the northbound and southbound flows "peak" at different times in the cycle, it may also be possible to physically offset the crossings and run two separate pedestrian phases with a 10-foot wide median or pedestrian refuge island. The crosswalk across northbound Harrison Street could be staggered with the crosswalk across southbound Harrison Street and the two could run at different times, with the median allowing pedestrians to move between the two crosswalks between pedestrian phases. This would permit the minimization of queues in both directions (pedestrian phases could be kept to about eight seconds of "walk" and twelve seconds of "flashing don't walk" for a total of 20 seconds) while still preserving pedestrian access across both directions of Harrison Street. Given that the traffic flows on Lakeside Drive are significantly less than those on Harrison Street, a single crosswalk would likely suffice for the midblock crossing on Lakeside Drive. A staggered crosswalk also forces pedestrians walking inside the refuge to face the direction of on-coming traffic, increasing the safety of the crossing.

  In order to provide a similar level of pedestrian access, the original Measure DD Configuration would likely require placement of crosswalks at the intersection of Harrison Street / 20th

Street / Kaiser Center Access Road or Harrison Street / Lakeside Drive. Crosswalks at Harrison Street / Lakeside Drive may be difficult, as it would interfere with the high turning-volumes, particularly from northbound Lakeside Drive to northbound Harrison Street.

A crosswalk at Harrison Street / 20th Street / Kaiser Center under the original Measure DD Configuration may be possible along the northeast portion of the intersection, which currently does not have a crosswalk, but would likely require major additional geometry and signal design to allow for concurrent vehicle phases and may result in increased delays to vehicular traffic at the intersection. In contrast, the mid-block crossing possible under the Alternative Measure DD configuration would provide this additional pedestrian access across Harrison Street without significant impacts to traffic operations.

Recommendation TRANS-6: Installation of a signalized mid-block crossing across Harrison Street between 20th Street and 21st Street.

Given the likelihood that the Project would generate substantial pedestrian traffic between the Project Site and Lake Merritt, it is recommended that the Project Applicant would fund, prepare, as well as install the approved plans and following improvements with the new midblock traffic signal:

- Optimize the traffic signal timing (i.e., adjust the allocation of green time for each intersection approach) for the AM, Midday and PM peak hour.
- Coordinate the signal timing at the new midblock traffic signal with the adjacent intersections that are in the same signal coordination group.

To implement these measures, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- PS&E to construct the new signal. All elements shall be designed to City standards in effect at the time of construction, and all new signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan
  - Signal timing plans for the signals in the coordination group.

Installation of a signalized mid-block pedestrian crossing across Harrison Street between 20th Street and 21st Street under the Alternative Measure DD Configuration would require signal coordination with adjacent traffic signals at Harrison Street / 21st Street, Harrison Street / 20th Street / Kaiser Center Access Road, and other signals in the same signal coordination group. Due to the coordination, the pedestrian phase could be timed to coincide with periods of low arriving traffic flow from upstream intersections such that no additional intersection delay would be created. Instead, the signalized mid-block crossing would potentially improve operations along this corridor by "metering" traffic entering the ultimate bottleneck intersections at Harrison Street / Grand Avenue and Harrison Street / 20th Street / Kaiser Center Access Road. As a result, the crossing itself would not result in secondary impacts to other modes.

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M. Utilities and Services Systems

This section describes existing public utilities on and in the vicinity of the Kaiser Center Redevelopment Project and evaluates the impact of the Proposed Project on the provision of public utilities and possible adverse physical impacts to the environment that could result from constructing new or expanded facilities. Topics analyzed in this section include public water supply, sanitary sewer (wastewater), stormwater drainage facilities, solid waste, and gas and electricity services. This section focuses on the effect the Proposed Project would have on the ability of the City of Oakland and other service providers to effectively deliver these services and utilities and identifies potential impacts.

Setting

Water Service

The East Bay Municipal Utility District (EBMUD), a publicly owned utility, supplies water and provides wastewater treatment to parts of Alameda and Contra Costa counties, including the city of Oakland. EBMUD supplies water to approximately 1.3 million people within its estimated 331-square-mile service area, and the city of Oakland comprises slightly less than one-third of EBMUD's customers.

Water Supply System

The EBMUD water supply system consists of a network of reservoirs, aqueducts, treatment plants, and distribution facilities. This network extends from its principal water source, the Mokelumne River Basin in the Sierra Nevada mountain range, to water treatment plants or to reservoirs[1] within its service area, and ultimately to residences and businesses in the East Bay. On average, 90 percent of the water delivered by EBMUD comes from the Mokelumne River watershed, with the remaining ten percent originating as runoff within the service area. EBMUD has water rights and facilities to divert up to a maximum of 325 million gallons of water per day (mgd), subject to the availability of Mokelumne River runoff and prior water rights of other users (EBMUD, 2005).

Water Demand

In mid-April 2008, EBMUD experienced an average demand of 223.3 mgd (EBMUD, 2008). In 2005, average daily water consumption among EBMUD customers was about 210 mgd. By 2030, EBMUD estimates that water demand will increase to approximately 281 mgd in its service area, although, with successful implementation of water recycling and conservation programs, this demand could be reduced to about 232 mgd (EBMUD, 2005).

As discussed in EBMUD's Urban Water Management Plan 2005, EBMUD adopted a long-term Water Supply Management Program (WSMP) in 1993. The WSMP serves as a planning guide for

1 EBMUD's East Bay service area includes five reservoirs: Briones, Chabot, Lafayette, San Pablo, and Upper San Leandro.

the reliable provision of quality water to the EBMUD service area through 2020. The WSMP analysis indicates that during a severe drought, [2] the current water supply is not sufficient to meet customer demand. An estimated supplemental supply need of 87 mgd of additional water supply (representing a 42 percent deficiency) would be needed to limit the deficiency to 25 percent. To limit the water supply deficiency to 25 percent by 2020, a supplemental supply of 154 mgd (representing a 67 percent deficiency) would be needed. EBMUD anticipates that customer demand will continue to exceed supply during severe drought conditions until a supplemental water supply project is implemented and a dependable supply is guaranteed for existing and future needs.

To meet 2020 projected water needs and address deficient supply during severe droughts, EBMUD is working to identify supplemental water supplies, recycled water programs, and continued implementation of water conservation measures.

Water Supply Projects

In September 1995 (two years after adopting its long-term Water Supply Management Program), EBMUD authorized a Water Supply Action Plan to identify supplemental water supplies during multiple-year droughts by pursuing several water supply components concurrently. As a result, on December 8, 2000, the U.S. Bureau of Reclamation, EBMUD, and Sacramento parties mutually agreed to develop a joint water supply from the Sacramento River. Components of this action include a diversion one-mile north of the City of Freeport, pumping facilities, treatment facilities, and transmission pipes. A federal Record of Decision was issued in 2004, and the engineering design work is expected to be complete by the spring of 2006. Construction is expected to be complete and EBMUD will be able to receive water from the project by the end of 2009. Once completed, the Freeport Project will provide EBMUD with up to 100 mgd of water during dry years only, estimated to be three out of every 10 years, as a supplemental water source to complement existing conservation programs (FRWA, 2008).

Other resource options identified in the 1995 Water Supply Action Plan (and its 1996 revision) for meeting future water needs include the Bayside Groundwater Project, which involves storing an annual average of 1.0 million gallons a day (MGD) of water in the groundwater aquifer beneath the cities of San Lorenzo/San Leandro during wet years and withdraw an equal annual amount during years of drought to reduce the water rationing impacts to our customers during a drought. Environmental review for the project has been completed and the project is anticipated to begin operation in 2008, following Board approval and a one-year construction period.

After successfully operating this project for some time, EBMUD will consider a larger project in the area that would have a capacity of between 2 and 10 MGD, allowing for even greater drought protection. Before the larger project would be undertaken, EBMUD would first have to complete a separate environmental impact report with its associated public review, similar to this initial 1.0 MGD effort.

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2 Defined by EBMUD as the third consecutive year in a series of multiple dry years.

Sanitary Sewer Service

In addition to providing water supply, EBMUD provides sanitary sewer treatment services to approximately 640,000 people within an 88-square-mile area of Alameda and Contra Costa counties, including the City of Oakland. The City of Oakland and about eight other communities[3] comprise the EBMUD Special District No. 1 sanitary sewer treatment service area.

Wastewater Collection and Treatment

EBMUD's main wastewater treatment plant is located southwest of the Interstate 580/Interstate 80 (I-580/I-80) interchange in Oakland, south of the San Francisco/Oakland Bay Bridge. Wastewater is collected by 29 miles of interceptor lines that move wastewater from about 1,400 miles of sewers owned and operated by the jurisdictions served. The permitted plant capacity for the dry weather season is 120 mgd and for the wet weather season is 320 mgd (RWQCB, 2010).

The City of Oakland owns, operates, and maintains a local sanitary sewer collection system covering approximately 48 square miles, approximately 1,000 miles of pipe, and seven pump stations. The City's sewer collection system is divided into basins and subbasins. Each numbered subbasin encompasses a specific physical area, and its sewer flows are assigned to a single discharge point from the City's collection system into the EBMUD's interceptor lines. City sewer pipes range from 6 to 72 inches in diameter, with most lines pre-dating 1938 and with some parts of the system over 100 years old. Most of the system is gravity-fed, and about five pump stations service the entire area. Some areas of Oakland, such as former military bases, cemeteries, large parks, and some hillside areas, are not part of the sewer service system. Over 90 percent of the sewer customers are residential users. Sanitary sewer facilities currently serve the Project Site.

Inflow/Infiltration Correction Program

A continuing issue with respect to sanitary sewer collection has been inflow and infiltration of stormwater into the EBMUD and Oakland sewer lines, resulting in high flow levels and overflow of untreated wastewater during wet weather events. Most of the stormwater enters sewer systems by infiltration (stormwater that passes through the soil and into deteriorated sewer pipes). Inflow originates from stormwater inlets and manholes that connect to the sanitary sewer system rather than the stormwater system. In 1986, with EBMUD as the lead agency, the Wet Weather Program was initiated to improve treatment capacity for wet weather flows and reduce the amount of inflow and infiltration throughout the EBMUD collection system. The cities of Alameda, Albany, Berkeley, Emeryville, Kensington, Oakland, Piedmont and portions of El Cerrito and Richmond participate in EBMUD's Wet Weather Program. The program has resulted in four new wet weather treatment facilities, two storage basins, 7.5 miles of new interceptors, and expansion of the main wastewater treatment plant. These new facilities accommodate an increase in peak wet weather treatment capacity from 290 mgd to 775 mgd. The City's long-range sewer improvements are anticipated to reduce peak regional flows from 1.1 billion gallons per day to 775 mgd.

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3 EBMUD's main wastewater treatment plant treats municipal wastewater from the cities of Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont, El Cerrito, Kensington, and part of Richmond.

The City of Oakland has a 25-year inflow and infiltration collection maintenance and rehabilitation program that will help eliminate overflow by reducing inflow and infiltration of stormwater to upgrade the existing system. The City's collection system is comprised of local collection mains and a network of trunk systems. The City's system capacity improvements have targeted the trunk network only and assume that the remainder of the system – the local mains – has sufficient capacity. The entire system is divided into drainage basins and subbasins. Each subbasin has a projected allocation for base flow increase based on an anticipated growth rate during the period of the inflow and infiltration collection maintenance and rehabilitation program. Growth (base flow increase) within each subbasin must not exceed projections. If exceeded, the impact of the additional growth must be analyzed on the entire City collection, and trunk system and additional system improvements would be required. If redirection of allocation from other subbasins is needed to accommodate a development project, further review and approval from the City would be required in order to determine locations and the amount of potential reallocation. If growth does not exceed projection within each subbasin, then impact analysis may be limited to the study of local mains serving the development site.

Stormwater Drainage Facilities

In Oakland, stormwater runoff is collected from the southwesterly flows from the Oakland/Berkeley hills to the developed flatlands, where it then flows primarily through underground storm drains and culverts to the San Francisco Bay, via the Oakland Estuary (directly or by way of Lake Merritt) or through the City of Emeryville.

The Alameda County Flood Control and Water Conservation District constructs, operates, and maintains major trunk lines and flood-control facilities in Oakland, and the Oakland Public Works Agency is responsible for construction and maintenance of the local storm drainage system within Oakland's public areas and roads.

The City has prepared a comprehensive storm drainage master plan to identify existing deficiencies in the system and develop prioritized recommendations for rehabilitating the system in order to reduce localized flooding. Storm drain complaints are scattered throughout the City and are mostly related to commercial business uses. Based on these complaints, even without televised footage of actual pipes, the City has taken the position that the storm drain system is aged and would not be able to handle increased runoff flows. The City requires development projects to evaluate the onsite and offsite condition and capacity of the existing stormwater collection system and implement necessary improvements that are identified to accommodate the Project. Specifically, the City requires developments to detain stormwater to the extent feasible.

Solid Waste

Waste Management and Disposal

Non-hazardous waste in the City of Oakland is collected by Waste Management of Alameda County (WMAC), which provides curbside pickup for residential, commercial and industrial non-hazardous waste, and transports it to WMAC's Davis Street Transfer Station in the City of San Leandro. The Alameda County Waste Management Authority estimates that in 2005, Oakland disposed of approximately 416,827 tons of solid waste or about 1,142 tons per day (CIWMB, 2008a). Transfer trucks haul waste to the Altamont Landfill and Resource Facility, located approximately 35 miles east of Oakland near Livermore. The Altamont Landfill has a permitted maximum daily disposal of 11,500 tons per day, seven percent of which is attributable to the City of Oakland (CIWMB, 2008b). Demolition and construction debris generated in Oakland is generally hauled by contractors and local construction companies to recycling facilities in the East Bay or to the Vasco Road Landfill near the City of Livermore. The Vasco Road Landfill, owned by Republic Services of California I, LLC, is estimated to have sufficient capacity through approximately 2015 (CIWMB, 2008c).

Waste Generation and Diversion

As required by enactment of the California Integrated Waste Management Act (AB 939) in 1989 (discussed in Regulatory Framework, below), the City has prepared a Source Reduction and Recycling Element (SRRE), which is a report that describes (1) the chief characteristics of each City's waste, (2) existing waste diversion programs and rates of waste diversion, and (3) the new or expanded programs the City intends to implement to achieve the mandated rates of diversion.[4] The City of Oakland generated approximately 926,282 tons of solid waste in 2004. The City's waste diversion rate has increased from approximately 11 percent in 1990 to an estimated 55 percent in 2004**.** The City's waste diversion programs and requirements are discussed below under *Regulatory Framework*.

Energy Services

Electricity and gas service in the City of Oakland is provided primarily by Pacific Gas and Electric (PG&E), which owns the gas and electrical utility supply lines. Some users purchase energy services directly from alternate power providers. Throughout most of Oakland, electrical power is delivered via overhead distribution and transmission lines, and natural gas is distributed through underground piping. PG&E expands its services on an as-needed basis and requires the user to fund the extension of service.

Electricity Service Demand

As a result of problems related to energy supply and demand following restructuring of the electricity industry during the previous decade, the California Energy Commission (CEC) adopted the State of California Energy Action Plan in May 2003, to outline the development of new power generating facilities in the Bay Area and elsewhere in the state to establish adequate, reliable, and reasonably priced energy for Californians. In 2005, a second Energy Action Plan was adopted by both the Energy Commission and the California Public Utilities Commission (CPUC) to reflect the policy changes and actions of the ensuing two years. The state's energy policies have since been significantly influenced by the passage of Assembly Bill 32, the California Global Warming Solutions Act of 2006. As a result, the Energy Commission's 2007 Integrated Energy Policy Report (IEPR) has advanced policies aimed at enabling the state to meet

[4] Waste diversion is defined as the total waste that a jurisdiction generates less the amount that is disposed at a landfill or transformation facility. Waste diversion occurs through reduction, reuse, recycling, and composting programs.

energy needs given anticipated carbon constraints. The report also provides a comprehensive set of recommended actions to achieve these policies (CEC, 2008).

The Project Site is currently fully developed and is served by existing electric and natural gas utilities which are available in all street frontages adjoining the site.

Regulatory Framework

Water Quality, Supply, and Distribution

Safe Drinking Water Act

The USEPA administers the Safe Drinking Water Act (SDWA), the primary federal law that regulates the quality of drinking water and establishes standards to protect public health and safety. The Department of Health Services (DHS) implements the SDWA and oversees public water system quality statewide. DHS establishes legal drinking water standards for contaminates that could threaten public health.

Senate Bill (SB) 610 / Senate Bill (SB) 221

Senate Bill (SB) 610, codified as Sections 10910-10915 of the California Public Resources Code, requires local water providers to conduct a water supply assessment for projects proposing over 500 housing units[5], 250,000 square feet of commercial office space (or more than 1,000 employees), a shopping center or business establishment with over 500,000 square feet (or more than 1,000 employees), or equivalent usage. Local water suppliers must also prepare or have already prepared an Urban Water Management Plan to guide planning and development in the water supplier's service area, and specifically pursue efficient use of water resources.

Water Conservation in Landscaping Act (Assembly Bill 1881, 2006)

The Water Conservation in Landscaping Act of 2006 (Assembly Bill 1881, Laird) requires cities, counties, and charter cities and charter counties to adopt landscape water conservation ordinances by January 1, 2010. Pursuant to this law, the Department of Water Resources (DWR) has prepared a Model Water Efficient Landscape Ordinance (Model Ordinance) for use by local agencies. Most new and rehabilitated landscapes are subject to a water efficient landscape ordinance. Public landscapes and private development projects are subject to the Model Ordinance. However, the Ordinance does not apply to registered local, state, or federal historic sites, ecological restoration projects, mined-land reclamation projects, or plant collections.

Stormwater Drainage

Regulations related to the quality and quantity of stormwater runoff (i.e., Federal Clean Water Act / NPDES are discussed in Section IV.G, *Hydrology and Water Quality*. As previously stated, this section focuses on whether the Proposed Project would result in the need for new or expanded stormwater drainage facilities.

5 Senate Bill (SB) 221 similarly amended the Subdivision Map Act to ensure confirmation that public water supply is sufficient to serve proposed development projects of 500 dwelling units or more.

Solid Waste

Assembly Bill (AB) 939

The California Integrated Waste Management Act of 1989, or Assembly Bill (AB) 939, established the Integrated Waste Management Board, required the implementation of integrated waste management plans and also mandated that local jurisdictions divert at least 50 percent of all solid waste generated (from 1990 levels), beginning January 1, 2000, and divert at least 75 percent by 2010. As required by AB 939, the City of Oakland has prepared a Source Reduction and Recycling Element (SRRE) which requires proposed development projects to undergo, as part of the required environmental review, an assessment of project impacts on the City's ability to maintain the mandated 50 percent waste diversion rates. Projects that would have an adverse effect on the City's waste diversion goals are required to include waste diversion mitigation measures to assist in reducing these impacts to less than significant levels.

Alameda County Waste Reduction and Recycling Initiative (Measure D)

In addition to AB 939, the 1990 Voter Initiative Measure D (Alameda County Waste Reduction and Recycling Initiative) mandates all cities in Alameda County to divert 75 percent of their solid waste from landfills by the year 2010.

Construction and Demolition Debris Waste Reduction and Recycling (Ordinance No. 12253 C.M.S.)

The City of Oakland's construction and demolition (C&D) debris waste reduction and recycling requirements are intended to further the goals of AB 939 and Alameda County's Measure D. As part of the application for a building permit, a project applicant is required to prepare and submit a Construction and Demolition Debris Waste Reduction and Recycling Plan (WRRP) to divert at least 50 percent of all construction and demolition debris generated by project development from landfill disposal.

Energy

Buildings constructed after June 30, 1977 must comply with standards identified in Title 24 of the California Code of Regulations. Title 24, established by the California Energy Commission (CEC) in 1978, requires the inclusion of state-of-the-art energy conservation features in building design and construction including the incorporation of specific energy conserving design features, use of non-depletable energy resources, or a demonstration that buildings would comply with a designated energy budget.

City of Oakland General Plan

The Land Use and Transportation Element of the Oakland General Plan includes the following policy related to the provision of utilities and infrastructure:

> *Policy N.12.4*: Electrical, telephone, and related distribution lines should be undergrounded in commercial and residential areas, except where special local conditions such as limited visibility of the poles and wires make this unneeded. They should also be underground in appropriate institutional, industrial, and other areas, and generally along freeways, scenic

routes, and heavily traveled streets. Programs should lead systematically toward the eventual undergrounding of all existing lines in such places. Where significant utility extensions are taking place in these areas, such as in new subdivisions, utilities should be installed underground at the start.

City of Oakland Standard Conditions of Approval

The City of Oakland's SCA relevant to reducing impacts on utilities and service systems due to the Proposed Project are listed below. If the project is approved by the City, then all applicable SCAs would be adopted as conditions of approval and required of the Proposed Project to help ensure less than significant impacts to utilities. The SCAs are incorporated and required as part of the Project, so they are not listed as mitigation measures.

- **SCA UTIL-1: Waste Reduction and Recycling**

  The project applicant will submit a Construction and Demolition WRRP and an Operational Diversion Plan (ODP) for review and approval by the Public Works Agency.

  Chapter 15.34 of the Oakland Municipal Code outlines requirements for reducing waste and optimizing construction and demolition recycling. Affected projects include all new construction, renovations/alterations/modifications with construction values of $50,000 or more (except R-3), and all demolition (including soft demo).The WRRP must specify the methods by which the development will divert construction and demolition debris waste generated by the proposed project from landfill disposal in accordance with current City requirements. Current standards, FAQs, and forms are available at www.oaklandpw.com/Page39.aspx or in the Green Building Resource Center. After approval of the plan, the project applicant shall implement the plan.

  The ODP will identify how the project complies with the Recycling Space Allocation Ordinance, (Chapter 17.118 of the Oakland Municipal Code), including capacity calculations, and specify the methods by which the development will meet the current diversion of solid waste generated by operation of the proposed project from landfill disposal in accordance with current City requirements. The proposed program shall be in implemented and maintained for the duration of the proposed activity or facility. Changes to the plan may be re-submitted to the Environmental Services Division of the Public Works Agency for review and approval. Any incentive programs shall remain fully operational as long as residents and businesses exist at the project site.

- **SCA UTIL-2: Stormwater and Sewer**

  Confirmation of the capacity of the City's surrounding stormwater and sanitary sewer system and state of repair shall be completed by a qualified civil engineer with funding from the project applicant. The project applicant shall be responsible for the necessary stormwater and sanitary sewer infrastructure improvements to accommodate the proposed project. In addition, the applicant shall be required to pay additional fees to improve sanitary sewer infrastructure if required by the Sewer and Stormwater Division. Improvements to the existing sanitary sewer collection system shall specifically include, but are not limited to, mechanisms to control or minimize increases in infiltration/inflow to offset sanitary sewer increases associated with the proposed project. To the maximum extent practicable, the applicant will be required to implement Best Management Practices to reduce the peak stormwater runoff from the project site. Additionally, the project applicant shall be responsible for payment of the required installation or hook-up fees to the affected service providers.

Impacts and Mitigation Measures

Significance Criteria

The Project would have a significant impact related to utilities and services systems if it would:

1. Exceed wastewater treatment requirements of the San Francisco Bay Regional Water Quality Control Board;

2. Require or result in construction of new stormwater drainage facilities or expansion of existing facilities, construction of which could cause significant environmental effects;

3. Exceed water supplies available to serve the project from existing entitlements and resources, and require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects;

4. Result in a determination by the wastewater treatment provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new wastewater treatment facilities or expansion of existing facilities, construction of which could cause significant environmental effects;

5. Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs and require or result in construction of landfill facilities or expansion of existing facilities, construction of which could cause significant environmental effects;

6. Violate applicable federal, state, and local statutes and regulations related to solid waste;

7. Violate applicable federal, state and local statutes and regulations relating to energy standards; or

8. Result in a determination by the energy provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new energy facilities or expansion of existing facilities, construction of which could cause significant environmental effects.

Utility and Service Systems Impacts

Water Supply

Impact UTIL-1: The Proposed Project would not exceed water supplies available to serve the Project from existing entitlements and resources, nor require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)

Water Demand, Supply, and Capacity

Pursuant to Sections 10910-10915 (SB 610) of the California Water Code, the City of Oakland submitted a request to EBMUD to prepare a water supply assessment (WSA) for the Proposed

Project. In the WSA, which was prepared in response to the City's request, EBMUD determined that the Project's estimated water demand is accounted for in EBMUD's 2030 water demand projections (Kirkpatrick, 2008).

According to EBMUD, at buildout, the total water demand resulting from the Proposed Project would be approximately 142,000 gpd, an increase of approximately 119,000 gpd over the existing onsite demand of 25,000 gpd (BKF, 2008). If the proposed buildings are constructed to meet requirements of CALGreen standards (as indicated by the Project Objectives in Chapter III), the net increase in water demand would be approximately 20 percent less, or approximately 95,200 gpd (ICC, 2010). The Proposed Project would not change EBMUD's 2030 water demand projection and would not result in a new significant increase in water use.

EBMUD further recommends incorporating water conservation measures into the design and construction of all new development projects to ensure that sufficient water capacity is available through EBMUD's planning horizon year 2030. The Proposed Project would be required to comply with EBMUD's Section 31-Water Efficiency Requirements. Internal conservation measures required by Section 31 include incorporation of water-efficient equipment and devices, such as low-flush toilets, into building design; external conservation measures include the use of drought-resistant and native plants for landscaping and minimization of turf areas. The Project would be exempt from the Water Conservation in Landscaping Act (Assembly Bill 1881, 2006), which does not apply to registered historic sites (e.g., the Kaiser Center roof garden.

The existing water lines serving the Project Site include a 6-inch line in Webster Street, 6- and 8-inch lines in 21st Street, a 12-inch line in Harrison Street, and an 8-inch line in 20th Street. Based on preliminary water flow data from EBMUD, the static pressure is 75 psi (pounds per square inch) and the residual pressure with a flow of 1,138 gpm (gallons per minute) is 60 psi; at 20 psi the calculated flow is approximately 2,200 gpm.

The existing water distribution system would continue to serve the Project Site and be adequate to accommodate the Project's expected water demand. While the Project would require water line extensions to create service connections to new buildings on the Project Site, which would be coordinated and financed by the Project sponsor, the Project would not exceed existing or projected water supply or result in the need for new or expanded water facilities.

In January 2002, the City adopted a dual plumbing ordinance, which requires new development to use recycled water provided by EBMUD and the installation of a dual plumbing system if recycled water is anticipated to be available. The nearest recycled water line to the Project Site is located on 14th Street approximately 3,000 linear feet south of the Project Site. Due to the relative cost of providing recycled water service to the Project Site given the location of existing facilities and the Project Site location, compared to the projected demand from the Project, the use of recycled water is not anticipated by the Proposed Project. EBMUD does not recommend the use of recycled water service for the Proposed Project (Kirkpatrick, 2008).

Mitigation: None required.

Sanitary Sewer Service

Impact UTIL-2: The Proposed Project's projected wastewater generation would not result in the City of Oakland exceeding its citywide projected base flow allocation or its base flow allocation for Subbasin 52-05. (Less than Significant)

The loads on the sanitary sewer system are a factor of water use, in addition to the design, capacity, and condition of the sanitary sewer facilities. In general, the average dry-weather demand sewer flow is 90 percent of the average water use. The wet weather demand sewer flow adds a factor for inflow and infiltration of the system from stormwater and wet soils. Therefore during wet weather, peak sanitary sewer flows can be greater than dry weather flows.

According to BKF Engineers, the estimated wastewater flow as a result of the Proposed Project would increase by over 105,000 gpd, from 22,500 gpd to 127,856 gpd. If proposed buildings are constructed to meet CALGreen standards (as indicated by the Project Objectives in Chapter III) the Project's net wastewater generation would be reduced by approximately 20 percent, to approximately 84,000 gpd, an increase of approximately 61,500 gpd.

The Project Site is currently served by existing sewer infrastructure located beneath surrounding roadways. Existing infrastructure consists of 12- to 15-inch mains located in 21st Street, a 24-inch main located in Harrison Street, and a 5 foot by 5.5 foot concrete box located in 20th Street. The Project Site is situated in City of Oakland sewer Subbasin 52-05.

The City of Oakland has indicated that sewer flows for the Proposed Project would not impact the capacity of the existing local sewer main (BKF, 2008) and would not exceed the capacity of Subbasin 52-05. However, the City will need to review the wastewater flows to assess mitigation fees because the proposed flows exceed the existing flows by more than 20 percent. This is based on the City's infiltration/inflow correction program which consists of a 25-year capital improvement program to rehabilitate the existing system in cost-effective areas and add capacity where needed. This program anticipates a 20 percent growth rate throughout Oakland. Mitigation fees are assessed to all new development or redevelopment in subbasins that have a growth rate greater than 20 percent. This fee represents the Project's pro-rata share of the improvements identified by the 25-year plan in anticipation of the Project's exceedance of existing flows by more than 20 percent.

The existing sanitary sewer lines located under existing streets would continue to serve the Project Site. The Project does not propose any major replacement or improvement of existing sanitary sewer lines. Implementation of SCA UTIL-2 would require that the Project sponsor construct the necessary sewer infrastructure improvements to accommodate the Proposed Project. This condition also includes the payment of sewer mitigation fees required by the City's Public Works Agency.

Mitigation: None required.

Stormwater Drainage Facilities

Impact UTIL-3: The Proposed Project would not require or result in construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

As evaluated in Section IV., Hydrology and Water Quality, overall stormwater runoff from the Project Site is not anticipated to change substantially with the Project due to the existing developed nature of the site. Approximately 5,270 square feet of building would be added to the existing impervious surface area and 4,280 square feet of pervious surface would be added as part of the roof garden. No new storm drain facilities are required (BKF, 2008).

Implementation of SCA UTIL-2 would require that the Project sponsor construct the necessary stormwater infrastructure improvements to accommodate the Proposed Project. The Project would also be required to implement SCA HYD-3 (as listed in Section IV.G, Hydrology and Water Quality), which requires compliance with Provision C.3 of the Alameda Countywide Clean Water Program. This provision regulates post-construction stormwater runoff. The Project would also be required to prepare a Stormwater Pollution Prevention Plan (SWPPP) as described under SCA HYD-2 (as listed in Section IV.G, Hydrology and Water Quality).

The Proposed Project would have a less than significant impact to storm drainage facilities with implementation of the required plans and SCA.

Mitigation: None required.

Solid Waste Service

Impact UTIL-4: The Proposed Project would be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs, and would not require or result in construction of landfill facilities or expansion of existing facilities. (Less than Significant)

Project Construction

Project construction would generate construction waste and debris. Waste generated by construction of the Project is estimated to be approximately 2,659 tons (approximately 3.89 pounds per square foot of development) (US EPA, 1998).

The construction-generated waste would be removed from the Project Site and disposed of primarily at the Vasco Road Landfill, which is estimated to have sufficient capacity to serve existing users through approximately 2015 (CIWMB, 2008c). The Project will be subject to SCA UTIL-1, which requires the Project sponsor to submit a Construction and Demolition WRRP for review and approval by the Public Works Agency. The WRRP must specify the methods by which construction and demolition waste generated by the Proposed Project will be diverted from landfill disposal in accordance with City requirements.

Project Operations

CIWMB provides estimates for solid waste generation by land use category. Using an average waste generation rate for “large office buildings” of 1,998 pounds per 1,000 square feet of floor area per year, , the office use of the Proposed Project would generate approximately 7,226 pounds of solid waste per day (2.6M pounds per year) (CIMWB, 2006). Using an average waste generation for “commercial/retail” uses of 2.5 pounds per 1,000 square feet of floor area per day, the ground-floor commercial/retail use would generate approximately 115 pounds of solid waste per day (41,975 pounds per year) (CIQMB, 2008d). Therefore, the total Project would generate approximately 7,341 pounds, or 3.7 tons, of solid waste per day (or 2.7M pounds, or 1,351 tons, per year)

In 2005, the City of Oakland disposed of approximately 416,827 tons of solid waste at the Altamont Landfill. Project-generated waste would result in an increase of less than one-percent of the total amount of waste processed annually at this facility. The landfill has adequate permitted capacity to accommodate the increase in solid waste disposal.

The Project would not impede the ability of the City to meet the waste diversion requirements of the California Integrated Waste Management Act or the Alameda County Waste Reduction and Recycling Initiative or cause the City to violate other applicable federal, state, and local statutes and regulations related to solid waste. In addition, the Project would be subject to SCA UTIL-1, which requires the preparation of an Operational Diversion Plan to identify how the Project would comply with the City’s Recycling Space Allocation Ordinance (Chapter 17.118 OMC) and specify the methods by which the Project would meet the current diversion of solid waste generated by Project operation from landfill disposal.

The Proposed Project would have a less than significant impact to solid waste services with implementation of the required SCAs.

Mitigation: None required.

Energy

Impact UTIL-5: The Proposed Project would not violate applicable federal, state and local statutes and regulations relating to energy standards; nor would result in a determination by the energy provider which serves or may serve the Project that it does not have adequate capacity to serve the Project’s projected demand in addition to the providers’ existing commitments and require or result in construction of new energy facilities or expansion of existing facilities. (Less than Significant)

The Proposed Project would result in an incremental increase in the demand for gas and electrical power given the increase in development on the Project Site. Overall, the level of public energy required of the Proposed Project would not be expected to violate applicable federal, state and local statutes and regulations relating to energy standards or exceed PG&E’s service capacity or require new or expanded facilities. The Project would be required by the City to comply with all standards of Title 24 of the California Code of Regulations, aimed at the incorporation of energy-conserving design and construction. PG&E infrastructure exists on the Project Site, and any improvements and extensions required to accommodate the Project would be determined in consultation with PG&E prior to installation**.** As a result, although the Project would increase energy consumption, it would not result in a significant impact related to the provision of energy services.

Mitigation: None required.

Cumulative Impacts on Utility and Service Systems

Impact UTIL-6: The increased development resulting from the Proposed Project, in conjunction with population and density of other past, present, pending and reasonably foreseeable development in the City, would not result in cumulative impacts on utilities and service systems. (Less than Significant)

Geographic Context

The geographic context considered for the cumulative utilities, service systems impacts includes the surrounding area that, when combined with the Proposed Project, could result in cumulative impacts. Given the nature of the potential impacts analyzed for this topic, the geographic scope would include, but not be limited to, projects listed in Table IV-1, List of Relevant Cumulative Projects from the City's Major Project List. In addition to these major projects, the geographic context for each of the utilities topics is as follows:

Regarding water supply, the geographic context is the planning area for East Bay Municipal District (EBMUD), the water district that serves the City of Oakland and other jurisdictions throughout Alameda County and Contra Costa County.

Regarding sanitary sewer facilities, the geographic context considered for the cumulative analysis of wastewater treatment impacts is EBMUD's Special District No. 1 (SD-1) area (the cities of Alameda, Berkeley, Emeryville, Oakland, and Piedmont, and for the Stege Sanitary District, which includes El Cerrito, Kensington, and parts of Richmond.

Regarding stormwater drainage, the geographic context is generally the Oakland and surrounding area development that affects the underground system of storm drains and culverts to the San Francisco Bay, via the Oakland Estuary (directly or by way of Lake Merritt) or through the City of Emeryville.

Regarding solid waste, the geographic context considered for the cumulative analysis consists of the service regions of the Altamont Landfill and Resource Recovery Facility, the WMAC service area, and the Vasco Road Landfill, which includes most of Alameda County.

Regarding energy utilities, the geographic context considered for the cumulative is Pacific Gas & Electric's (PG&E's) service area in north and central California.

Impacts

Water Supply

The Proposed Project, in conjunction with past, present, and reasonably foreseeable future projects, could result in a cumulative increase in demand for water service. However, as discussed in the above analysis, the Project would not exceed water supplies available to serve the Project, nor cause significant environmental effects due the construction of new or expanded water facilities. The increases in demand attributable to other future development would be addressed on a site-by-site basis by EBMUD prior to approval of new development. Additionally, all future Projects would be required to comply with City ordinances and polices regarding water supply, as well as water conservation measures, and wherever feasible, participate in water recycling programs established by EBMUD to address effects of severe drought. Development of the Project and other future projects may involve improvements to existing water utility lines and may result in construction impacts. Construction related impacts are addressed throughout this EIR and would address any construction activities related to water utilities. Overall, the effect of the Proposed Project on water supply, in combination with other foreseeable projects would be less than significant.

Sanitary Sewer Facilities

The Proposed Project, in conjunction with past, present, and reasonably foreseeable future projects, could result in a cumulative increase in sewage generation, resulting in increased demand on EBMUD's wastewater treatment facility serving the Project Site. However, it is not anticipated that the wastewater demands of the Project combined with future projects in Oakland would result in the City exceeding its citywide allocation under the Wet Weather Program or East Bay Municipal Utility District's (EBMUD) capacity to serve the Project's projected demand in addition to its existing commitments within its service area.

The City would continue to implement its infiltration/inflow correction program intended to reduce the amount of inflow and infiltration, but this would not provide additional capacity beyond that projected for future years, and other foreseeable future projects would be required to comply with the City's programs and ordinances regarding adequate function and capacity of the sanitary sewer system. Any construction related effects that may result from future projects' improvements to existing sanitary sewer facilities are addressed by other mitigation measures in this EIR. Overall, the effect of the Proposed Project on the need for new or expanded wastewater facilities, in combination with other foreseeable projects would be less than significant.

Stormwater Drainage

Overall stormwater runoff from the Project Site is not anticipated to change substantially with the Project due to the existing developed nature of the site. No major change in the total annual stormwater discharge from the site into the storm drain system is anticipated, due to the required implementation of stormwater management strategies, including the preparation of a SWPPP.

Past, present, pending and reasonably foreseeable future projects would also be subject to all regulatory requirements and programs aimed to reduce impacts on the storm drain system citywide; thus the Proposed Project, in conjunction with reasonably foreseeable future projects, would not result in a cumulative increase in stormwater runoff, requiring the need for new or expanded stormwater drainage facilities.

Solid Waste

The Proposed Project, in conjunction with past, present, pending and reasonably foreseeable future projects, could result in a cumulative increase in solid waste and debris generated by Project construction and operations. However, comprehensive implementation of City and County waste reduction and diversion requirements and programs by the Project would reduce the potential for exceeding existing capacities of existing landfills, which have indicated that adequate capacity currently exists. As a result, the Project would not result in new or expanded landfill facilities or impede the City's ability to meet mandated waste diversion requirements, and the impact would be less than significant.

Energy

Despite annual statewide increases in energy consumption, development of the Project and other past, present, and reasonably foreseeable future projects in Oakland, which is mostly already served by gas and electricity infrastructure, and the net increased power demand from these projects relative to the regional service area, would be minimal and not require expanded or new power facilities as a direct result of project development. Further, all future projects would be required to comply with all standards of Title 24 of the California Code of Regulations, (or other similar building codes that would apply to residential and/or commercial developments); therefore, the effect of the Proposed Project on energy consumption levels, in combination with other foreseeable projects, would be less than significant.

Mitigation: None required.

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CHAPTER V
Alternatives

A. Criteria for Selecting Alternatives

The California Environmental Quality Act (CEQA) requires that an EIR compare the effects of a "reasonable range of alternatives" to the effects of the Project. The alternatives selected for comparison should be those that would attain most of the basic objectives of the Project and avoid or substantially lessen one or more significant effects of the Project (CEQA *Guidelines* Section 15126.6). The "range of alternatives" is governed by the "rule of reason" which requires the EIR to set forth only those alternatives necessary to permit an informed and reasoned choice by the decision-making body and informed public participation (CEQA *Guidelines* Section 15126.6[f]). CEQA generally defines "feasible" to mean an alternative that is capable of being accomplished in a successful manner within a reasonable period of time, while also taking into account economic, environmental, social, technological, and legal factors.

CEQA Guidelines

The alternatives addressed in this EIR were selected based on the following factors:

1. The extent to which the alternative would accomplish most of the basic objectives of the Proposed Project (see Chapter III, Project Description; Section C, Objectives of the Proposed Project);

2. The extent to which the alternative would avoid or lessen any of the identified potentially significant environmental effects of the Proposed Project (identified throughout Chapter IV, Environmental Setting, Impacts, and Mitigation Measures);

3. The feasibility of the alternative, taking into account site suitability, availability of infrastructure, property control (ownership), and consistency with applicable plans and regulatory limitations;

4. The extent to which an alternative contributes to a "reasonable range" of alternatives necessary to permit a reasoned choice; and

5. The requirement of the CEQA *Guidelines* to consider a no project alternative and to identify an environmentally superior alternative in addition to the no-project alternative (CEQA *Guidelines*, Section 15126.6[e]).

This chapter describes and discusses each of the selected alternatives as well as alternatives that were considered but not studied further in this EIR based on one or more of the aforementioned factors or requirements under CEQA.

Significant Impacts Resulting from the Project

As indicated above, CEQA requires that the alternatives selected for comparison would avoid or substantially lessen one or more significant effects of the Project. To determine alternatives that would avoid or substantially lessen any of the identified significant environmental effects of the Project, the significant impacts of the Project must be considered. Impacts for which no feasible mitigations are identified to reduce the impact to less than significant are considered "significant and unavoidable" ("SU"). The analysis in Chapter IV of this EIR determined that the Proposed Project would result in the following SU impacts:

SU Aesthetics - Wind Hazards Impacts

- **Impact AES-6:** The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

- **Impact AES-7:** Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to wind hazards at the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Air Quality – Criteria Pollutant Emissions Impacts

- **Impact AIR-3:** The Proposed Project would result in increased emissions of criteria pollutants. *(Significant and Unavoidable PM_{10} emissions for Operations)*

- **Impact AIR-8:** Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. *(Significant and Unavoidable for Operations)*

SU Historic Resources Impacts

- **Impact CUL-1:** The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

- **Impact CUL-2:** The proposed new construction would adversely affect the remaining portion of the qualified historic resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Roadway Noise Impacts

- **Impact NOI-4:** Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. *(Significant and Unavoidable)*

SU Transportation – Intersection/Roadway Impacts

The Proposed Project would result in SU impacts at several intersections and roadways under several scenarios: "Existing plus Project", "2015 plus Phase 1 Only", "2015 plus Project", and "Cumulative 2030 plus Project". ("Project" includes Phase 1 and Phase 2 buildout.) The following list of impact summaries is organized by intersection, with the specific Impact Statement (e.g., TRANS-7a) and scenario (e.g., Cumulative 2030 plus Project) for each noted. This allows the reader to assess all the scenarios under which SU impacts at a particular intersection or roadway occurs. This organization is provided here specifically to allow for easy comparison of relative impacts across the alternatives analyzed in this chapter. (See Table V-2, *Comparison of Proposed Project and Alternatives Impacts*, at the end of this Chapter for complete Impact Statement for each scenario.)

Intersections Outside Downtown

- **Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour. *(Impacts TRANS-1a, Existing plus Project; TRANS-3a, 2015 plus Phase 1 Only; TRANS-5a, 2015 plus Project; TRANS-7a Cumulative Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #3 (Harrison Street / 27th Street / 24th Street)**

  Added traffic would increase the average intersection vehicle delay by more than four seconds during the PM peak hour and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour (2015); and increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour (2030). *(Impacts TRANS-3b, 2015 without Project; TRANS-5b, 2015 Plus Project; and TRANS-7b, Cumulative 2030 Plus Project) (Conservatively Deemed Significant and Unavoidable, after mitigation; Less than Significant if City determines proposed implementation approach for Mitigation Measure TRANS-1b is feasible)*

- **Intersection #45 (Grand Avenue / El Embarcadero)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-7h, Cumulative 2030 plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp**

  Added traffic would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-1f, Existing plus Project; TRANS-5h, 2015 plus Project; and TRANS-7i, Cumulative 2030 plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-5i, 2015 Plus Project; TRANS-7j, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue)**

Added traffic would cause an increase in average intersection delay by more than two seconds during the AM peak hour. (Impact TRANS-7l, *Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

Intersections Within Downtown

- **Intersection #12 (Harrison Street / Grand Avenue)**

  Added traffic would increase the average intersection vehicle delay by more than two seconds during the PM peak hour and increase the average intersection vehicle delay by more than two seconds during the PM peak hour (2015); increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour (2030). *(Impacts TRANS-3c, 2015 Plus Phase 1 Only; TRANS-5d, 2015 Plus Project; and TRANS-7d, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #13 (Harrison Street / 21st Street)**

  Added traffic would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour *(Impact TRANS-7e, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)**

  If the City elects to implement Alternative Measure DD, but determines proposed mitigation measures are infeasible, then added traffic would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour and degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour (2015); and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour) (2030). *(Impact ALT DD TRANS-1, 2015 Plus Project Phase 1 only; ALT DD TRANS-2, 2015 Plus Project; ALT DD TRANS-3 , Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation, if the City determines additional mitigation measures feasible)*

- **Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour, increase the average intersection vehicle delay by more than four seconds during the AM peak hour (2015); and increase the v/c ratio by more than three percent during the PM peak hour (2030). *(Impacts TRANS-1d, Existing Plus Project; TRANS-5f, 2015 Plus Project; and TRANS-7g, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

Roadways

- **Segment #3 (I-880 from Oak Street to 5th Avenue) – Caltrans Facility**

  Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours. *(Impact TRANS-8a, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) – Non-Caltrans Facility**

  Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, would increase the v/c ratio by more than three percent during the PM peak hour (2015); would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour (2030). *(Impacts TRANS-2a, Existing Plus Project; TRANS-6a, 2015 Plus Project; and TRANS-8b, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580). – Non-Caltrans Facility**

  Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour (2015); degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour *(Impacts TRANS-2b, Existing Plus Project; TRANS-4a, 2010 Plus Phase 1 Only; TRANS-6b, 2015 Plus Phase 1 Only; and TRANS-8c, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

B. Summary of Alternatives

In accordance with the alternatives selection criteria discussed above in Section A, *Criteria for Selecting Alternatives*, the alternatives listed below were selected for analysis in this EIR because they reduce or avoid adverse effects of the Proposed Project while aligning with most of the Project Objectives. Each is described in greater detail and discussed relative to the Proposed Project throughout Section C, *Alternative Analysis*, below.

- **No Project/No Build Alternative** – As discussed in Section A, above, consideration of a "no project" alternative is required in the EIR. CEQA states, "The purpose of describing and analyzing a "no project" alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." It also states that the "no project" alternative is "not the baseline for determining whether the proposed project's environmental impacts may be significant, unless it is identical to the existing environmental setting analysis which does establish that baseline . . ." (CEQA *Guidelines* Section 15126.6[e]). The No Project/No Building Alternative is consistent with the existing environmental setting presented throughout Chapter IV of this EIR.

- **Alternative 1: South Tower Build Only**– This alternative would construct only the proposed South Tower, as described for Phase I of the Proposed Project. The 42-story North Tower would not be built. This alternative would include 552,000 square feet of office space and 27,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative, as with the Project.

- **Alternative 2: Onsite Maximum Reduced Impacts –** This Alternative would be similar to Alternative 1 in that only the South Tower would be constructed. However, in order to reduce the maximum number of SU impacts that occur on the Project Site, the size of the South Tower is reduced from 34 stories (Proposed Project) to 11 stories. The South Tower would have 222,000 square feet of office space and 46,000 square feet of commercial/retail. No roof garden space would be removed, but improvements to the garden would occur under this alternative as with the Project.

- **Alternative 3: Offsite Maximum Reduced Impacts –** This alternative would construct a 268,000 square foot office tower at an offsite location immediately north of the Project Site.

The total floor area is the same as Alternative 2, but no commercial/retail would be developed due to the limited street frontage available along the site. This Alternative is intended to avoid most of the impacts identified with the Proposed Project by avoiding SU historic resources and roof garden level wind hazards impacts. The offsite location, which is currently a 1-acre private pay parking lot bounded by 21st Street on the south, an existing 11-story commercial office building that fronts Webster Street on the west, 22nd Street on the north, and Kaiser Plaza Street on the east. Under this alternative, Kaiser Center would remain in its current state, with no improvements or demolition of existing facilities.

The development programs for the Proposed Project and each of the alternatives described above are summarized in **Table V-1**, Comparison of Proposed Project and Alternatives Characteristics, below.

TABLE V-1
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES CHARACTERISTICS

	Proposed Project	No Project/ No Build	Alternative 1: South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3: Offsite Maximum Reduced Impacts
South Tower (20th Street Mall Building)	34 stories 552,000 sf office 46,000 sf commercial/retail	3 stories 58,190 sf office/retail	34 stories 552,000 sf office 27,000 sf commercial/retail	11 stories 222,000 sf office 46,000 sf retail	11-12 stories 268,000 sf office
North Tower (Webster Street Mall)	42 stories 786,900 sf retail	3 story 38,190 sf retail	0	0	0
Total Floor Area	1.47 million sf	96,380 sf	579,000 sf	268,000 sf	268,000 sf
Roof Garden	127,170 sf	122,606 sf	127,170 sf	127,170 sf	122,606 sf

SOURCE: The Swig Company, 2008, 2009; SOM, 2009

C. Alternatives Analysis

The alternatives analysis is conducted in this EIR to provide a comparison of the Proposed Project to one or more reduced alternatives that could reasonably occur if the Proposed Project was not approved. As permitted by CEQA, the potential effects of the alternatives are discussed in less detail than are the effects of the Project (CEQA *Guidelines* Section 15126.6[d]). However, the analysis is conducted at a sufficient level of detail to provide the public, other public agencies, and City decision-makers adequate information to fully evaluate the alternatives and for the City to approve an alternative instead of the Proposed Project without further environmental review.

Unless otherwise indicated, the impacts associated with the Proposed Project and the alternatives throughout this chapter are for buildout conditions and are stated as levels of significance *after* implementation of mitigation measures identified in Chapter IV. Table V-1 at the end of this chapter summarizes the comparison of the impacts associated with the Proposed Project and the Alternatives.

No Project/No Build Alternative

Under the No Project/No Build Alternative, no demolition or new construction would occur on the Project Site, and existing conditions would continue into the future. Existing buildings, infrastructure, the Kaiser Center roof garden, parking garage, and all other physical conditions would remain in their current state. The existing mall buildings – the 20th Street Mall and Webster Street Mall - and the current tenant mix would not change from existing uses. Overall, the characteristics of this alternative are a continuation of existing conditions through buildout. Table V-1, above, summarizes this alternative relative to the Proposed Project.

Impacts Compared to the Proposed Project

Aesthetics, Shadow and Wind

Under the No Project/No Build Alternative, all conditions of the Project Site would remain the same as the current conditions. No new construction, alterations or demolition would occur. Unlike the Proposed Project, this alternative would not impact aesthetics, shadow, or light and glare as a result of changes on the site. No impacts would occur.

The wind tunnel testing conducted for this EIR indicate that, existing winds at ten sidewalk locations on and around the Project Site and one location on the Kaiser Center roof garden exceed the thresholds for significant wind hazards impacts. This existing condition occurs because the Project Site is currently quite open and exposed to the three strongest of the prevailing wind. In comparison, the Proposed Project would result in an overall net increase of 7 hours in the duration of the wind hazard and would result in at least 2 new wind hazards and an increase in total wind hazard on the roof garden by 55 hours due to downwash winds from the new towers. The Proposed Project's effects are determined to be significant, and the No Project/No Build Alternative is affected by existing hazard conditions, however they are less than those identified with the Proposed Project.

Air Quality and Greenhouse Gases

There would be no construction activity or an increase in vehicle trips, development or on-site activity under the No Project/No Build Alternative. Therefore, the significant air quality impact identified with the Proposed Project would not occur under this alternative, and the less-than-significant GHG emissions impacts would occur since no new development would occur. No impacts would occur.

Biological Resources

Since no construction activities or tree removal would occur under the No Project/No Build Alternative, the less-than-significant biological resource impacts associated with tree removal or the effects of new buildings and lighting on birds or other species would not occur since no changes would occur to the site or the roof garden. No impacts would occur

Cultural Resources

The No Project/No Build Alternative would not alter, demolish or construct any structures on the Project Site. Specifically, there would be no effect to any portion of the Kaiser Center or existing character-defining exterior features of the mall buildings, which includes their overall shape, siting, and massing and aggregate wall panels. Also, there would be no grading or excavation to potentially affect archaeological or paleontological resources or human remains. Therefore, the No Project/No Build Alternative would not result in the significant historic resources impacts associated with the Proposed Project, including the conservatively-deemed significant historic resources impacts associated with changes to existing buildings and roof garden (CUL-1 and CUL-2). No impacts would occur

Geology, Soils, and Seismicity

Under the No Project/No Build Alternative, no new structures would be built and no site alterations would occur. Therefore, while the Project Site would still be susceptible to the less-than-significant seismic ground shaking and geologic hazards impacts due to its location as identified with the Proposed Project, this alternative would not introduce new population to these seismic risk conditions on the Project Site. No impacts would occur.

Hazards and Hazardous Materials

Under the No Project/.No Build Alternative, no significant hazards to the public or the environment would occur due to routine transport, use, or disposal of hazardous materials since no changes would occur to the site. Nor would significant hazards result from reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. Since there would be no construction activity, the No Project/No Build Alternative would not expose construction workers or the public to hazardous materials or airborne toxics (i.e., lead-based paint and asbestos) during construction activities. No impacts would occur, however, this alternative would not remove existing hazardous conditions that may exist in buildings or on the Project Site.

Hydrology and Water Quality

The No Project/No Build Alternative would not construct any new structures or alter the Project Site in any way. Runoff associated with this alternative could affect stormwater conveyance systems at levels potentially greater than the Proposed Project, but no more than existing conditions. This is because the Proposed Project would implement current NPDES requirements to reduce stormwater flows from current/existing conditions. Further, this alternative would not expand the roof garden, which under the Proposed Project would increase pervious surface area on the Project Site and incorporate landscaped based treatment options and detention of stormwater runoff. While no improvements would occur, this analysis does not assume that existing conditions constitute a violation of any waste discharge requirements.

Since dewatering would not occur on the Project Site under this alternative, construction workers and the public would not potentially be exposed to contaminants that may be present in the soil and groundwater. Therefore, the less-than-significant impacts associated with hydrology and water quality or stormwater drainage capacity would not occur with this alternative, which would maintain existing conditions on the Project Site. No impacts would occur.

Land Use, Plans and Policies

Under the No Project/No Build Alternative, the existing mall buildings containing commercial and retail uses would remain, as would the publicly accessible roof garden. Land uses would remain consistent with existing surrounding uses, as would all buildings on the Project Site. Therefore, like the Proposed Project, this alternative would not result in the physical division of an existing community, or conflict with any existing plans. No impacts would occur.

Noise

The No Project/No Build Alternative would not involve construction activity or new operations on the Project Site. Therefore, the alternative would not result in the SU roadway noise impact associated with operations identified with the Proposed Project. No impacts would occur.

Population, Employment, and Housing

Under the No Project/No Build Alternative, no changes would occur to existing businesses or jobs on the Project Site, nor would there be an increase in population due to new housing, businesses or infrastructure. Therefore this alternative would not result in the population and housing impacts identified with the Proposed Project. No impacts would occur.

Public Services

The No Project/No Build Alternative would not result in any increase in population on the Project Site. Therefore, there would be no increase in demand for fire, police, schools and emergency services. Thus, this alternative would not result in public services impacts identified with the Proposed Project. No impacts would occur.

Traffic and Circulation

The No Project/No Build Alternative would not change the existing traffic conditions, circulation patterns, or parking associated with uses on the Project Site. Therefore, this alternative would not have traffic, circulation or parking impacts that were identified with the Proposed Project. This alternative specifically would not have the significant intersection and roadway impacts resulting from new vehicle trips associated with the Proposed Project. None of the SU intersection and roadway impacts resulting with the Proposed Project would occur.

Utilities and Service Systems

The No Project/No Build Alternative would not result in any new development on the Project Site or any other site changes. Therefore this alternative would not cause an increase in demand for water, wastewater, solid waste disposal, and energy, and would not have utilities and service systems impacts like those identified with the Proposed Project. No impacts would occur.

Alternative 1: South Tower Build Only

The South Tower Build Only Alternative assumes that the Proposed Project would construct the South Tower (on the 20th Street Mall site at the corner of 20th and Webster streets), but would not construct the North Tower (on the Webster Street Mall site at the corner of 21st and Webster streets). Table V-1, above, summarizes this alternative relative to the Proposed Project, and the other alternatives. The South Tower Build Only Alternative would include office and retail uses in a 34 story (469 foot tall) tower, with 552,000 square feet of office and 27,000 square feet of commercial/retail use, including in street level retail space. This is the same program as the South Tower proposed by the Project. The existing Webster Street Mall would remain as is with a 3-story building and approximately 38,190 square feet of retail space. No roof garden space would be removed, but improvements to the garden would occur under this alternative

Impacts of Alternative 1: South Tower Build Only Compared to the Proposed Project

Aesthetics, Shadow and Wind

The South Tower Build Only Alternative would include the construction of a 34-story South Tower at the corner of 20th and Webster Streets, and would not construct the 42-story North Tower that the Project proposes at the corner of 21st and Webster Streets; the existing Webster Street Mall building would remain at that location. Considerably less new physical development and changes would occur on the Project Site. As a result, this alternative would have less-than-significant impacts to scenic vistas and resources, visual character, light and glare, and shadow since only one of the proposed towers would be built. The City’s Standard Conditions of Approval (SCA) identified to address light and glare effects of the Proposed Project would also apply to this alternative. Shadow effects would also be less than with the Proposed Project because there would be no 42-story tower casting new shadows.

As discussed in the wind hazards analysis in Section IV.A of this EIR, building large new high-rise structures can decrease the number and durations of occurrence of wind hazard in an area. The largest adverse wind hazards effect with the Proposed Project occurs at the roof garden, which would be exposed to downwash winds from the two new towers. Only the 34-story tower would be constructed under this alternative, so the downwash wind effects at the roof garden would likely be less than with the Proposed Project. Because existing significant wind hazards conditions exist at the roof garden however, those are not expected to be reduced under this alternative. Even with construction of only the 34-story South Tower at the southwest area of the Project Site (20th and Webster Streets), the Project Site will remain quite exposed to the strongest of the prevailing winds there, winds from the west, north-northwest, and south-southeast, particularly without construction of the 42-story North Tower at the northwest corner of the Project Site (21st and Webster Streets). Therefore, the South Tower Build Only alternative would reduce, but would not avoid, the significant wind hazards impact (AES-6 and AES-7) identified with the Proposed Project. Overall, aesthetics impacts would be the same or reduced from those identified for the Project.

Air Quality

The South Tower Build Only Alternative would involve demolition of the 3-story 20th Street Mall, related site excavation /grading (approx. 31,000 cubic yards), and construction and paving to build the 34-story tower. The construction emissions and fugitive dust resulting from Alternative 1 would be less than would occur with the Proposed Project since demolition, site preparation and construction of the North Tower would not occur. The construction period emissions (ROG in 2018) impact identified for the Project would be mitigated to less than significant, however, Alternative 1 would avoid this impact. The SCAs identified to address fugitive dust and construction emissions with the Proposed Project would also apply to this alternative.

The vehicle trips and stationary area source emissions under this alternative would also be less compared to the Proposed Project due to the reduction in office, commercial and retail square footage (from not building the 42-story North Tower). As a result, criteria pollutant emissions would be less than with the Proposed Project. The Proposed Project would result in a significant impact due to PM10 emission increases (as much as 111 lbs/day compared to the BAAQMD significance threshold of 82 lbs/day). Vehicle trips with this South Tower Build Only Alternative would be reduced by approximately 60 percent compared to the Proposed Project. As a result, this alternative would avoid the significant impact identified with the Proposed Project; the net new PM10 emissions would be approximately 49 lbs/day compared to the aforementioned threshold: less than significant. The City's SCAs identified for the Proposed Project would also apply to this alternative. See Appendix C to this Draft EIR for supporting calculations.)

Greenhouse Gases

Compared to the Proposed Project, the South Tower Build Only Alternative would result in fewer vehicle trips (thus fewer emissions) and require less net increases for heating (natural gas), electricity use, and solid waste – key sources of GHG emissions. Considering the 1,100 MT CO_2e per year threshold for GHG emissions, this alternative would generate approximately 7,110 MT CO_2e per year compared to 13,591 MT CO_2e for the Proposed Project. However, because the ratio of employees to annual emissions is different for Alternative 1, it would exceed the 4.6 MT CO_2e annual service population threshold, whereas the Project would not. The alternative would result in approximately 5.0 MT CO_2e per year per service population (total emissions divided by service population 1,423 net new employees for Phase I South Tower) compared to 4.2 MT CO_2e for the Proposed Project. Thus, Alternative 1 would have a significant but mitigable GHG emissions CEQA impact (by exceeding both significance thresholds) where the Project resulted in a less-than-significant impact. Standard Conditions identified for the Proposed Project would also apply to Alternative 1. (See Appendix I to this Draft EIR for supporting calculations.)

Biological Resources

The South Tower Build Only Alternative would not impact special-status plants or species given the limited and marginal habitat existing on and around the Project Site. The alternative would still require the removal of seven or eight protected trees, which is fewer than the 19 protected trees that would be removed with the Proposed Project. Also like the Proposed Project, this alternative would not affect wetlands or breeding birds and would not conflict with any existing tree ordinance, conservation plan, or creek ordinance. The alternative would result in the same less-than-significant impacts identified with the Proposed Project, and the same SCA regarding tree removal identified with the Proposed Project would apply to this alternative.

Because a new 34-story tower would be constructed where a 3-story structure currently exists, this alternative, like the Proposed Project, would create the potential for bird strikes to the towers. This would be the case although the potential for strikes would be reduced since only one tower would be constructed (instead of two with the Proposed Project). The potential for bird strikes would be reduced due to the absence of the 42-story tower, but the impact would still occur and be less-than-significant, as with the Proposed Project. The applicable SCA's identified for the Proposed Project would also apply to this alternative. Overall, biological resources impacts would be the same or reduced from those identified for the Project.

Cultural Resources

The South Tower Build Only Alternative would involve demolition of one of the two Mall Buildings, which is a component of a qualified historic resource (the Kaiser Center). As discussed in Section IV.D in this EIR, demolition or material impairment of a resource is considered to be a significant adverse impact

As with the Proposed Project, construction of the new South Tower under this alternative would affect the integrity of the historic resource's setting and continue to be a significant impact. This would occur since the 20th Street Mall building would be removed, including its dolomite panels, and because the view corridor from the west on 20th Street to the rear of the existing Kaiser Center office tower (which is identified as a contributor to the resource's historic integrity) would be altered by the construction of the new South Tower. This is the case although there would only be one tower in the view corridor instead of the two with the Proposed Project. This alternative would not remove any part of the existing historic roof garden, but would actually add more garden space adjacent to the South Tower on the east side. Therefore the direct impact associated specifically with the roof garden identified with the Proposed Project would not occur. Overall, the alternative would result in the significant impact to historic resources identified for the Proposed Project (CUL-1 and CUL-2).

Mitigation measures and SCAs identified for the Proposed Project would also apply to this alternative, including those address potential effects to archaeological and paleontological resources and human remains. However, as discussed for the Proposed Project, because design details adhering to the mitigation measures are not yet available, the impact would be conservatively deemed significant and unavoidable, as is the case with the Proposed Project. Overall, cultural resources impacts would be the same or reduced from those identified for the Project.

Geology, Soils, and Seismicity

Under the South Tower Build Only, grading activities and building foundations similar to those required for the Proposed Project would be required and would be subject to the same geologic and seismic conditions and constraints of the site. An earthquake on a nearby fault could result in strong seismic shaking at the Project Site, and the alternative would introduce new population to these seismic risks. The alternative would result in the same less-than-significant impacts identified with the Proposed Project. Each of the City's SCAs requiring the preparation, approval and adherence to geotechnical reports and erosion reports, as identified for the Proposed Project, would also apply to this alternative. Overall, geological, soils and seismicity impacts would be the same or reduced from those identified for the Project.

Hazards and Hazardous Materials

The South Tower Build Only Alternative would involve development on a portion of the Project Site and at a reduced intensity compared with the Proposed Project. However, this alternative would continue to have similar effects related to public health and hazards associated with demolition of existing structures, the routine transport, use or disposal of hazardous materials; or the creation of a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs addressing each of the above effects would also apply to the alternative. Overall, hazards and hazardous materials impacts would be the same or reduced from those identified for the Project.

Hydrology and Water Quality

The South Tower Build Only Alternative involves reduced development on a portion of the Project Site, but would not result in substantially different drainage patterns, flooding, or impervious surfaces to adversely affect stormwater conveyance systems. As with the Proposed Project, construction workers and the public would be exposed to potential contaminants in the soil and groundwater related to dewatering onsite, but this potential impact would be reduced by the fact that only part of the site would be developed. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs that would ensure the alternative would not violate water quality standards or waste discharge requirements nor increase runoff to levels that would exceed the capacity of the stormwater drainage system would also apply to the alternative. Overall, hydrology and water quality impacts would be the same or reduced from those identified for the Project.

Land Use, Plans and Policies

Under the South Tower Build Only Alternative, land uses would remain consistent with existing surrounding uses, even though the 34-story South Tower would involve a substantial addition of office and retail use on the site compared to existing conditions, but notably less than would be with the Proposed Project since the 42-story North Tower would not be built. The configuration of new development on the site would be similar to the Proposed Project and would be essentially the same except for not constructing the North Tower on the Webster Street Mall. As a result, this alternative would have the same less-than-significant impacts associated with the physical division of an existing community, or relationship with existing plans as identified with the Proposed Project.

Noise

Noise effects from construction of the South Tower would be similar to that with the Proposed Project. It would be temporary and would occur over a shorter period of time than with the Proposed Project since only one tower would be constructed. City SCAs identified with the Proposed Project to address construction period noise effects would also apply to this alternative.

As discussed above for Air Quality, development under this alternative would be approximately 60 percent less than that for the Proposed Project and would generate approximately 40 percent of peak hour and daily vehicle trips compared to the Proposed Project given the reduced level of development. The Proposed Project would generate a net increase of 1,187 AM peak hour vehicle trips and 1,144 PM peak hour vehicle trips. The Project's contribution to cumulative roadway noise levels would exceed the significance threshold by 0.3 dBA and be a cumulative SU impact . Given the 40 percent reduction in traffic that would result with the Alternative, resulting roadway noise levels would not exceed the significance threshold. This alternative would avoid the SU cumulative roadway noise impact; the impact would be less than significant. All City SCAs identified with the Project would also apply to the alternative.

Population, Employment, and Housing

Under the South Tower Build Only Alternative, less new population would occur on the Project Site and there would be fewer changes to existing businesses and jobs than would occur with the Proposed Project on the Project Site. This is because approximately 60 percent less office development would be developed with this alternative. There would be population increase resulting from new business on the site, however, it would not result from new housing on the Project Site or be at levels not previously anticipated by the City. The impacts with this alternative would be essentially the same as the less-than-significant impact identified with the Proposed Project in that it will not be necessary to replace facilities due to displaced existing business and jobs, and that it will not induce substantial population growth.

Public Services

The South Tower Build Only Alternative would result in less new population on the Project Site compared to the Proposed Project. The development would be approximately 60 percent less office and retail development than the Proposed Project. As a result, there would be a proportional reduction in the level of increased demand for fire, police, schools and emergency services from the Project. Thus, the alternative would have the same or reduced less-than-significant impacts to public services as identified for the Proposed Project.

Traffic and Circulation

The South Tower Build Only Alternative would result in fewer AM and PM peak hour trips compared to the Proposed Project (approximately 60 percent less) (see Table 1 in Appendix J).

As a result, this alternative would avoid several of the Project's SU intersection impacts that would occur in the Cumulative (2030) plus Project Condition. SU intersection conditions at the following Project-impacted intersections would be avoided by this alternative, as detailed in Table 2 in Appendix J to this Draft EIR: Intersections #2, #13, #44, #45, #47, and #48. Except for Intersection #2, traffic contributions to these intersections would not exceed thresholds of significance and would therefore have no impact. Intersection #2 would not exceed thresholds of significance *after* mitigation and also would therefore be less than significant. This alterative would result in the same SU roadway impacts (Segments #3, #9, and #10) at buildout as identified with the Project. (See Appendices J and H to this Draft EIR for supporting calculations.)

Utilities and Service Systems

The amount of development under the South Tower Build Only Alternative is approximately 60 percent less than the Proposed Project, and only one tower would be developed instead of two. As a result, the alternative would result in less demand for water, wastewater, solid waste disposal, and energy compared to the Proposed Project. Therefore, impacts to utilities and services systems with this alternative would be less-than-significant, as with the Project, and have a relatively reduced effect. The City's SCA's identified with the Proposed Project and that apply to the wastewater generation and stormwater drainage facilities would also apply to this alternative.

Alternative 2: Onsite Maximum Reduced Impacts

The Onsite Maximum Reduced Impacts Alternative would be similar to Alternative 1 in that only the South Tower would be constructed. However, in order to reduce all SU traffic impacts, the total floor area of the South Tower would be reduced to 11 stories, compared to the 34 stories under the Proposed Project. The South Tower would have 222,000 square feet of office space and 27,000 square feet of commercial/retail. The floor area was formulated after the number/percentage of vehicle trips would need to be reduced to avoid the Project's SU impacts. No roof garden space would be removed, but improvements to the garden would occur under this alternative. Table V-1, above, summarizes this alternative relative to the Proposed Project and the other alternatives.

Impacts of Alternative 2: Onsite Maximum Reduced Impacts Compared to the Proposed Project

Aesthetics, Shadow and Wind

The Onsite Maximum Reduced Impacts Alternative would include the construction of an 11-story South Tower at the corner of 20th and Webster Streets, and would not construct the proposed 42-story North Tower at the corner of 21st and Webster Streets; the existing Webster Street Mall building would remain at that location. Considerably less new physical development and changes would occur on the Project Site. As a result, this alternative would have less-than-significant impacts to scenic vistas and resources, visual character, light and glare, and shadow since only one of the proposed towers would be built and would be 23 stories shorter. The City's SCAs identified to address light and glare effects of the Proposed Project would also apply to this alternative. Shadow effects would also be less than with the Proposed Project because there would be no 42-story tower casting new shadows.

As discussed in the wind hazards analysis in Section IV.A of this EIR, building large new high-rise structures can decrease the number and durations of occurrence of wind hazard in an area. The largest adverse wind hazards effect with the Proposed Project occurs at the roof garden, which would be exposed to downwash winds from the two new towers. Only an 11-story tower would be constructed under this alternative, so the downwash wind effects at the roof garden would likely be less than with the Proposed Project. Because existing significant wind hazards conditions exist at the roof garden however, those are not expected to be reduced under this alternative. Even with construction of only the 11-story South Tower at the southwest area of the Project Site (20th and Webster Streets), the Project Site will remain quite exposed to the strongest of the prevailing winds there, winds from the west, north-northwest, and south-southeast, particularly without construction of the 42-story North Tower at the northwest corner of the Project Site (21st and Webster Streets). Therefore, the Onsite Maximum Reduced Impacts Alternative would reduce, but would not avoid, the significant wind hazards impact identified with the Proposed Project.

The City's SCAs identified to address light effects of the Proposed Project would also apply to this alternative.

Air Quality

The Onsite Maximum Reduced Impacts Alternative would involve demolition of the 3-story 20th Street Mall, related site excavation /grading (approx. 31,000 cubic yards), and construction and paving to build the 11-story tower. The construction exhaust emissions and fugitive dust resulting from Alternative 2 would be less than the Proposed Project since demolition, site preparation and construction of the North Tower would not occur. Alternative 2 would avoid the Project's less-than-significant after mitigation short-term pollutant emissions impact during construction . The SCAs identified to address fugitive dust and construction emissions with the Proposed Project would also apply to this alternative.

The vehicle trips and stationary area source emissions under this alternative would also be less compared to the Proposed Project due to the reduction in office and commercial footage (from not building the 42-story North Tower and from building a smaller South Tower). As a result, criteria pollutant emissions would be less than with the Proposed Project. The Proposed Project would result in a significant impact due to PM_{10} emission increases (as much as 111lbs/day compared to the existing BAAQMD significance threshold of 82 lbs/day). Vehicle trips with this Onsite Maximum Reduced Alternative would be reduced by approximately 80 percent compared to the Proposed Project. As a result, this alternative would avoid the significant impact identified with the Proposed Project; the net new PM_{10} emissions would be approximately 24 to 26 lbs/day compared to the aforementioned threshold, less than significant. (See Appendix C to this Draft EIR for supporting calculations.)

Greenhouse Gases

Compared to the Proposed Project, the Onsite Maximum Reduced Alternative would result in fewer vehicle trips (thus fewer emissions) and require less net increases for heating (natural gas), electricity use, and solid waste – key sources of GHG emissions. This alternative would generate approximately 2,554 MT CO2e per year compared to 13,591 MT CO2e for the Proposed Project. On an annual service population basis, this alternative would generate approximately 3.9 MT CO2e per year per service population (total emissions divided by service population 647 net new employees for the reduced Project) compared to 4.2 MT CO2e for the Proposed Project. Thus, like the Project, Alternative 2 exceeds the 1,100 MT CO2e per year threshold, and is below the 4.6 MT CO2e service population threshold, resulting in a less-than-significant GHG emissions impact. However, Alternative 2, unlike the Project, does not meet the criteria of "very large project" and therefore the SCA GHG-1 identified for the Proposed Project would not apply to the Alternative 2. (See Appendix I to this Draft EIR for supporting calculations.)

Biological Resources

The Onsite Maximum Reduced Impacts Alternative would not impact special-status plants or species given the limited and marginal habitat existing on and around the Project Site. The alternative would still require the removal of seven or eight protected trees with construction of the 11-story South Tower, which is less than the 19 protected trees that would be removed with the Proposed Project. Also like the Proposed Project, this alternative would not affect wetlands or breeding birds and would not conflict with any existing tree ordinance, conservation plan, or creek ordinance. The alternative would result in the same less-than-significant impacts identified with the Proposed Project, and the same SCA regarding tree removal identified with the Proposed Project would apply to this alternative.

Because the alternative involves a lower in height South Tower, compared to the Proposed Project, this alternative would have less potential for bird strikes to the tower from height incidents, but could still create impacts from glare conditions. However, as indicated with the Proposed Project, the impact would continue to be less-than-significant and the applicable SCA's identified for the Proposed Project would also apply to this alternative.

Cultural Resources

The Onsite Maximum Reduced Impacts Alternative would involve demolition of one of the two Mall Buildings, which is a component of a qualified historic resource (the Kaiser Center). As discussed in Section IV.D in this EIR, demolition or material impairment of a resource is considered to be a significant adverse impact.

As with the Proposed Project, construction of the new 11-story South Tower under this alternative would affect the integrity of the historic resource's setting and continue to be a significant impact. This would occur since the 20th Street Mall building would be removed, including its dolomite panels, and because the view corridor from the west on 20th Street to the rear of the existing Kaiser Center office tower (which is identified as a contributor to the resource's historic integrity) would be altered by the construction of the new South Tower. This is the case although there would only be one tower in the view corridor instead of the two with the Proposed Project, and the new tower would be shorter than the one tower under Alternative 1. This alternative would not remove any part of the existing historic roof garden, but would actually add more garden space adjacent to the South Tower on the east side. Therefore the direct impact associated specifically with the roof garden identified with the Proposed Project would not occur. Overall, the alternative would result in the significant impact to historic resources.

Mitigation measures identified for the Proposed Project would also apply to this alternative. However, as discussed for the Proposed Project, because design details adhering to the mitigation measures are not yet available, the impact would be conservatively deemed significant and unavoidable, as is the case with the Proposed Project.

Geology, Soils, and Seismicity

Under this alternative, grading activities and building foundations similar to those required for the Proposed Project would be required and would be subject to the same geologic and seismic conditions and constraints of the site. An earthquake on a nearby fault could result in strong seismic shaking at the Project Site, and the alternative would introduce new population to these seismic risks. The alternative would result in the same less-than-significant impacts identified with the Proposed Project. Each of the City's SCAs requiring the preparation, approval and adherence to geotechnical reports and erosion reports, as identified for the Proposed Project, would also apply to this alternative.

Hazards and Hazardous Materials

The Onsite Maximum Reduced Impacts Alternative would involve development on a portion of the Project Site and at a reduced intensity compared with the Proposed Project. However, this alternative would continue to have similar effects related to public health and hazards associated with demolition of existing structures, the routine transport, use or disposal of hazardous materials; or the creation of a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs addressing each of the above effects would also apply to the alternative.

Hydrology and Water Quality

The Onsite Maximum Reduced Impacts Alternative involves reduced development on a portion of the Project Site, but would not result in substantially different drainage patterns, flooding, or impervious surfaces to adversely affect stormwater conveyance systems. As with the Proposed Project, construction workers and the public would be exposed to potential contaminants in the soil and groundwater related to dewatering onsite, but this potential impact would be reduced by the fact that only part of the site would be developed. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs that would ensure the alternative would not violate water quality standards or waste discharge requirements nor increase runoff to levels that would exceed the capacity of the stormwater drainage system would also apply to the alternative.

Land Use, Plans and Policies

Under the Onsite Maximum Reduced Impacts Alternative, land uses would remain consistent with existing surrounding uses, even though the 11-story South Tower would involve a substantial addition of office and retail use on the site compared to existing conditions, but notably less than would be with the Proposed Project since the 42-story North Tower would not be built, and less than would be with Alternative 1 since the South Tower would be only 11 stories instead of 34 stories. The configuration of new development on the site would be similar to the Proposed Project and would be essentially the same except for not constructing the North Tower on the Webster Street Mall. As a result, this alternative would have the same less-than-significant impacts associated with the physical division of an existing community, or relationship with existing plans as identified with the Proposed Project.

Noise

Noise effects from construction of the Onsite Maximum Reduced Impacts Alternative would be substantially less than that with the Proposed Project. The effects would be temporary and would occur over a shorter period of time than with the Proposed Project since only one tower would be constructed. City SCAs identified with the Proposed Project to address construction period noise effects would also apply to this alternative.

As discussed above for Air Quality, development under this alternative would be approximately 80 percent less than that for the Proposed Project and would generate approximately 40 percent of peak hour and daily vehicle trips compared to the Proposed Project given the reduced level of development. The Proposed Project would generate a net increase of 1,187 AM peak hour vehicle trips and 1,144 PM peak hour vehicle trips. The Project's contribution to resulting cumulative roadway noise levels would exceed the significance threshold by 0.3 dBA and be a cumulative SU impact. Given the reduced traffic that would result with the Alternative, resulting roadway noise levels would not exceed the significance threshold. Thus, this alternative would avoid the SU cumulative roadway noise impact identified with the Project; the impact would be less than significant. All City SCAs identified with the Project would also apply to the alternative.

Population, Employment and Housing

Under the Onsite Maximum Reduced Impacts Alternative, less new population would occur on the Project Site and there would be fewer changes to existing businesses and jobs than would occur with the Proposed Project on the Project Site. This is because approximately 60 percent less office development would be developed. There would be population increase resulting from new business on the Project Site, however, it would not result from new housing on the Project Site or be at levels not previously anticipated by the City. The impacts with this alternative would be essentially the same as the less-than-significant impact identified with the Proposed Project in that it will not be necessary to replace facilities due to displaced existing business and jobs, and that it will not induce substantial population growth.

Public Services

The Onsite Maximum Reduced Impacts Alternative would result in less new population on the Project Site compared to the Proposed Project. The development would be approximately 60 percent less office development than the Proposed Project. As a result, there would be a proportional reduction in the level of increased demand for fire, police, schools and emergency services from the Project. Thus, the alternative would have the same less-than-significant impacts to public services as identified for the Proposed Project.

Traffic and Circulation

Under the Onsite Maximum Reduced Impacts Alternative, only the South Tower would be built, similar to Alternative 1, except the South Tower would have 80 percent less office square footage than the South Tower proposed in the Proposed Project (222,000 square feet in Alternative 2 compared with 522,000 square feet in the Proposed Project).

The Onsite Maximum Reduced Impacts Alternative would result in fewer AM and PM peak hour trips compared to the Proposed Project (approximately 80 percent less) As a result, this alternative would avoid all of the Project's SU intersection impacts that would occur in the Cumulative (2030) plus Project Condition. These include Intersections #2, #12, #13, #44, #45, #47, and #48 (Intersection #12 is avoided in addition to those avoided under Alternative 1). Except for Intersection #2, traffic contributions to these intersections would not exceed thresholds of significance and would therefore have no impact. Intersection #2 would not exceed thresholds of significance *after* mitigation and also would therefore be less than significant. This alterative would avoid all 3 SU roadway impacts (Segments #3, #9, and #10) at buildout as identified with the Project. (See Appendices J and H to this Draft EIR for supporting calculations.)

Utilities and Service Systems

The amount of development under the Onsite Maximum Reduced Impacts Alternative is approximately 80 percent less than with the Proposed Project, and only one tower would be developed instead of two. In addition, the constructed tower would be 80 percent less square footage than the Proposed Project. As a result, the alternative would result in less demand for water, wastewater, solid waste disposal, and energy compared to the Proposed Project. Therefore, impacts to utilities and services systems with this alternative would be less-than-significant, as with the Project, and have a reduced effect. The City's SCA's identified with the Proposed Project and that apply to the wastewater generation and stormwater drainage facilities would also apply to this alternative.

Alternative 3: Offsite Maximum Reduced Impacts

The Offsite Maximum Reduced Impacts Alternative assumes that Alternative 2 would be constructed at another location in order to avoid the significant cultural and wind impacts that occur with the Proposed Project and Alternatives 1 and 2. The selected offsite location is currently a private pay parking lot which is not owned or controlled by the Applicant and may not be available for acquisition or use. The rectangular site is approximately 1 acre in size and is bounded by 21st Street on the south, an existing 11-story commercial office building that flanks Webster Street on the west, 22nd Street on the north, and Kaiser Plaza Street on the east. Across 22nd Street from the Alternative 3 site is the 15-story Caltrans building, and across Kaiser Plaza Street is the 28-story Ordway building. A map showing the location of the Alternative 3 site is included as **Figure V-1**, and a conceptual layout for Alternative 3 is included as **Figure V-2**.

This alternative would construct a 268,000 square foot office tower at this location; No street level or other retail or commercial use would be included. The Kaiser Center Site would remain in its current state, with no improvements or demolition of existing facilities, including improvements to the roof garden.

Compared to Proposed Project

Aesthetics, Shadow and Wind

The Offsite Maximum Reduced Impacts Alternative would include the construction of a 268,000 square foot Office Tower at the offsite location and would not construct a second office tower. This alternative would be about the same height at the commercial building west of the site and would be considerably less in height than the Ordway Building east of the site and the Caltrans building to the north. No new physical development and changes would occur on the Project Site. As a result, this alternative would have less-than-significant impacts to scenic vistas and resources, visual character, light and glare, and shadow since only one of the proposed towers would be built. The City's SCA identified to address light and glare effects of the Proposed Project would also apply to this alternative. Shadow effects would also be less than with the Proposed Project because there would be no new 34- and 42-story towers casting new shadows across the roof garden, and the building under Alternative 3 would not be tall enough to cast a large shadow across 21st Street onto the roof garden.

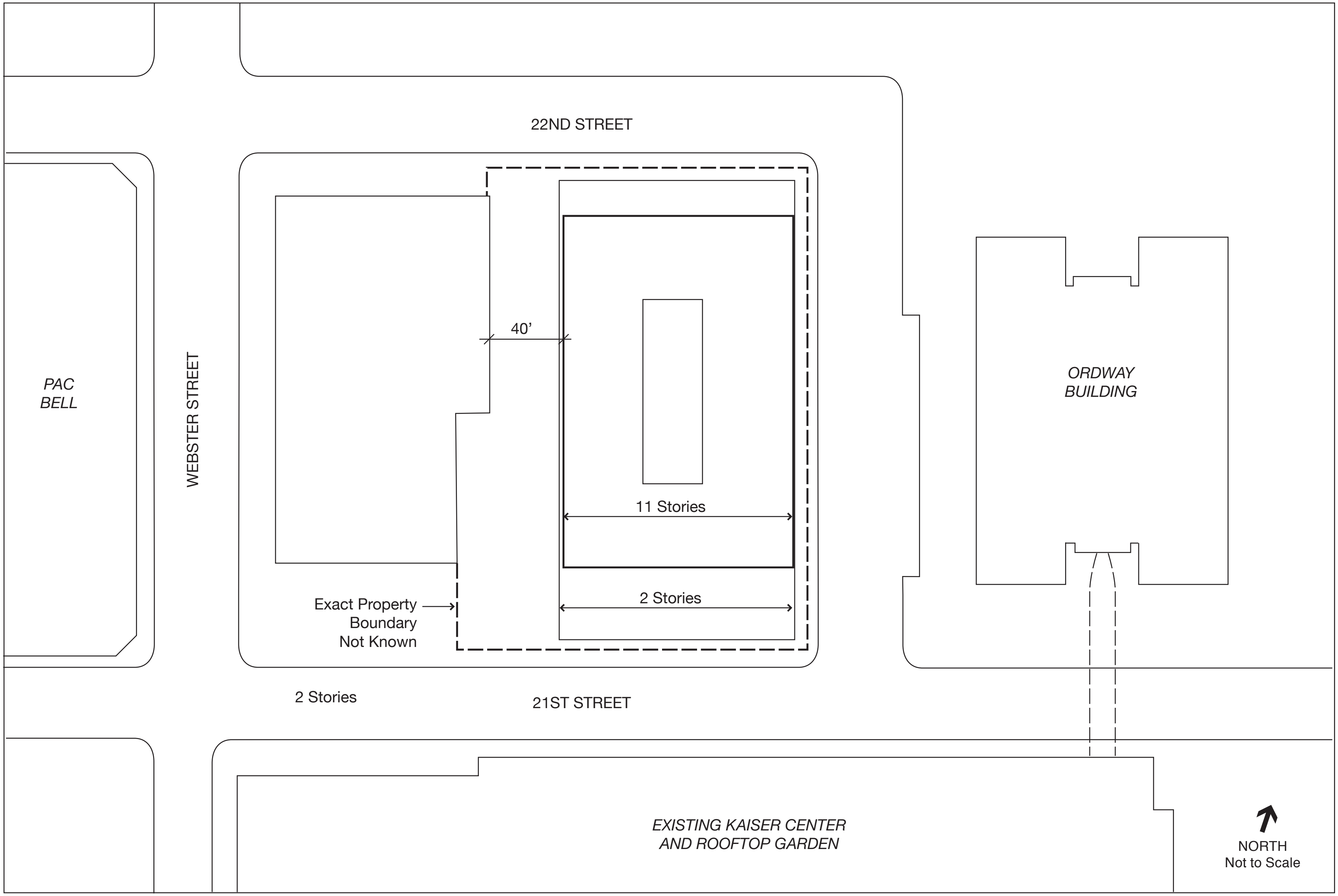
As discussed in the wind hazards analysis in Section IV.A of this EIR, building large new high-rise structures can decrease the number and durations of occurrence of wind hazard in an area. The largest adverse wind hazards effect with the Proposed Project occurs at the roof garden, which would be exposed to downwash winds from the two new towers. Because Alternative 3 is at another location but across 21st Street from the Kaiser Center roof garden, the existing wind conditions at the roof garden would remain the same. However, significant new wind hazards are also identified at ground level for the Project, so it is conservatively assumed that the similar impacts could occur at ground level with the new tower under Alternative 3 and the significant wind hazards impact at ground level could continue.

The City's SCAs identified to address light effects of the Proposed Project would also apply to this alternative. This would be a less than significant impact.

SOURCE: ESA

Kaiser Oakland . 206213

Figure V-1
Proposed Offsite Location
Alternative 3 Offsite Fully Mitigated Project



SOURCE: SOM, 2010; The Swig Company, 2010

Kaiser Oakland . 206213

Figure V-2
Conceptual Site Plan Alternative 3
Offsite Maximum Reduced Impacts

Impacts of Alternative 3: Offsite Maximum Reduced Impacts

Air Quality

The Maximum Reduced Impacts Alternative would not involve demolition of any existing buildings; the Alternative 3 site is currently a paved parking lot. The Project would require new construction and paving to build the 268,000 square foot tower. The construction exhaust emissions and fugitive dust resulting from this alternative would be less than the Proposed Project since demolition, site preparation and construction would be approximately 50 percent less than with the Proposed Project. The alternative would have a less-than-significant short-term pollutant emissions and dust impacts during construction and would avoid the less-than-significant after mitigation construction emissions impact identified with the Proposed Project. The SCAs identified to address fugitive dust and construction emissions with the Proposed Project would also apply to this alternative. Since the development program for Alternative 3 is the same as the Onsite Maximum Reduced Alternative (Alternative 2), the resulting comparative air quality emissions would also be less than significant, as discussed above for Alternative 2.

Greenhouse Gases

The development program of the Offsite Maximum Reduced Impacts Alternative is generally the same as Alternative 2, therefore, its GHG emissions would be the same. As discussed for Alternative 2, compared to the Proposed Project, this alternative would result in fewer vehicle trips (thus fewer emissions) and require less net increases for heating (natural gas), electricity use, and solid waste – key sources of GHG emissions. This alternative would generate approximately 2,554 MT CO_2e per year compared to 13,591 MT CO_2e for the Proposed Project. On an annual service population basis, this alternative would generate approximately 3.9 MT CO_2e per year per service population (total emissions divided by service population 647 net new employees for the reduced Project) compared to 4.2 MT CO_2e for the Proposed Project. Thus, like the Project, Alternative 3 exceeds the 1,100 MT CO_2e per year threshold, and is below the 4.6 MT CO_2e service population threshold, resulting in a less-than-significant GHG emissions impact. SCA GHG-1 identified for the Project would not apply to Alternative 3, unlike the Project, does not meet the criteria of "very large project" and therefore the SCA GHG-1 identified for the Proposed Project would not apply to the Alternative 2. (See Appendix I to this Draft EIR for supporting calculations.)

Biological Resources

The Offsite Maximum Reduced Impacts Alternative would not impact special-status plants or species given the limited and marginal habitat existing on and around the Project Site. In addition, this alternative would not require the removal of any trees, which is less than the 19 protected trees that would be removed with the Proposed Project. Like the Proposed Project, this alternative would not affect wetlands or breeding birds and would not conflict with any existing tree ordinance, conservation plan, or creek ordinance. The alternative would result in the same less-than-significant impacts identified with the Proposed Project, and the same SCA regarding tree removal identified with the Proposed Project would apply to this alternative.

Because a new 11 story tower would be constructed where a parking lot currently exists, this alternative, like the Proposed Project, would create the potential for bird strikes to the towers, based on a new obstruction and the possible placement of glass windows that would increase glare. This would be the case although the potential for strikes would be reduced since only one tower would be constructed (instead of two with the Proposed Project). The potential for bird strikes would be reduced due to the absence of a second tower, but the impact would still occur and be less-than-significant, as with the Proposed Project. The applicable SCA's identified for the Proposed Project would also apply to this alternative.

Cultural Resources

The Offsite Maximum Reduced Impacts Alternative would not require the demolition of any of the buildings at the Kaiser Center, which is a component of a qualified historic resource (the Kaiser Center). Building offsite would preserve the historic resource in its existing condition, including retention of the dolomite panels and keeping the roof garden in its existing condition. There could be an issue with shadows cast across the northern part of the roof garden and into some areas of the Lake Merritt Historic District, but this is likely to be minimal. Therefore, no mitigation measures would be required for construction of Alternative 3 and impacts would be less than significant.

Geology, Soils, and Seismicity

Under this alternative, grading activities and building foundations similar to those required for the Proposed Project would be required and would be subject to the same geologic and seismic conditions and constraints of the site. An earthquake on a nearby fault could result in strong seismic shaking at the Project Site, and the alternative would introduce new population to these seismic risks. The alternative would result in the same less-than-significant impacts identified with the Proposed Project. Each of the City's SCAs requiring the preparation, approval and adherence to geotechnical reports and erosion reports, as identified for the Proposed Project, would also apply to this alternative.

Hazards and Hazardous Materials

The Offsite Maximum Reduced Impacts oject Alternative would involve construction of an office tower on an existing paved parking lot. Demolition of an existing structure would not occur. However, this alternative would continue to have similar effects related to public health and hazards associated with building constructions, the routine transport, use or disposal of hazardous materials; or the creation of a significant hazard to the public or the environment through reasonable foreseeable upset or accident conditions involving the release of hazardous materials into the environment. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs addressing each of the above effects would also apply to the alternative.

Hydrology and Water Quality

The Offsite Maximum Reduced Impacts Alternative involves reduced development at another location from the Proposed Project Site, but would not result in substantially different drainage patterns, flooding, or impervious surfaces to adversely affect stormwater conveyance systems. As with the Proposed Project, construction workers and the public would be exposed to potential contaminants in the soil and groundwater related to dewatering onsite. The alternative would result in the same less-than-significant impacts as identified with the Proposed Project, and the same City SCAs that would ensure the alternative would not violate water quality standards or waste discharge requirements nor increase runoff to levels that would exceed the capacity of the stormwater drainage system would also apply to the alternative.

Land Use, Plans and Policies

Under the Offsite Maximum Reduced Impacts Alternative, land uses would remain consistent with existing surrounding uses, even though the 268,000 square foot tower in Alternative 3 would involve a substantial addition of office (and possibly retail) use on the site compared to existing conditions, but notably less than would be with the Proposed Project. The configuration of new development on the site would be similar to the Proposed Project. As a result, this alternative would have the same less-than-significant impacts associated with the physical division of an existing community, or relationship with existing plans as identified with the Proposed Project.

Noise

Noise effects from construction of the 268,000 square foot tower would be similar to that with the Proposed Project. It would be temporary and would occur over a shorter period of time than with the Proposed Project since only one tower would be constructed at the offsite location. City SCAs identified with the Proposed Project to address construction period noise effects would also apply to this alternative. As discussed above for Air Quality, development under this alternative would be approximately 60 to 80 percent less than that for the Proposed Project and would generate approximately 20 to 40 percent of peak hour and daily vehicle trips compared to the Proposed Project given the reduced level of development. The Project's contribution to resulting cumulative roadway noise levels would exceed the significance threshold by 0.3 dBA and be a cumulative SU impact . Given the reduced traffic that would result with the Alternative, resulting roadway noise levels would not exceed the significance threshold, consistent with Alternative 2. Thus, this alternative would avoid the SU cumulative roadway noise impact identified with the Project; the impact would be less than significant. All City SCAs identified with the Project would also apply to the alternative.

Population, Employment and Housing

Under the Offsite Maximum Reduced Impacts Alternative, less new population would occur with the Alternative and there would be fewer changes to existing businesses and jobs than would occur with the Proposed Project on the Project Site. This is because approximately 60 to 80 percent less office development would be developed. There would be population increase resulting from new business on the site, however, it would not be resulting from new housing on the Site or be at levels not previously anticipated by the City. The impacts with this alternative would be essentially the same as the less-than-significant impact identified with the Proposed Project in that it will not be necessary to replace facilities due to displaced existing business and jobs, and that it will not induce substantial population growth.

Public Services

The Offsite Maximum Reduced Impacts Alternative would result in less new population on the Alternative 3 site compared to the Proposed Project. The development would be approximately 60-80 percent less office and retail development than the Proposed Project. As a result, there would be a proportional reduction in the level of increased demand for fire, police, schools and emergency services from the Project. Thus, the alternative would have the same less-than-significant impacts to public services as identified for the Proposed Project.

Traffic and Circulation

As indicated under Greenhouse Gases, above, the development program of the Offsite Maximum Reduced Impacts Alternative is generally the same as Alternative 2, therefore, intersection operations would be similar. Like Alternative 2, this alternative would have fewer AM and PM peak hour trips compared to the Proposed Project (approximately 80 percent less) As a result, this alternative would avoid all of the Project's SU intersection impacts that would occur in the Cumulative (2030) plus Project Condition. These include Intersections #2, #12, #13, #44, #45, #47, and #48, . (Intersection #12 is avoided in addition to those avoided under Alternatives 1 and 2). Except for Intersection #2, traffic contributions to these intersections would not exceed thresholds of significance and would therefore have no impact. Intersection #2 would not exceed thresholds of significance *after* mitigation and also would therefore be less than significant. This alterative would avoid all 3 SU roadway impacts (Segments #3, #9, and #10) at buildout as identified with the Project.

Access and Circulation

Access for the Off-Site Alternative was assumed to be provided on the north side of 21st Street (between Harrison Street and Webster Street), and thus, would be similar to that of the three Project garage access points on the south side of 21st Street. The primary inbound access routes from westbound I-580 (via southbound Harrison Street and then westbound 21st Street) would remain unchanged under the Off-Site Alternative. Similarly, the primary outbound route (eastbound 21st Street to northbound Harrison Street) to eastbound I-580 on-ramps should be the same for the Project and the Off-Site Alternative.

However, on the south side of the proposed Project there is an additional access point from the intersection of Harrison Street / 20th Street. Therefore, original project trips assigned to this access point are expected to use 21st Street in order to enter or exit the Off-Site Alternative's Garage. In particular, there may be slight increases in traffic generated under the Off-Site Alternative at the intersections of Harrison Street / 21st Street, Kaiser Plaza / 21st Street, and Webster Street / 21st Street. The Cumulative (2030) plus Project (Phase I and Phase II) Conditions intersection analysis identifies only one out of these three intersections as operating at unacceptable conditions, namely Harrison Street / 21st Street during the weekday PM peak hour. The poor LOS and delay at this intersection is a result of spillback queuing from the northbound right from Harrison Street onto eastbound Grand Avenue, which affect throughput on the Harrison Street NBT and 21st Street EBL movements at Harrison Street / 21st Street.

While the Off-Site Alternative would add traffic at Harrison Street / 21st Street above what the original Project would add, these vehicles are expected to be on movements that generally do not operate at unacceptable conditions—namely, the Harrison Street NBL (for inbound trips) and 21st Street EBR (for outbound trips). Additional traffic generated under the Off-Site Alternative above what the original Project would generate at the remaining two intersections (Kaiser Plaza / 21st Street and Webster Street / 21st Street) is not expected to be sufficient to degrade operations at these intersections to unacceptable conditions. The Cumulative (2030) plus Project (Phase I and Phase II) Conditions intersection analysis identifies that the intersection of Webster Street / 21st Street would operate at LOS B under both the weekday AM and PM peak hours.

It should be noted that the effect of the relocated garage access under the Off-Site Alternative is also lessened by parking behavior, as not everyone will want to or be able to park in the on-site garage. The analysis for the Project assumes diversion to other parking facilities in the area as the on-site garage fills to capacity, and this would continue to be the case under the Off-Site Alternative. As a result, the relocation of garage access would have little to no impact on these drivers, as they would not be accessing the on-site garage anyways. In fact, some traffic under the Off-Site Alternative would be expected to use the Kaiser Center Garage given its proximity and available capacity.

Utilities and Service Systems

The amount of development under the Offsite Maximum Reduced Impacts Alternative is approximately 60 to 80 percent less than with the Proposed Project. As a result, the alternative would result in less demand for water, wastewater, solid waste disposal, and energy compared to the Proposed Project. Therefore, impacts to utilities and services systems with this alternative would be less-than-significant, as with the Project, and have a reduced effect. The City's SCA's identified with the Proposed Project and that apply to the wastewater generation and stormwater drainage facilities would also apply to this alternative.

D. Environmentally Superior Alternative

CEQA requires that the EIR identify an environmentally superior alternative that, when compared to the Proposed Project and all other alternatives considered, would avoid (or reduce to the greatest extent) more of the adverse environmental effects identified for the project, particularly any significant impacts. The **No Project/No Build Alternative** is considered the environmentally superior alternative in the strictest sense that environmental impacts associated with the Proposed Project's implementation would reduce of avoid most of the significant impacts identified with the Proposed Project to the greatest extent compared to the other alternatives. The exception is where adverse conditions current exist on the Project Site, such as with wind hazards and cultural resources. While the No Project/No Build Alternative would avoid all of the significant environmental effects, it would fail to achieve any of the objectives of the Project.

In cases where the No Project/No Build Alternative is the environmentally superior alternative, CEQA requires that the second most environmentally superior alternative be identified. Comparison of the environmental impacts associated with each of the alternatives and the

Proposed Project indicates that the **Alternative 3, Offsite Maximum Reduced Impacts**, would be the next environmentally superior in that it would *avoid* most of the Proposed Project's significant impacts than would continue to occur with the other build alternatives. This is primarily because developing the Project offsite would *avoid* the significant cultural resources and roof garden wind hazards impacts that are site specific and would therefore still occur with Alternative 2 because it would be developed on the Kaiser Center site. [1] Although Alternative 3 would avoid the significant wind hazards impact that would occur at the roof garden (as Alternative 3 does not include a roof garden), the significant wind hazards at ground level identified with the Project is conservatively considered also to potentially occur with Alternative 3. Therefore, Alternative 3 is the Environmentally Superior Alternative.

The comparative impacts of the Proposed Project and all the alternatives are summarized in **Table V-2**, below.

[1] Development of the project on the offsite location may not be feasible as it is not known if the site, which is owned by a separate private entity, is available for acquisition or development, or if the Project Sponsor is interested in such.

TABLE V-2
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Aesthetics, Shadow, Light, and Wind					
Impact AES-1: The Proposed Project would not adversely affect a scenic vista or substantially damage scenic resources. (Less than Significant)	LS	N	LS	LS	LS
Impact AES-2: The Proposed Project would alter the existing visual conditions on the Project Site, but would not substantially degrade the existing visual character or quality of the site and its surroundings. (Less than Significant)	LS	N	LS	LS	LS
Impact AES-3: The Proposed Project would create a new source of light or glare, but would not adversely affect day or nighttime views in the area. (Less than Significant)	LSC	N	LSC⇩	LSC⇩	LSC⇩
Impact AES-4: The Proposed Project would result in additional shadow on adjacent areas. However, it would not cast shadow that would substantially impairs the function of a building using passive solar heat collection, solar collectors for hot water heating, or photovoltaic solar collectors; would not cast shadow that would substantially impair the beneficial use of any public or quasi-public park, lawn, garden, or open space; and would not cast shadow on an historic resource. (Less than Significant)	LS	N	LS	LS⇩	LS⇩
Impact AES-5: The Proposed Project would be consistent with the policies and regulations addressing the provision of adequate light related to appropriate uses. (Less than Significant)	LS	N	LS	LS	LS
Impact: AES-6: The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. (Potentially Significant)	SU (Conservatively Deemed)	N	SU⇩ (Conservatively Deemed)	SU⇩ (Conservatively Deemed)	SU⇩ (Conservatively Deemed)
Impact AES-7: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to visual character, views, aesthetics, shadow, or light and glare. (Potentially Significant)	SU (Conservatively Deemed)	N	SU⇩ (Conservatively Deemed)	SU⇩ (Conservatively Deemed)	SU⇩ (Conservatively Deemed)

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS	Less than significant or negligible impact; no mitigation required	SU	Significant or Significant and Unavoidable adverse impact, after mitigation
LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Air Quality					
Impact AIR-1: Construction and demolition activities associated with new development under the Proposed Project would generate short-term emissions of fugitive dust. (Less than Significant)	LSC	N	LSC⇩	LSC⇩	LSC⇩
Impact AIR-2: Activities associated with demolition, site preparation, and construction throughout development of the Proposed Project would generate emissions of criteria pollutants, including equipment exhaust emissions. (Potentially Significant Phase 2 ROG emissions)	LSC, LSM	N	LSC⇩	LSC⇩	LSC⇩
Impact AIR-3: The Proposed Project would result in increased emissions of criteria pollutants. (Significant PM10 emissions at Buildout)	SU	N	LSC	LSC	LSC
Impact AIR-4: The Proposed Project would not result in increased emissions of criteria pollutants due to poor ventilation in the Parking Garage. (Less than Significant)	LS	N	LS	LS	LS
Impact AIR-5: The Proposed Project would not contribute to CO concentrations exceeding the State AAQS of 9 ppm averaged over 8 hours and 20 ppm for 1 hour. (Less than Significant)	LS	N	LS	LS	LS
Impact AIR-6: The Proposed Project would not frequently and for a substantial duration, create or expose sensitive receptors to substantial objectionable odors affecting a substantial number of people, specifically in residential uses, schools, daycare centers, nursing homes, or medical centers.(Less than Significant)	LS	N	LS	LS	LS
Impact AIR-7: The Proposed Project would not expose persons to substantial levels of toxic air contaminants (TACs) or $PM_{2.5}$ concentrations (Less than Significant)	LS	LS	LS	LS	LS
Impact AIR-8: Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. (Significant Operational PM10 Emissions,)	SU (PM10)	N	LSC	LSC	LSC
Impact AIR-9: Construction and operation of the Proposed Project would result in a cumulatively considerable increase in GHG emissions. (Significant)	LSC (LSM Phase 1)	N	LSM; LSC	LS	LS

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Air Quality (cont.)					
Impact AIR-10: The Proposed Project would conflict with an applicable plan, policy or regulation of an appropriate regulatory agency adopted for the purpose of reducing greenhouse gas emissions (Potentially Significant)	LSC; (LSM Phase 1)	N	LSM; LSC	LS	LS
Biological Resources					
Impact BIO-1: The Proposed Project would not adversely affect special-status species. (Less than Significant)	LS	N	LS	LS	LS
Impact BIO-2: The Proposed Project not would adversely affect sensitive natural communities. (Less than Significant)	LS	N	LS	LS	LS
Impact BIO-3: The Proposed Project not would adversely affect wetlands. (Less than Significant)	LS	N	N	N	N
Impact BIO-4: Project construction and operations have the potential to affect migratory and breeding birds, and wildlife, corridors, and nursery sites, through building collisions, increases in night lighting, increases in noise pollution due to project construction, shading of existing habitat, and vegetation removal. (Potentially Significant)	LSC	N	LSC⇩	LSC⇩	LSC
Impact BIO-5: The Proposed Project would not adversely affect adopted Habitat Conservation Plans. (Less than Significant)	LS	N	LS	LS	LS
Impact BIO-6: The Proposed Project would not adversely affect the City's Tree Preservation or Removal Ordinance. (Less than Significant)	LSC	N	LSC	LSC	N
Impact BIO-7: The Proposed Project would not adversely affect the City's Creek Protection Ordinance. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact BIO-8: Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would not result in impacts on special-status species, wetlands, and other waters of the U.S. (Less than Significant)	LSC	N	LSC	LSC	LSC

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Cultural Resources					
Impact CUL-1. The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site (Potentially Significant)	SU (Conservatively Deemed)	N	SU⇩ (Conservatively Deemed)	SU⇩ (Conservatively Deemed)	N
Impact CUL-2. The proposed new construction would adversely affect remaining portion of the qualified historic resource on the Project Site. (Potentially Significant)	SU (Conservatively Deemed)	N	SU⇩ (Conservatively Deemed)	SU⇩ (Conservatively Deemed)	N
Impact CUL-3. The Proposed Project would have indirect shadow effects on the historic roof garden (Less than Significant).	LS	N	LS⇩	LS⇩	LS⇩
Impact CUL-4. The Proposed Project could affect the eligibility of the Lake Merritt Historic District (Less than Significant).	LS	N	LS	LS	LS
Impact CUL-5: Construction of the Proposed Project could cause substantial adverse changes to the significance of archaeological resources at the Project Site. (Less than Significant)	LSC	N	LSC	LSC	LSC⇩
Impact CUL-6: The Proposed Project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Less than Significant)	LSC	N	LSC	LSC	LSC⇩
Impact CUL-7: The Proposed Project may adversely affect unidentified human remains at the Project Site. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact CUL-8. The Proposed Project could have a cumulative impact to a historic architectural resources (Less than Significant).	LS	N	LS	LS	N

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Geology, Soils, and Seismicity					
Impact GEO-1: Redevelopment in the project area could expose people or structures to seismic hazards such as groundshaking or liquefaction. (Less than Significant).	LSC	N	LSC⇩	LSC⇩	LSC⇩
Impact GEO-2: Redevelopment in the project area could be subjected to geologic hazards, including expansive soils and differential settlement. (Less than Significant).	LSC	N	LSC	LSC	LSC
Impact GEO-3: The development proposed as part of the project, when combined with other past, present, pending and reasonably foreseeable development in the vicinity, would not result in significant cumulative impacts with respect to geology, soils or seismicity. (Less than Significant)	LSC	N	LSC	LSC	LSC
Hazardous Materials					
Impact HAZ-1: Demolition of existing structures that contain hazardous building materials, such as lead-based paint, asbestos, and PCBs could expose workers, the public, or the environment to these hazardous materials and would generate hazardous waste. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HAZ-2: The project would involve the transportation, use, and storage of hazardous chemicals, which could present public health and/or safety risks to facility workers, patients and visitors, and the surrounding area. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HAZ-3: Hazardous materials used onsite during construction activities (i.e. solvents) could be spilled through improper handling or storage, potentially increasing public health and/or safety risks to Kaiser Center workers, patients and visitors, and the surrounding area. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HAZ-4: Hazards at the Project Site could contribute to cumulative hazards in the vicinity of the Project Site. (Less than Significant)	LS	N	LS	LS	LS

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Hydrology and Water Quality					
Impact HYD-1: Project construction would involve activities (excavation, soil stockpiling, and grading) that could generate loose, erodable soils that could violate water quality standards or waste discharge requirements, result in substantial erosion or siltation, create or constitute substantial polluted runoff, or otherwise substantially degrade water quality. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HYD-2: Project excavation activities would not deplete groundwater supplies nor substantially interfere with groundwater recharge or cause contaminated groundwater discharge to surface water. (Less than Significant)	LS	N	LS	LS	LS
Impact HYD-3: The project would result in new development that could substantially alter existing drainage pattern of the Project Site or the surrounding area (Less than Significant)	LS	N	LS	LS	LS
Impact HYD-4: The project would not result in a net increase in impervious surfaces and would not cause an increase in the volume of stormwater runoff. The project would not violate any waste discharge requirements that would create substantial runoff and result in substantial flooding onsite or offsite. The project would not exceed the capacity of the stormwater drainage system. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact HYD-5: The project would not result in flooding due to its proximity to a 100-year flood hazard area, or expose people or structures to other substantial risk related to flooding, seiche, tsunami, or mudflow. (Less than Significant)	LS	N	LS	LS	LS
Impact HYD-6: The increased construction activity and new development resulting from the project, in conjunction with past, present, and reasonably foreseeable probable future projects in the city, would not result in cumulatively considerable impacts on hydrology and water quality conditions. (Less than Significant)	LS	N	LS	LS	LS

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Land Use, Plans, and Policies					
Impact LU-1: The project would redevelop buildings at the Kaiser Center property on the northwest corner of Webster and 20th Streets in Downtown Oakland, but would not result in the physical division of an existing community. (Less than Significant)	LS	N	LS	LS	LS
Impact LU-2: The project would not conflict with applicable land use plans and policies adopted for the purpose of avoiding or mitigating an environmental effects. (Less than Significant)	LS	N	LS	LS	LS
Impact LU-3: The project would not result in a fundamental conflict between adjacent and nearby land uses, particularly with respect to any applicable habitat conservation plan or natural community conservation plan. (Less than Significant)	LS	N	LS	LS	LS
Impact LU-4: The proposed project would not result in a significant cumulative land use impact by potentially physically dividing an established community; or conflicting with adjacent or nearby land uses; or conflicting with applicable land use plans, policies or regulations adopted for the purpose of avoiding or mitigating an environmental effect from past, present or reasonably foreseeable future development. (Less than Significant)	LS	N	LS	LS	LS
Noise					
Impact NOI-1: Construction activities associated with the Proposed Project would temporarily generate noise levels that could conflict with standards established in the City noise ordinance. (Less than Significant)	LSC	N	LSC⇩	LSC⇩	LSC⇩
Impact NOI-2: Project operations would increase noise levels in the Project vicinity that could result in the generation of noise levels in excess of standards established in the local general plan or noise ordinance or applicable standards of other agencies. (Less than Significant)	LS	N	LS	LS	LS
Impact NOI-3: Project traffic could substantially increase traffic noise levels in the project area. (Less than Significant)	LSC	N	LSC⇩	LSC⇩	LSC⇩
Impact NOI-4: Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. (Potentially Significant)	SU	N	LSC	LSC	LSC

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Population and Housing					
Impact POP-1: The project would displace existing businesses and jobs, but not in substantial numbers necessitating construction of replacement facilities elsewhere, in excess of that anticipated in the City's General Plan. (Less than Significant)	LS	N	LS	LS	LS
Impact POP-2: The project would not induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	LS	N	LS	LS	LS
Impact POP-3: In combination with other past, present and reasonably foreseeable projects, the Proposed Project would not cumulatively induce substantial population growth in a manner not anticipated by the General Plan, either directly by proposing new housing or businesses, or indirectly through infrastructure improvements. (Less than Significant)	LS	N	LS	LS	LS
Public Services and Recreation Facilities					
Impact PUB-1: The project could result in an increase in calls for police protection services, but would not require new or physically altered police facilities in order to maintain acceptable performance objectives. (Less than Significant)	LS	N	LS	LS	LS
Impact PUB-2: The increased population and density resulting from the project would not involve or require new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection and emergency medical services and facilities. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact PUB-3: The proposed project could result in new students for local schools, but would not require new or physically altered school facilities to maintain acceptable performance objectives. (Less than Significant)	LS	N	LS	LS	LS

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LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Public Services and Recreation Facilities (cont.)					
Impact PUB-4: The project could increase the demand for parks, recreational facilities, and library facilities, but would not result in substantial physical deterioration of such facilities or require new or physically altered facilities in order to maintain acceptable performance objectives. (Less than Significant)	LS	N	LS	LS	LS
Impact PUB-5: The project, when combined with other past, present, pending, and reasonably foreseeable development in the vicinity, could result in cumulative impacts to the provision of public services. (Less than Significant)	LS	N	LS	LS	LS
Traffic and Circulation					
Impact TRANS-1a:. Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions (Significant)	SU	N	SU⇩	LS	LS
Impact TRANS-1b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (Existing). (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM⇩	LSM⇩

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-1c: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (Existing). (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-1d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)	SU	N	LS	LS	LS
Impact TRANS-1e: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-1f: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp)* (Existing). (Significant)	SU	N	LS	LS	LS
Impact TRANS-2a: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on *Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero)* (Existing). (Significant)	SU	N	SU ⇩	LSM	LSM
Impact TRANS-2b: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour on Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580) (Existing). (Significant)	SU	N	SU ⇩	LSM	LSM

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS	Less than significant or negligible impact; no mitigation required	SU	Significant or Significant and Unavoidable adverse impact, after mitigation
LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-3a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ⇩	LSM	LSM
Impact TRANS-3b: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2015), which would operate at an unacceptable LOS E during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM ⇩	LSM ⇩
Impact TRANS-3c: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions.(Significant)	SU	N	SU ⇩	LSM	LSM
Impact TRANS-3d: Phase I of the proposed Project, when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS	Less than significant or negligible impact; no mitigation required	SU	Significant or Significant and Unavoidable adverse impact, after mitigation
LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-3e: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015), which would operate at an unacceptable LOS E during the AM peak hour under Near-Term (2015) without Project Conditions. (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-4a: Phase I of the proposed Project, when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ⇩	LSM	LSM
Impact TRANS-5a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 EB Ramps)* (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ⇩	LSM	LSM
Impact TRANS-5b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at Intersection #3 (*Harrison Street / 27th Street / 24th Street*) (2015). (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM	LSM

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<u>Legend</u>:

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LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-5c: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2015). (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-5d: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at Intersection #12 (Harrison Street / Grand Avenue) (2015), which would operate at an unacceptable LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU ⇩	LSM	LSM
Impact TRANS-5e: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2015). (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-5f: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the average intersection vehicle delay by more than four seconds during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)* (2015), which would operate at an unacceptable LOS F during both peak hours under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-5g: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	LSM	N	N	N	N

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

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LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-5h: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp)* (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-5i: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2015), which would operate at LOS F during the PM peak hour under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-5j: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #49 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2015). (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-6a: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on *Segment #9 (Grand Avenue from Harrison Street to El Embarcadero)* (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-6b: Buildout of the proposed Project (Phase I and Phase II), when added to projected 2015 traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580)* (2015), which would operate at LOS F under Near-Term (2015) without Project Conditions. (Significant)	SU	N	SU⇩	LSM	LSM

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Legend:

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LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-7a: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	LSM	LSM	LSM
Impact TRANS-7b: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #3 (Harrison Street / 27th Street / 24th Street) (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM⇩	LSM⇩
Impact TRANS-7c: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at Intersection #5 (Telegraph Avenue / 27th Street) (2030) (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-7d: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU⇩	LSM	LSM

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

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LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-7e: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour at *Intersection #13 (Harrison Street / 21st Street)* (2030). (Significant)	SU	N	N	N	N
Impact TRANS-7f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road) (2030). (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-7g: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #44 (Oak Street / 5th Street / I-880 SB On-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-7h: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #45 (Grand Avenue / El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-7i: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #47 (Grand Avenue / MacArthur Boulevard (EB) / I-580 Eastbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N
Impact TRANS-7j: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	N	N	N

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

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LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-7k: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the v/c ratio by more than three percent during the PM peak hour at Intersection #449 (Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	LSM	N	N	N	N
Impact TRANS-7l: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue) (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU⇩	LSM	LSM
Impact TRANS-8a: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on Segment #3 (I-880 from Oak Street to 5th Avenue) (2030). (Significant)	SU	N	SU⇩	LSM	LSM
Impact TRANS-8b: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #9 (Grand Avenue from Harrison Street to El Embarcadero) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU⇩	LSM	LSM

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

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LSC	Less than significant impact with SCA	N	No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact TRANS-8c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street) (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)	SU	N	SU⇩	LSM	LSM
Impact TRANS-9: The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-10: The Project proposes vehicular site access out of an existing garage exit located along 21st Street (just east of Kaiser Plaza) which is currently designed in such a way that could be hazardous to pedestrians on the sidewalk (Significant).	LSM	N	LSM⇩	LSM⇩	LSM⇩
Impact TRANS-11: Potential short-term construction impacts generated by the Proposed Project would include the impacts associated with the delivery of construction materials and equipment, removal of construction debris, and parking for construction workers. (Less than Significant).	LSC	N	LSC	LSC	LSC

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LSM Less than significant impact, after mitigation
LSC Less than significant impact with SCA
SU Significant or Significant and Unavoidable adverse impact, after mitigation
⇧⇩ Impact is more severe or less severe than project impact, after mitigation
N No Impact

TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact ALT DD TRANS-1: Intersection #24 Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM
Impact ALT DD TRANS-2: Intersection #24 Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) without Project Conditions (Alternative Measure DD). The intersection is located within the Downtown area. Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Traffic and Circulation (cont.)					
Impact ALT DD TRANS-3: Intersection #24 Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus Project (Phase I and Phase II) Conditions (Alternative Measure DD). The intersection is located within the Downtown area. Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection. (Significant)	SU (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	N	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	SU ⇩ (Conservatively Deemed); LSM if the City determines the specific implementation approach described for Mitigation Measure TRANS-1b feasible	LSM
Utilities and Service Systems					
Impact UTIL-1: The project would not exceed water supplies available to serve the project from existing entitlements and resources, nor require or result in construction of water facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	LS	N	LS⇩	LS⇩	LS⇩
Impact UTIL-2: The project's projected wastewater generation would not result in the City of Oakland exceeding its citywide projected base flow allocation or its base flow allocation for Subbasin 52-05. (Less than Significant)	LSC	N	LSC⇩	LSC⇩	LSC⇩
Impact UTIL-3: The project would not require or result in construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)	LSC	N	LSC⇩	LSC⇩	LSC⇩

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TABLE V-2 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES IMPACT

	Proposed Project	No Project /No Build	Alternative 1; South Tower Build Only	Alternative 2: Onsite Maximum Reduced Impacts	Alternative 3; Offsite Maximum Reduced Impacts
Utilities and Service Systems (cont.)					
Impact UTIL-4: The project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs, and would not require or result in construction of landfill facilities or expansion of existing facilities, construction of which could cause significant environmental effects. (Less than Significant)	LSC	N	LSC	LSC	LSC
Impact UTIL-5: The project would not violate applicable federal, state and local statutes and regulations relating to energy standards; nor would result in a determination by the energy provider which serves or may serve the project that it does not have adequate capacity to serve the project's projected demand in addition to the providers' existing commitments and require or result in construction of new energy facilities or expansion of existing facilities. (Less than Significant)	LS	N	LS	LS	LS
Impact UTIL-6: The increased development resulting from the proposed project, in conjunction with population and density of other past, present, and reasonably foreseeable future project development in the City, would not result in cumulative impacts on utilities and service systems. (Less than Significant)	LS	N	LS	LS	LS

NOTE: Significance levels shown in the table reflect levels of significance after mitigation and indicate maximum impact during buildout and operation, unless otherwise specified.

Legend:

LS	Less than significant or negligible impact; no mitigation required	SU	Significant or Significant and Unavoidable adverse impact, after mitigation
LSM	Less than significant impact, after mitigation	⇧⇩	Impact is more severe or less severe than project impact, after mitigation
LSC	Less than significant impact with SCA	N	No Impact

CHAPTER VI

Impact Overview and Growth-Inducing Impacts

A. Significant Unavoidable and Cumulative Environmental Impacts

A significant, unavoidable impact results if a project reaches or exceeds the defined threshold of significance and no feasible mitigation measure is available to reduce the significant impact to a less-than-significant level. CEQA defines cumulative impacts as two or more individual impacts which, when considered together, are substantial or which compound or increase other environmental impacts. The cumulative analysis is intended to describe the "incremental impact of the project when added to other, closely related past, present, and reasonably foreseeable future projects" that can result from "individually minor but collectively significant projects taking place over a period of time (CEQA Guidelines Section 15355). The analysis of cumulative impacts is a two-phase process that first involves the determination of whether the Project, together with past, present and reasonably foreseeable projects, would result in a significant impact. If there would be a significant cumulative impact of all such projects, the EIR must determine whether the Project's incremental effect is cumulatively considerable, in which case, the Project itself is deemed to have a significant cumulative effect (CEQA Guidelines Section 15130).

The Proposed Project would result in the following significant, unavoidable environmental effects, some of which are also cumulative effects, as identified in Chapter IV of this EIR:

Proposed Project would result in the following SU impacts:

SU Aesthetics - Wind Hazards Impacts

- **Impact AES-6:** The Proposed Project would create winds exceeding the wind hazard criterion for more than 1 hour during daylight hours during the year at ground level and the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

- **Impact AES-7:** Project construction activity and operations, in conjunction with other past, present, pending and reasonably foreseeable development in downtown Oakland and the Lake Merritt shoreline, would result in cumulative impacts related to wind hazards at the roof garden. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Air Quality – Criteria Pollutant Emissions Impacts

- **Impact AIR-3:** The Proposed Project would result in increased emissions of criteria pollutants. *(Significant and Unavoidable PM_{10} emissions for Operations)*

- **Impact AIR-8:** Implementation of the Proposed Project would contribute to a cumulative air quality impact in the Project area. *(Significant and Unavoidable for Operations)*

SU Historic Resources Impacts

- **Impact CUL-1:** The Proposed Project would demolish the Mall Buildings, which are components of a qualified historical resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

- **Impact CUL-2:** The proposed new construction would adversely affect the remaining portion of the qualified historic resource on the Project Site. *(Conservatively Deemed Significant and Unavoidable, after mitigation, pending final design)*

SU Roadway Noise Impacts

- **Impact NOI-4:** Project traffic, in combination with cumulative traffic, could substantially increase traffic noise levels in the Project area. *(Significant and Unavoidable)*

SU Transportation – Intersection/Roadway Impacts

The Proposed Project would result in SU impacts at several intersections and roadways under several scenarios: “Existing plus Project”, “2015 plus Phase 1 Only”, “2015 plus Project”, and “Cumulative 2030 plus Project”. (“Project” includes Phase 1 and Phase 2 buildout.) The following list of impact summaries is organized by intersection, with the specific Impact Statement (e.g., TRANS-7a) and scenario (e.g., Cumulative 2030 plus Project) for each noted. This allows the reader to assess all the scenarios under which SU impacts at a particular intersection or roadway occurs. This organization is provided here specifically to allow for easy comparison of relative impacts across the alternatives analyzed in this chapter. (See Table V-2, *Comparison of Proposed Project and Alternatives Impacts*, at the end of this Chapter for complete Impact Statement for each scenario.)

Intersections Outside Downtown

- **Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour. *(Impacts TRANS-1a, Existing plus Project; TRANS-3a, 2015 plus Phase 1 Only; TRANS-5a, 2015 plus Project; TRANS-7a Cumulative Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #3 (Harrison Street / 27th Street / 24th Street)**

  Added traffic would increase the average intersection vehicle delay by more than four seconds during the PM peak hour and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS E during the PM peak hour (2015); and increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable

LOS F during the PM peak hour (2030). *(Impacts TRANS-3b, 2015 without Project; TRANS-5b, 2015 Plus Project; and TRANS-7b, Cumulative 2030 Plus Project) (Conservatively Deemed Significant and Unavoidable, after mitigation; Less than Significant if City determines proposed implementation approach for Mitigation Measure TRANS-1b is feasible)*

- **Intersection #45 (Grand Avenue / El Embarcadero)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-7h, Cumulative 2030 plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp**

  Added traffic would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-1f, Existing plus Project; TRANS-5h, 2015 plus Project; and TRANS-7i, Cumulative 2030 plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #48 (Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour. *(Impacts TRANS-5i, 2015 Plus Project; TRANS-7j, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue)**

  Added traffic would cause an increase in average intersection delay by more than two seconds during the AM peak hour. (Impact TRANS-7l, *Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

Intersections Within Downtown

- **Intersection #12 (Harrison Street / Grand Avenue)**

  Added traffic would increase the average intersection vehicle delay by more than two seconds during the PM peak hour and increase the average intersection vehicle delay by more than two seconds during the PM peak hour (2015); increase the average intersection delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour (2030). *(Impacts TRANS-3c, 2015 Plus Phase 1 Only; TRANS-5d, 2015 Plus Project; and TRANS-7d, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #13 (Harrison Street / 21st Street)**

  Added traffic would degrade the vehicle level of service from LOS B to an unacceptable LOS F during the PM peak hour *(Impact TRANS-7e, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)**

  If the City elects to implement Alternative Measure DD, but determines proposed mitigation measures are infeasible, then added traffic would degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour and degrade the vehicle level of service from an acceptable LOS C to an unacceptable LOS F during the PM peak hour (2015); and degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour) (2030). *(Impact ALT DD TRANS-1, 2015 Plus Project Phase 1 only; ALT DD TRANS-2, 2015 Plus Project; ALT DD TRANS-3 , Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation, if the City determines additional mitigation measures feasible)*

- **Intersection #44 (Oak Street / 5th Street / I-880 Southbound On-Ramp)**

  Added traffic would increase the v/c ratio by more than three percent during the PM peak hour, increase the average intersection vehicle delay by more than four seconds during the AM peak hour (2015); and increase the v/c ratio by more than three percent during the PM peak hour (2030). *(Impacts TRANS-1d, Existing Plus Project; TRANS-5f, 2015 Plus Project; and TRANS-7g, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

Roadways

- **Segment #3 (I-880 from Oak Street to 5th Avenue) – Caltrans Facility**

  Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours. *(Impact TRANS-8a, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Segment #9 (eastbound Grand Avenue from Harrison Street to El Embarcadero) – Non-Caltrans Facility**

  Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, would increase the v/c ratio by more than three percent during the PM peak hour (2015); would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour (2030). *(Impacts TRANS-2a, Existing Plus Project; TRANS-6a, 2015 Plus Project; and TRANS-8b, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

- **Segment #10 (northbound Harrison Street / Oakland Avenue from 27th Street to I-580). – Non-Caltrans Facility**

  Added traffic would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the PM peak hour, increase the v/c ratio by more than three percent during the PM peak hour (2015); degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour *(Impacts TRANS-2b, Existing Plus Project; TRANS-4a, 2010 Plus Phase 1 Only; TRANS-6b, 2015 Plus Phase 1 Only; and TRANS-8c, Cumulative 2030 Plus Project) (Significant and Unavoidable, after mitigation)*

B. Growth-Inducing Impacts

Section 15126.2(d) of the CEQA Guidelines requires that an EIR should discuss "…the ways in which the Proposed Project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." Growth can be induced in a number of ways, including through the elimination of obstacles to growth, through the stimulation of economic activity within the region, or through precedent-setting action.

Examples of projects likely to have significant growth-inducing impacts include extensions or expansions of infrastructure systems beyond what is needed to serve project-specific demand, and development of new residential subdivisions or industrial parks in areas that are currently only sparsely developed or are undeveloped. Typically, projects on infill sites that are surrounded by existing urban uses are not considered growth-inducing because it usually does not facilitate development intensification on adjacent sites.

Because the Proposed Project would be redeveloping an existing urban site, it is not expected to have any growth-inducement effects. The Project Site is in a developed area fully served by public utilities. There are no significant areas that are undeveloped adjacent to the Project Site. Additionally, the Project would not remove any obstacles that would help facilitate growth that could significantly affect the physical environment.

However, indirect population growth associated with the Proposed Project could occur in association with job creation. The economic stimulus generated by construction of the Proposed Project could result in the creation of new construction-related jobs. In addition, the increase in commercial and office space square footage that would be built as part of the Project could generate more employees. It is estimated that the future office businesses at the completed Kaiser Center Project would employ approximately 3,300 people, commercial/retail businesses would employ approximately 132 people, plus add 4 people to the site's parking services for a total of 12 parking employees. However, the jobs created during both the construction and operation phases of the Project would not be substantial in the context of job growth in Oakland and the region over the next 10 to 20 years. The Proposed Project's new employment would represent about 1.7 percent increase of the total 2005 employment in Oakland and only 1.3 percent increase of the City's future total employment as projected by ABAG's projections for Oakland in 2030. Consequently, the Proposed Project would not result in a substantial population increase.

The Proposed Project does not include housing; therefore, it would not directly induce an increase in residential population. Indirectly, as described above, it could bring new residents into the downtown area, fulfilling Oakland's 10k in Downtown plan (see Section IV.J *Population, Employment, and Housing*).

The Proposed Project would occur on an infill site in an existing urbanized neighborhood in Oakland. It would not result in the extension of utilities or roads into exurban areas, and would not directly or indirectly lead to the development of greenfield sites in the East Bay. Because the Project Site is located within an existing urbanized area, and is near a major transit station (19th Street BART Station) as well as high-density urban residential units, anticipated growth would benefit the existing transit system and could reduce adverse impacts associated with automobile use, such as traffic, air pollution and noise. Therefore, the population growth that would occur as a result of Project implementation would be largely beneficial and not considered substantial and adverse.

C. Significant Irreversible Environmental Effects

An EIR must identify any significant irreversible environmental changes that could result from implementation of a Proposed Project. These may include current or future uses of non-renewable resources, and secondary or growth-inducing impacts that commit future generations to similar uses. CEQA dictates that irretrievable commitments of resources should be evaluated to assure that such current consumption is justified (CEQA Guidelines §15126.2(c)). The CEQA Guidelines identify three distinct categories of significant irreversible changes: (1) changes in land use that would commit future generations; (2) irreversible changes from environmental actions; and (3) consumption of non-renewable resources.

Changes in Land Use Which Would Commit Future Generations

The Proposed Project would allow for the redevelopment of approximately 2.2 acres of land near Lake Merritt and the 19th Street BART Station. The Project Site, which is within the Central Business District and is designated C-55 Central Core Commercial Zone, is surrounded by urban development on all sides. The Project Site has been identified for additional growth, including housing, commercial, and mixed use development, which is consistent with the plans, policies, and zoning of the City of Oakland. Because the Proposed Project Site's land use is expected to remain unchanged, and because the Proposed Project would occur on an infill site on land within an urban area surrounded by similar or compatible uses, it would not commit future generations to a significant change in land use.

Irreversible Changes from Environmental Accidents

No significant irreversible environmental damage, such as what could occur as a result of an accidental spill or explosion of hazardous materials, is anticipated due to implementation of the Proposed Project. Furthermore, compliance with federal, State, and local regulations, the City of Oakland's Standard Conditions of Approval, and the implementation of mitigation measures identified in Section IV.F, *Hazardous Materials*, would reduce to a less than significant level the possibility that hazardous substances within the Project Site would cause significant environmental damage.

Consumption of Non-Renewable Resources

Consumption of non-renewable resources includes conversion of agricultural lands, loss of access to mining reserves, and use of non-renewable energy sources. The Project Site is located within an urban area of Oakland; no agricultural land would be converted to non-agricultural uses. The Project Site does not contain known mineral resources and does not serve as a mining reserve.

Construction of Proposed Project would require the use of energy, including energy produced from non-renewable resources. Energy consumption would also occur during the operational period of the Proposed Project due to the use of automobiles, lighting, and appliances. However, the Proposed Project would incorporate energy-conserving features, as required by the uniform Building Code and California Energy Code Title 24. The Proposed Project would also incorporate sustainable construction features where feasible or as otherwise required by law that would strive to meet the LEED ND Program over the long-term, resulting in a more energy efficient development and reduced consumption using local materials and labor. Additionally, the location of the Project Site in close proximity to the 19th Street BART Station and with access to other public transit options, would facilitate the increased use of public transit, further reducing non-renewable energy consumption associated with single-occupant vehicles.

D. Effects Found Not to be Significant

Meetings with representatives of the City of Oakland departments involved in the planning and review of development projects, and consultants for the City were held to determine the preliminary scope of the Kaiser Center EIR Project. In addition to those meetings, a Notice of Preparation was circulated on May 22, 2008 and two public scoping meetings were held, one on June 9, 2008 at the Landmark Preservation Advisory Board, and on June 19, 2008 at the Planning Commission, to solicit comments from the public and city officials about the scope of this EIR. Written comments received on the NOP were considered in the preparation of the final scope for this document and in the evaluation of the Proposed Project. An Initial Study was not prepared for the Proposed Project.

The following two topics from the CEQA Environmental Checklist were excluded from discussion in the EIR because it was determined during the scoping phase that there would be no impacts to these issues: Agricultural Resources and Mineral Resources.

Agricultural and Forest Resources

The Proposed Project Site is located within an urban area and is completely developed with existing commercial buildings. No agriculture uses or farmland are present within or adjacent to the Project Site.

The March 18, 2010 revisions to the CEQA Guidelines’ Appendix G included revisions considering impacts on forestry resources. The Project area is not in a forest, nor would the Project cause changes to timberland zoning, loss of forest land, or conversion of forest land to non-forest use.

Mineral Resources

No known mineral resources are located within or near the Project Site. Mineral resource extraction activities have not taken place within or around the Project Site during recent history.

CHAPTER VII
Report Preparers

EIR Preparers

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KAISER CENTER OFFICE PROJECT

Draft Environmental Impact Report Appendices
SCH No. 2008052103

Prepared for
The City of Oakland

August 2010

KAISER CENTER OFFICE PROJECT

Draft Environmental Impact Report Appendices
SCH No. 2008052103

Prepared for
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August 2010

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APPENDIX A

Notice of Preparation (NOP) and Responsive Comments

Appendix A Contents:

APPENDIX A.1

NOP and Attachments

CITY OF OAKLAND

Community and Economic Development Agency, Planning & Zoning Services Division
250 Frank H. Ogawa Plaza, Suite 3315, Oakland, California, 94612-2032

NOTICE OF PREPARATION (NOP) OF A DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) KAISER CENTER PROJECT

The Oakland Community and Economic Development Agency, Planning and Zoning Division, is preparing a Draft Environmental Impact Report (EIR) for the Kaiser Center Project as identified below, and is requesting comments on the scope and content of the EIR. The EIR will address the potential physical, environmental effects for each of the environmental topics outlined in the California Environmental Quality Act (CEQA). The City has **not** prepared an Initial Study.

The City of Oakland is the Lead Agency for the Project and is the public agency with the greatest responsibility for approving the Project or carrying it out. This notice is being sent to Responsible Agencies and other interested parties. Responsible Agencies are those public agencies, besides the City of Oakland, that also have a role in approving or carrying out the Project. When the Draft EIR is published, it will be sent to all Responsible Agencies and to others who respond to this NOP or who otherwise indicate that they would like to receive a copy. Responses to this NOP and any questions or comments should be directed in writing to: Margaret Stanzione, Planner IV, City of Oakland, Community and Economic Development Agency, Planning Division, 250 Frank H. Ogawa Plaza, Suite 3315, Oakland, CA 94612; (510) 238-4932 (phone); (510) 238-6538 (fax); or e-mailed to mstanzione@oaklandnet.com. Comments on the NOP must be received at the above mailing or e-mail address **by 5:00 p.m. Monday, June 23, 2008.** Please reference case number ER 08-003/PUD 08-103 in all correspondence. In addition, comments may be provided at the EIR Scoping Meetings to be held before the Landmarks Preservation and Advisory Board and the City Planning Commission. Comments should focus on discussing possible impacts on the physical environment, ways in which potential adverse effects might be minimized, and alternatives to the project in light of the EIR's purpose to provide useful and accurate information about such factors.

EIR SCOPING MEETING
LANDMARKS PRESERVATION ADVISORY BOARD
Monday, June 9, 2008
6:00 p.m.
Oakland City Hall – Hearing Room 1

EIR SCOPING MEETING
CITY PLANNING COMMISSION
Wednesday, June 18, 2008
6:00 p.m.
Oakland City Hall – Hearing Room 1

PROJECT TITLE: Kaiser Center Project

PROJECT LOCATION: 300 Lakeside Drive. The project site to be redeveloped is an approximately 2.2-acre portion of the 7 acre Kaiser Center site, and is located at the northeast corner of Webster and 20th Streets in the City of Oakland, Alameda County, California. The project site is a portion of a larger parcel identified as Assessor's Parcel Number 008-0652-00-105.

PROJECT SPONSOR: The Swig Company, LLC

EXISTING CONDITIONS: The project site contains existing commercial structures which range from approximately 25 to 35 feet tall, and includes Longs Drugs Store/US Bank on 20th Street (generally the "20th Street Mall") comprising approximately 58,190 square feet, and 24 Hour Fitness on Webster Street (generally the "Webster Street Mall") comprising approximately 38,190 square feet. The project site and the larger Kaiser Center site are CEQA historic resources (Oakland Cultural Heritage Survey Rating A1+; listed on the Local Register of Historical Resources; appears eligible for the National Register individually and as part of the Lake Merritt District (code 3B)).

The project site is located in Oakland's Central Business District. Uses to the east of the project site include the existing Kaiser Center office tower (386 feet in height), parking garage and roof garden, as well as Lakeside Park opposite Harrison Street and Lakeside Drive, and Lake Merritt beyond. To the southeast of the project site opposite Harrison Street and 20th Street is 4.2-acre Snow Park. Uses to the west of the project opposite Webster Street include approximately four low- to mid-rise commercial uses

(25 feet to 65 feet) and surface parking lots. Uses to the north of the project site opposite 21st Street include the Pacific Bell/City National Bank Building (313 feet), the Ordway Building (404 feet), the AT&T Building (125 feet), and surface parking lots. The Cathedral of Christ the Light (57 feet) is located one block northeast of the project site. Uses to the south of the project site opposite 20th Street include Lake Merritt Plaza (371 feet). The project site has not been identified on the Cortese List of Hazardous Waste and Substance Sites as of the date of this Notice.

PROJECT DESCRIPTION: The proposed project would redevelop approximately 2.2 acres of the 7-acre Kaiser Center property to include approximately 1.47 million square feet (msf) of office, ground-floor retail, parking, and enhanced open space on approximately 97,000 square feet at the northeast corner of Webster and 20th Streets in Downtown Oakland. The project would result in two office towers of approximately 436 feet or 34 stories tall in place of the "20th Street Mall" (generally in the location of Longs Drugs Store/US Bank), and 566 feet or 42 stories tall in place of the "Webster Street Mall" (generally in the location of the 24 Hour Fitness). Approximately 22,500 square feet of retail space would be constructed on the ground floor along the Webster and 20th Street frontages. The project would add approximately 852 net new parking spaces, which would be integrated into the existing Kaiser Center garage or constructed behind the new ground-floor retail. The project would relocate the westernmost portion of the existing rooftop garden to the southern portion of the site, which would result in a net increase of public open space by approximately 4,500 square feet. The public open spaces uses would be made accessible by a new exterior "grand stairway" from 20th Street to the rooftop garden. All existing development on the 2.2-acre project site would be demolished and replaced as part of the proposed project. In connection with the redevelopment of the 2.2-acre project site, the Kaiser Center site would be subdivided into four parcels, although no physical changes are proposed to the remainder of the Kaiser Center site. The proposed project would also require Planned Unit Development (PUD) approvals as well as other possible discretionary permits from the City.

The project site is located within the City of Oakland General Plan Central Business District land use designation, and is located within the City of Oakland's C-55, S-1, and S-4 zoning districts (Commercial – Central Core, Special Zoning – Downtown Residential Usable Open Space Combining District, and Special Zoning – Design Review Combining Zone). The C-55 zoning district is intended to preserve and enhance a very high-intensity regional center of employment, shopping, culture, and recreation, and is appropriate to the core of the central district. The S-17 zone is intended to provide open space standards for residential development that are appropriate to the unique density, urban character and historic character of the central business district. The S-4 zone is intended to create, preserve, and enhance the visual harmony and attractiveness of areas which require special treatment and the consideration of relationships between facilities, and is typically appropriate to areas of special community, historical, or visual significance.

PROBABLE ENVIRONMENTAL EFFECTS: It is anticipated that the proposed project may have the following environmental effects: aesthetics (including views and shadows), traffic, circulation, and parking; air quality; and cultural resources. It is anticipated that the project will not have the following environmental effects: biological resources; geology and soils; wind; hazards and hazardous materials; hydrology and water quality; land use, plans, and policies; noise levels; population and housing; public services; recreation; utilities and service systems; and cumulative growth. However these environmental factors will nevertheless be analyzed in the EIR.

The Draft EIR will also examine a reasonable range of alternatives to the Project, including the CEQA-mandated No Project Alternative, and other potential alternatives that may be capable or reducing or avoiding potential environmental effects.

Gary V. Patton, Deputy Director
Planning and Zoning

May 22, 2008
ER 08-003

Attachments: ASK-047-Project and Lot Information
ASK-048-Building Section Looking East
ASK-050-Site Plan
ASK-057-Sixth Level Floor Plan (including rooftop garden)

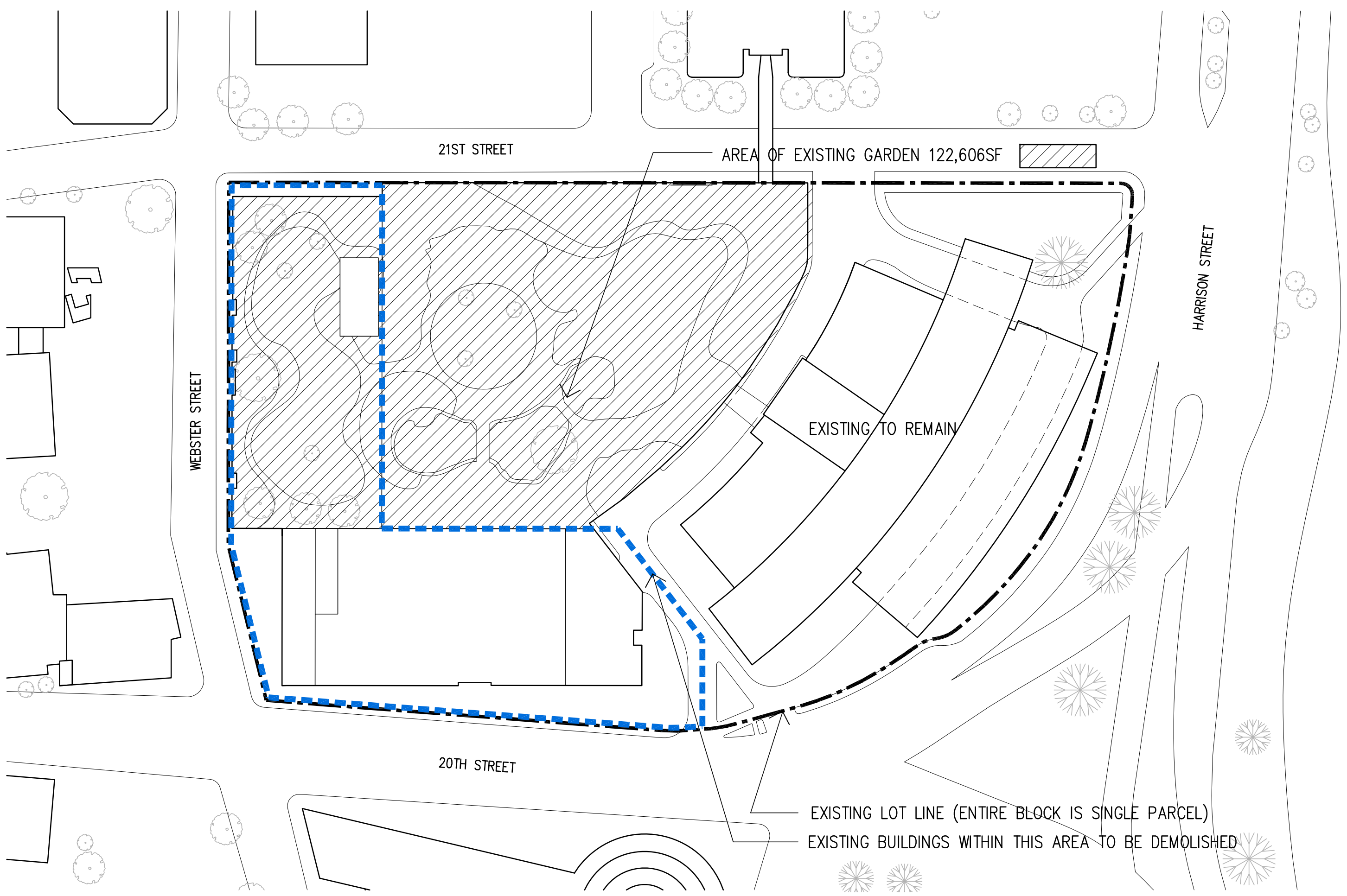
EXISTING & PROPOSED AREA OVERVIEW

	TOTAL EXISTING	- EXISTING TO BE DEMOLISHED	= EXISTING TO REMAIN	+ NEW	= TOTAL	% CHANGE
TOTAL LOT AREA*	311,741GSF	0	311,741GSF	0	311,741GSF	0%
TOTAL BUILDING FOOTPRINT AREA	197,460GSF	74,900GSF	122,560GSF	80,168GSF	202,728GSF	+3%
TOTAL FLOOR AREA	1,690,879GSF	280,002GSF	1,410,877GSF	1,830,984GSF	3,241,861GSF	+92%
BUILDING HEIGHT						
MAXIMUM STORIES	29	N/A	29	42	N/A	N/A
MAXIMUM FEET	386'	N/A	386'	±573.5'	±573.5'	+49%
NUMBER OF PARKING SPACES **	1340	155	1185	852	2037	+52%

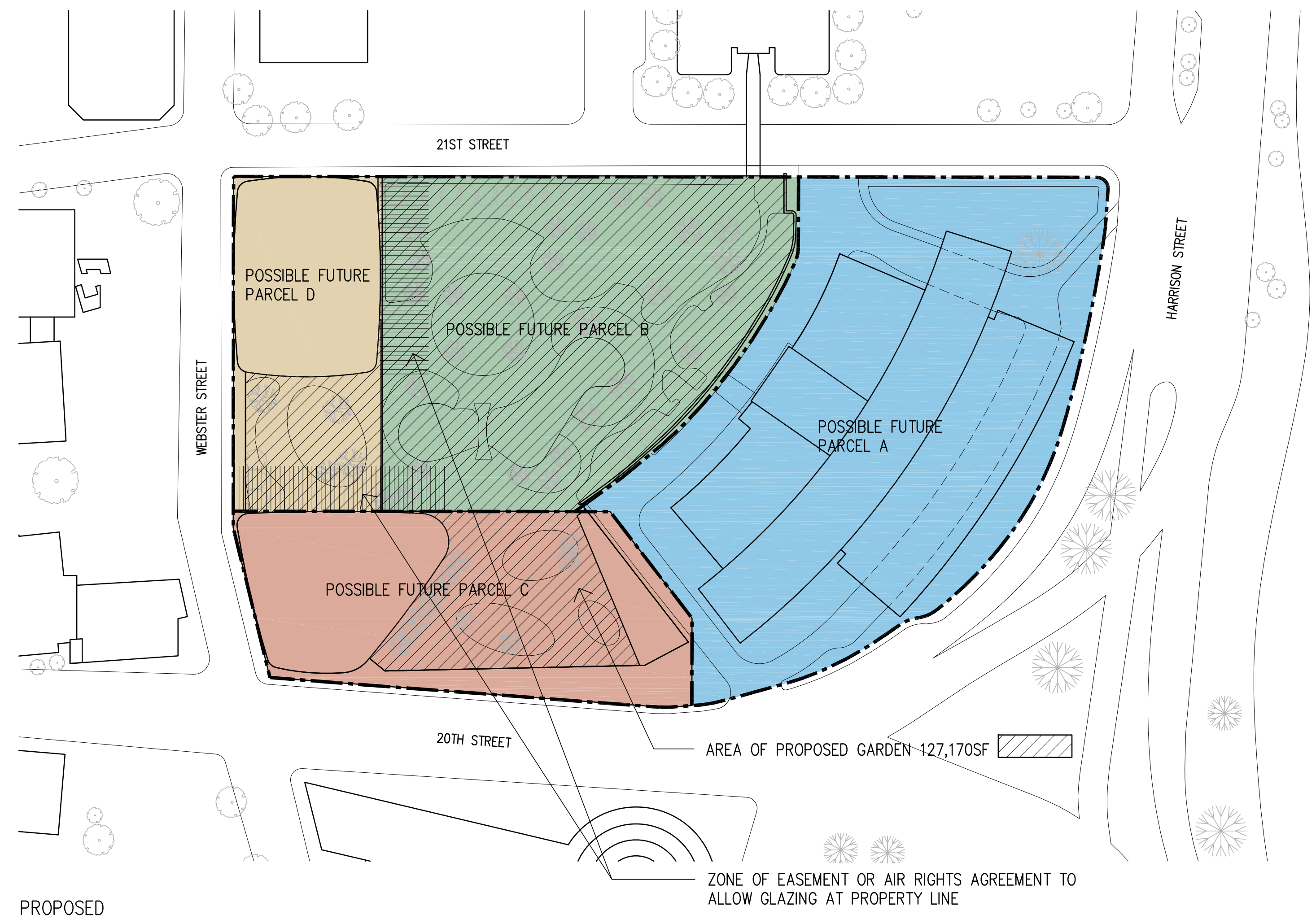
* LOT AREA INCLUDES ALL FOUR POSSIBLE FUTURE PARCELS

** PARKING INCLUDES SPACES RESERVED FOR (E) KAISER CENTER TOWER AND ORDWAY BUILDING. SEE ASK-059

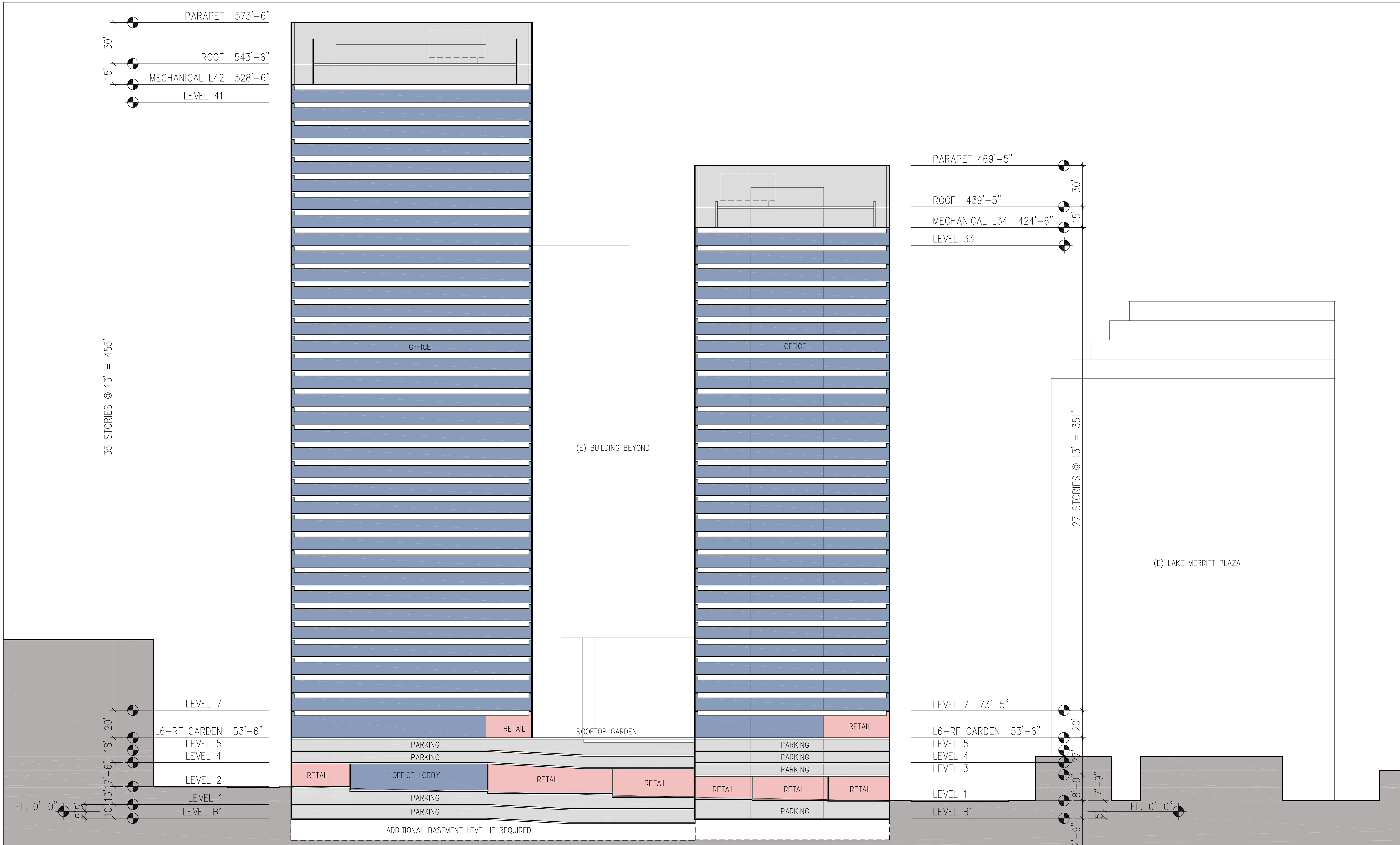
NOTE : POSSIBLE PARCELS SHOWN ON THIS DRAWING ARE FOR REFERENCE ONLY AND ARE INTENDED ONLY TO FACILITATE DESCRIPTION OF THE RELEVANT AREAS AND LOCATION OF THE PROPOSED PROJECT. THIS DRAWING DOES NOT SUGGEST OR PROPOSE A LEGAL SUBDIVISION.



EXISTING



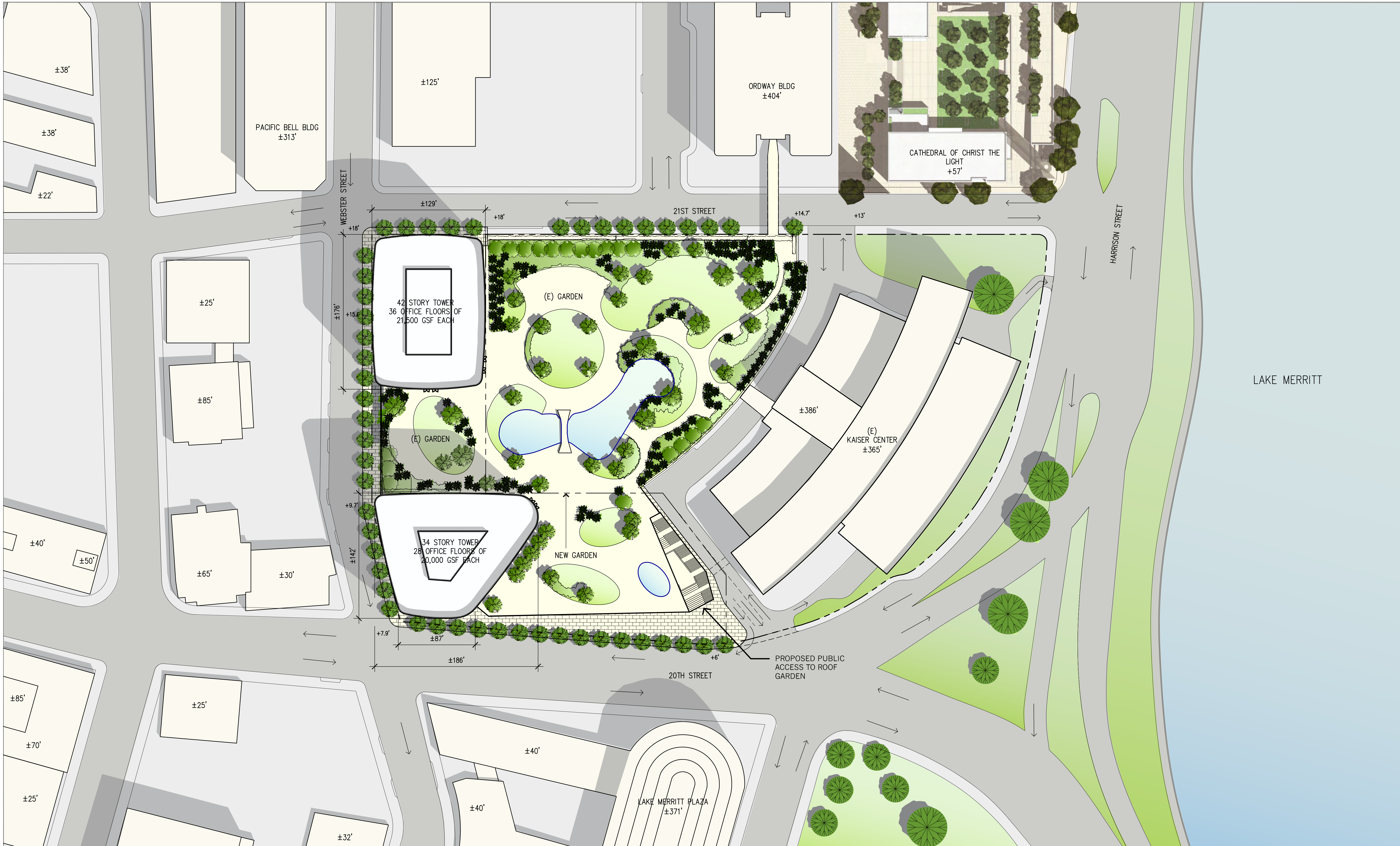
PROPOSED



EAST/ WEST BUILDING SECTION
ASK - 048R1

September 15, 2008
Scale: 1" = 64'-0"

KAISER CENTER
THE SWIG COMPANY
SOM



SITE PLAN
ASK - 050R1

May 29, 2009
Scale: 1" = 100'-0"

0 20' 50' 100'

NORTH

KAISER CENTER
THE SWIG COMPANY
SOM

SIXTH LEVEL FLOOR PLAN
ASK - 057R2

0 16' 32' 64'

May 29, 2009
Scale: 1" = 64'-0"

NORTH

KAISER CENTER
THE SWIG COMPANY
SOM

APPENDIX A.2

NOP Mailing List: Agencies and Organizations

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CERTIFICATE OF MAIL DEPOSIT FOR PUBLIC NOTICES

I certify that on May 21, 2008 notices called under the Oakland Zoning and Subdivision Regulations for the following cases were placed into the U.S. Mail system:

CASE FILE NOS:	STREET ADDRESS:
1. ER08-003/PUD08-103	Mailed a Notice of Preparation (NOP) of a Draft Environmental
2.	Impact Report (EIR) – Kaiser Center Project to the attached
3.	mailing list.
4.	
5.	
6.	
7.	
8.	
9.	
10.	FILE COPY
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

Celia Rivera
(NAME OF PERSON PLACING NOTICES IN MAIL)

May 21, 2008
(DATE)

FMC1 5CERTMAIL.GB

Agency Mailing Labels for Environmental Review Notices
Revised 3/31/08

City of Alameda
Planning Department
2263 Santa Clara Avenue, Rm. 120
Alameda, CA 94501

City of Piedmont
Planning Department
120 Vista Avenue
Piedmont, CA 94611

County of Alameda
Planning Department
399 Elmhurst, Room 136
Hayward, CA 94544

Alameda County CMA
Attn: Saravana Suthanthira
1333 Broadway, Suite 220
Oakland, CA 94612

California Dept. of Water Resources
Attn: DPLA Environmental Review
P.O. Box 942836
Sacramento, CA 94236-0001

California Highway Patrol
3601 Telegraph Avenue
Oakland, CA 94609

Alameda Co. Dept. of Env. Health
Hazardous Materials Division
1131 Harbor Bay Parkway
Alameda, CA 94612

AC Transit Attn: Nathan Landau
Long Range Planning Division
1600 Franklin Street, Suite 700
Oakland, CA 94612

Alameda County Clerk-Recorder
1106 Madison Street
Oakland, CA 94607

Oakland Chamber of Commerce
475 14th Street
Oakland, CA 94612

City of Emeryville
Planning/Redevelopment Agency
1330 Park Avenue
Emeryville, CA 94608

City & County of San Francisco
Planning Department
1660 Mission Street, 5th Floor
San Francisco, CA 94103

EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

California Air Resources Board
Bob Fletcher
P.O. Box 2815
Sacramento, CA 95812

MTC
Attn: Environmental Staff
Metro Center
101 8th Street
Oakland, CA 94612

BCDC
Environmental Planning Departm
50 California Street, #260
San Francisco, CA 94111

Marianne Payne
Planning Department Manager
San Francisco BART District
300 Lakeside Drive, P.O. Box 12
Oakland, CA 94604-2688

City of Berkeley
Planning Director
2118 Milvia Street
Berkeley, CA 94704

City of San Leandro
Planning Division
835 E. 14th Street
San Leandro, CA 94577

Agency Mailing Labels for Environmental Review Notices Revised 3/31/08 - Page 2

Melinda Pagadwan
Caltrans, Transportation Planning
111 Grand Avenue
Oakland, CA 94623

State Lands Commission
Environ. Planning & Mgt. Division
100 Howe Avenue, Suite 100
South Sacramento, CA 95825-8202

Montclarion Newspaper
1516 Oak Street
Alameda, CA 94501

S. F. Bay Guardian
c/o Matthew Hirsch
135 Mississippi Street
San Francisco, CA 94107-2536

Oakland Heritage Alliance
446 17th Street, Suite 301
Oakland, CA 94612

EBMUD, Office of Water Recycling
Attn: Linda Hu
P.O. Box 24055, MS 702
Oakland, CA 94623-1055

State Office of Historic Preservation
Attn: Ms. Cherilyn Widell
P.O. Box 942896
Sacramento, CA 94296

State Geologist
Attn: John Parrish
801 K Street, MS 12-30
Sacramento, CA 95814

Dept. of Toxic Substances Control
Attn: Manager
700 Heinz Ave., Bldg. F, Suite 200
Berkeley, CA 94710-2721

Oakland Tribune
c/o Laura Counts
7677 Oakport Street, #950
Oakland, CA 94621

Ron Bishop
BPAC
409 45th Street
Oakland, CA 94609

East Bay News Service
c/o Sanjiv Handa
P.O. Box 11093
Oakland, CA 94611

Oakland Unified School District
1025 Second Avenue, Room 301
Oakland, CA 94606

Pacific Gas & Electric Company
1919 Webster Street
Oakland, CA 94612

East Bay Regional Park District
Attn: Brad Olson
P.O. Box 5381
Oakland, CA 94605-0381

CA Department of Fish & Game
Habitat Conservation
P.O. Box 47
Yountville, CA 94599

Governor's Office of Planning &
Research - State Clearinghouse U
1400 10th Street, Room 121
Sacramento, CA 95814

Oakland Public Library
Social Science and Documents
125 14th Street
Oakland, CA 94612

East Bay Express
c/o Bob Gammon
1335 Stanford Avenue
Emeryville, CA 94608

Staff Mailing Labels for EIR Notices
Page 1 of 2
Revised 3/10/08

DOUGLAS BOXER
Boxer & Associates, Inc.
300 Frank H. Ogawa Plaza, Suite 500
Oakland, CA 94612

MICHAEL COLBRUNO
Clear Channel Outdoor
555 12th Street, Suite 950
Oakland, CA 94607

SANDRA GALVEZ
4044 Elston Avenue
Oakland, CA 94602

C. BLAKE HUNTSMAN
SEIU, Local 1021
155 Myrtle Street
Oakland, CA 94607

SUZIE W. LEE
YHLA Architects, Inc.
1617 Clay Street
Oakland, CA 94612

MADELEINE ZAYAS-MART
24 Buckeye Avenue
Oakland, CA 94618

ANNIE E. MUDGE
6155 Girvin Drive
Oakland, CA 94611

Deputy Editor of Oakland News
c/o Jane Powell
2708 Sunset Avenue
Oakland, CA 94601

Oakland Tribune
c/o Laura Counts
7677 Oakport Street, #950
Oakland, CA 94621

East Bay Express
c/o Bob Gammon
1335 Stanford Avenue
Emeryville, CA 94608

East Bay News Service
c/o Sanjiv Handa
P.O. Box 11093
Oakland, CA 94611

Montclarion Newspaper
1516 Oak Street
Alameda, CA 94501

Kenneth S. Katzoff
Katzoff & Riggs
1500 Park Avenue, Suite 300
Emeryville, CA 94608

Michael VanVeber Dyett, AICP
Dyett & Bhatia
755 Sansome Street, Suite 400
San Francisco, CA 94111

Communities for a Better Environme
c/o Will Rostor
1611 Telegraph Avenue, Suite 450
Oakland, CA 94612

Staff Mailing Labels for EIR Notices

Dan Lindheim, Director
CEDA/Planning

Gary Patton
CEDA/Planning

Scott Miller
CEDA/Zoning

Margaret Stanzione
CEDA/Planning

Reference Copies for
Zoning Div., 2nd Floor
2 each

Planning Commission
Reference Copy for Zoning Div.
2nd Floor

Reference Copy
for Planning Div.
3rd Floor

Councilmember Jean Quan
(District 4)
Council Office, 2nd Fl.

Oraiu Amoni
Council Office, 2nd Fl.
City Hall

Interested Parties

Tomás Schoenberg
Senior Vice President
The Swig Company
220 Montgomery Street, 20th Floor
San Francisco, CA 94104

David Preiss
Wendel Rosen Black & Dean
1111 Broadway, 24th Floor
Oakland, CA 94607

Councilmember Nancy Nadel
(District 3)
Council Office, 2nd Floor

Landmarks Preservation Advisory Board Mailing List

↓↓WHOLE PACKET↓↓ (20)

THOMAS BIGGS
Biggs Group Architecture
P.O. Box 70448
Oakland, CA 94612

KELLEY KAHN
544 Guerrero Street, Apt. 6
San Francisco, CA 94110

ROSEMARY MULLER
Muller & Caulfield
339 15th Street, Suite 300
Oakland, CA 94612

NEAL A. PARISH
Wendel, Rosen, Black & Dean
1111 Broadway, 24th Floor
Oakland, CA 94607

KIRK E. PETERSON
Kirk E. Peterson & Assoc. Architects
5253 College Avenue
Oakland, CA 94618

DELPHINE PRÉVOST, MBA
Port of Oakland
Maritime Division
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Oakland, CA 94607

East Bay News Service
c/o Sanjiv Handa
P.O. Box 11093
Oakland, California 94611

Oakland Heritage Alliance
446 17th Street, Suite 301
Oakland, CA 94612

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Alameda, CA 94501

Gary Patton
CEDA/Planning
3rd Floor

Dan Lindheim, Director
CEDA/Planning
3rd Floor

Joann Pavlinec
CEDA/Planning
3rd Floor

Betty Marvin
CEDA/Planning
3rd Floor

Mark Wald
City Attorney's Office
City Hall, 6th Floor
(Interoffice Mail)

Eric Angstadt
CEDA/Planning
3rd Floor

City Clerk's Office
City Hall, 1st Floor

Reference Copies
4 each
(Give to Joann)

AGENDA & MINUTES
↓ ↓ ↓

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YHLA Architects, Inc.
1617 Clay Street
Oakland, CA 94612

Annie E. Mudge
Cox, Castle & Nicholson LLP
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San Francisco, CA 94111

Michael Colbruno
Clear Channel Outdoor
555 12th Street, Suite 950
Oakland, CA 94607

C. Blake Huntsman
SEIU, Local 1021
155 Myrtle Street
Oakland, CA 94607

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Caltrans - OCRS
Environ. Div., Mail Station 8A
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Oakland, California 94623-0660

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Oakland, California 94606

Robin Bartoo
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Joyce Roy
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Oakland, California 94611

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Oakland, California 94607

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Oakland, California 94618

Suzanne Brinkley
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Pleasant Hill, CA 94523

Kevin Flynn
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FELICIA VERDIN
Oakland Sharing the Vision
1 Frank H. Ogawa Plaza, 3rd Fl.
(Interoffice Mail)

Mayor Ronald V. Dellums
Mayor's Office
City Hall, 3rd Floor
(Interoffice Mail)

Celia McCarthy
Port of Oakland
Environmental Planning
530 Water Street
(Interoffice Mail)

Aliza Gallo
CEDA/Business Dev.
Suite 3315

Landmarks Preservation Advisory Board Mailing List
Page 3 of 3
AGENDA ONLY
↓ ↓ ↓

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Richmond, CA 94805

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Oakland, CA 94610

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Oakland, California 94610

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San Francisco, California 94102

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Oakland, CA 94611

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Shute, Mihaly et.al.
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San Francisco, California 94102

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Berkeley, California 94709

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Express
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Oakland, California 94619

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Oakland, California 94604-1885

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Oakland, CA 94621

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Pardee Home Museum
672 - 11th Street
Oakland, California 94607

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c/o Jane Powell
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Oakland, CA 94601

Dr. P. Christiaan Klieger
Interim Chief Curator of History
Oakland Museum
(Interoffice Mail)

Michael Munson
KTOP TV
5th Floor, Suite 5354
(Interoffice Mail)

Michele Morton
KTOP
5th Floor, Suite 5354
(Interoffice Mail)

Mark Bryant
OPW - Real Estate, 4th Fl.
(Interoffice Mail)

Library - History Room
125 14th Street
(PLEASE POST)
(Interoffice Mail)

APPENDIX A.3

NOP Mailing List; 300' Radius

300 Lakeside Drive
ER08-003, PUD08-103
24TH ST
24TH ST
27TH ST
ORIN DR
23RD ST
TELEGRAPH AV
VALLEY ST
VALDEZ ST
WAVERLY ST
VERNON ST
23RD ST
W GRAND AV
WEBSTER ST
BAY PL
22ND ST
GRAND AV
22ND ST
008 065100101
008 065100301
KAISER PLZ
008 065301903
008 065302400
HARRISON ST
21ST ST
20TH ST
008 065200105
HARRISON ST
BROADWAY
008 063602008
FRANKLIN ST
HARRISON ST
008 063500100
19TH ST
17TH ST
LAKESIDE DR
ALICE ST
JACKSON ST
15TH ST
MADISON ST

2030 ASSOCIATES
2021 WEBSTER ST
OAKLAND CA 94612

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

22ND STREET PARTNERS LLC
N/AVAIL

80 GRAND MC LLC
2250 BROADWAY
OAKLAND CA 94612

OPERATING PTSHP BRANDYWINE
N/AVAIL

ORDWAY LLC BRANDYWINE
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

CALIFORNIA NURSES ASSOCIATION
2000 FRANKLIN ST
OAKLAND CA 94612-2908

CSHV 180 GRAND LLC
220
SANTA ANA CA 92707

CSHV 180 GRAND LLC
220
SANTA ANA CA 92707

SHAHLA DAVOUDI
23 LAGOON RD
SAN RAFAEL CA 94901-1522

EAST BAY STATE BUILDING AUTHORITY
1401 LAKESIDE DR
OAKLAND CA 94612-4305

PORTFOLIO ESSEX
925 E MEADOW DR
PALO ALTO CA 94303-4233

SUSAN B. JOHNSON
PO BOX 173
LEWISTON CA 96052-0173

ELENA LEON
115 LATHAM ST
PIEDMONT CA 94611-4141

MASRI FAMILY LP A
290 27TH ST
OAKLAND CA 94612-3821

MASRI FAMILY LP A
290 27TH ST
OAKLAND CA 94612-3821

PACIFIC BELL 279-1-43-2
2600 CAMINO RAMON #IN05
SAN RAMON CA 94583-5000

PPD MERRITT I LLC
3993 HOWARD HUGHES PKWY #450
LAS VEGAS NV 89169-6759

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #215
DALLAS TX 75204-2911

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

PRENTISS PROPERTIES ACQUISITION
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

PRENTISS PROPERTIES WEBSTER
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

JOHN J. & GRACE E. SHANAHAN
450 TARAVAL ST
SAN FRANCISCO CA 94116-2530

LAKESIDE DRIVE LLC SIC
220 MONTGOMERY ST #20
SAN FRANCISCO CA 94104-3526

SODALITE
2711 N HASKELL AVE #2150
DALLAS TX 75204-2912

TWENTY THIRTY ASSOCIATES
2030 FRANKLIN ST #400
OAKLAND CA 94612-2948

PATRICIA WELD
101 N TRYON ST
CHARLOTTE NC 28255-0001

WEST COAST PROPERTY MANAGEMENT INC
400 VALLEY WAY
MILPITAS CA 95035-4136

RICK T. ZAWADSKI
982 TULARE AVE
ALBANY CA 94707-2540

300 foot radius

Lakeside Drive Llc Sic
220 Montgomery St Fl 20
San Francisco Ca 94104-3526
008-0652-001-05

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0679-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0685-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0681-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0682-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0687-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0680-001

22nd Street Partners Llc
360 22nd St
Oakland Ca 94612-3019
008-0684-001

Bank Of California National Association
Po Box 7788
Newport Beach Ca 92658-7788
008-0637-004-03

Lottie T. Blue
2828 Chestnut St
Oakland Ca 94608-4450
008-0650-003

Operating Ptshp Brandywine
155 Grand Ave
Oakland Ca 94612-3758
008-0653-023

Ordway Llc Brandywine
2711 N Haskell Ave Ste 2150
Dallas Tx 75204-2912
008-0653-019-03

Dana & Manuel Cabello
2120 Broadway
Oakland Ca 94612-2310
008-0650-004

California Bank & Trust
300 Lakeside Dr # 8wes
Oakland Ca 94612-3534
008-0650-016-04

Csa Property Management Llc
334 19th St
Oakland Ca 94612-3406
008-0636-013-01

East Bay State Building Authority
1401 Lakeside Dr
Oakland Ca 94612-4305
008-0653-021-02

Ronald A. Grant
60 98th Ave
Oakland Ca 94603-1000
008-0637-015

Susan B. Johnson
Po Box 173
Lewiston Ca 96052-0173
008-0653-011

Marvene Ltd
1230 Bennett Ln
Calistoga Ca 94515-9714
008-0650-007-01

Oakland Property Llc
1999 Harrison St
Oakland Ca 94612-3520
008-0636-020-08

P G & E Co 135-1-84a-1
Po Box 770000
San Francisco Ca 94177-0001
008-0637-008-08

Pacific Bell 279-1-43-2
2600 Camino Ramon # In05
San Ramon Ca 94583-5000
008-0653-014-01

Michael K. Park
119 Via Floreado
Orinda Ca 94563-192(
008-0636-018-01

Plaza Oakland Park
Po Box 13247
Kansas City Mo 64199
008-0636-010-01

Bernard S. Reynolds
3965 Washington St
San Francisco Ca 94118-1613
008-0650-008-01

Lakeside Drive Llc Si(
220 Montgomery St Fl
San Francisco Ca 941(
008-0652-001-05

Sodalite
2711 N Haskell Ave Ste 2150
Dallas Tx 75204-2912
008-0717-002

Twenty Thirty Associates
2030 Franklin St # 400
Oakland Ca 94612-2948
008-0651-008-01

Two Thousand One W
Po Box 4900
Scottsdale Az 85261-4
008-0637-003-03

Vsf Of Ref Family Trust
Po Box 219
San Bruno Ca 94066-0219
008-0637-013-01

Patricia Weld
101 N Tryon St
Charlotte Nc 28255-0001
008-0651-018-01

Western Alliance Banc
1951 Webster St
Oakland Ca 94612-29(
008-0637-005

APPENDIX A.4

NOP Mailing List: Neighborhood Groups/Census Tract

<u>NEIGHBORHOOD GROUPS CENSUS TRACT 4034:</u>

<u>CENSUS TRACT 4034:</u>
B-19, C-33, F-11,
J-6, L-4, L-14, O-15,
O-3-1, S-22,

ER08-003
PUD08-103

B-19
JIM RATLIFF
725 HILLGIRT CIR
OAKLAND CA 94610

C-33
FR TIMOTHY K JOHNSON
176 RIDGEWAY AVE
OAKLAND CA 94611

F-11 *(& F-13)*
JOHN JAY
10700 MACARTHUR BLVD STE 200
OAKLAND CA 94605

J-6
CHRISTINE ANDERSON
5095 DUBLIN AVE
OAKLAND CA 94602

L-14
CAYREN M KING
1727 CLEMENS RD
OAKLAND CA 94602-1801

L-4
MAUREEN DORSEY
4258 MACARTHUR BLVD
OAKLAND CA 94619

O-15
ELLEN WYRICK PARKINSON
1420 MAGNOLIA ST
OAKLAND CA 94607

O-3-1
GORDON LINK
6510 RAYMOND ST
OAKLAND CA 94609

S-22
MARGARET ELIZARES
7501 SUNKIST DR
OAKLAND CA 94605-3022

APPENDIX A.5

NOP Posting Locations

POSTING LOCATIONS

Community & Economic Development Agency

The Swig Company LLC	300 Lakeside Dr.	ER08-003 PUD08-103
APPLICANT	ADDRESS	CASE NO.

5/30/08	
DATE	TIME

Posting for the above case were made in the following locations:

1. At site
2. Kaiser / 21st
3. Webster / 21st
4. Webster
5. Webster / 20th
6.
7.
8.
9.
10.
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12.
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15.
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18.
19.
20.

Posted By: DMG/YPW

notice of
PLANNING COMMISSION
PUBLIC HEARING

3.	**Location:**	**300 Lakeside Drive (Kaiser Center)** Block bounded by 20th Street, Webster Street, 21st Street, and Harrison Street. APN: 008-0652-001-05
	Proposal:	**Scoping Session** for an Environmental Impact Report to receive comments regarding potential impacts related to the redevelopment of a portion of the Kaiser Center site. The Project would add approximately 1,474,992 square feet of net new development. The Project includes (1) demolition of 280,002 square feet of existing retail/commercial development along 20th and Webster Streets, (2) construction of one 34 story office tower (436 ft.) at the corner of 20th /Webster Streets, (3) construction of one 42 story office tower (566 ft.) at the corner of Webster/21st Street, (4) construction of 22,500 square feet of ground floor retail, and (5) addition of 828 parking spaces. The 122,606 s.f. rooftop garden will be reconfigured by removing approx. 18,369 s.f. in the Webster/21st Street corner and adding 22,933 s.f. along 20th Street.
	Applicant:	The Swig Company, LLC
	Contact Person/Phone Number:	Tomás Schoenberg, (415) 291-1100
	Owner:	SIC-Lakeside Drive, LLC
	Case File Number:	**ER 08-003, PUD 08-103**
	Planning Permits Required:	Vesting Tentative Parcel Map, Planned Development Permit, Preliminary Development Plan
	General Plan:	Central Business District
	Zoning:	C-55, Central Core Commercial; S-4, Design Review Combining Zone; S-17 Downtown Residential Open Space
	Environmental Determination:	An environmental review application was submitted on 3/25/08. A determination has been made that an EIR will be prepared that covers all environmental topic areas.
	Historic Status:	Kaiser Center Building & Rooftop Garden is a CEQA Historic Resource (Oakland Cultural Heritage Survey Rating A1+; listed on the Local Register of Historical Resources; appears eligible for the National Register individually and as part of the Lake Merritt District (code 3B))
	Service Delivery District:	1 – Downtown/West Oakland/Harbor
	City Council District:	3
	Status:	The Notice of Preparation was published and distributed on May 22, 2008 with comments due on June 23, 2008
	Action to be Taken:	Receive public and Planning Commission comments about what information and analysis should be included in the Environmental Impact Report
	For Further Information:	Contact project planner **Margaret Stanzione** at (510) 238-4932 or by email mstanzione@oaklandnet.com

The public hearing will be heard on **Wednesday, June 18, 2008, at Oakland City Hall, Hearing Room One, 1 Frank H. Ogawa Plaza, Oakland, California 94612**. The public hearing will be heard at 6:30 p.m.

If you challenge the public hearing in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice or in written correspondence delivered to the Community and Economic Development Agency on, or proper to, the public hearing. If you wish to be notified of the decision of this case, please indicate the **case number and submit a self-addressed stamped envelope for each** to the Community and Economic Development Agency/Zoning Division, 250 Frank H. Ogawa Plaza, 2nd floor, Oakland, California 94612-2031. Please telephone (510)238-3781 for further information.

AT SUCH HEARING, FACTS MAY BE PRESENTED FAVORING OR OPPOSING THIS PROPOSAL

IT IS UNLAWFUL TO ALTER OR REMOVE THIS NOTICE on or before the hearing date indicated above. Such an act is punishable by fine or imprisonment or by both fine and imprisonment.

SECRETARY, City Planning Commission
City Hall, Oakland, California 94612

APPENDIX A.6

Summary of Scoping Meeting and Responsive Comments

KAISER CENTER
SUMMARY OF NOP/SCOPING MEETING COMMENTS
Comment Period: May 22, 2008 to June 23, 2008
SCH# 2008052103

Date	Respondent	Organization/Address	Comment Summary
5/23	Scott Morgan Project Analyst, State Clearinghouse	State of California Governor's Office of Planning & Research 1400 10th Street P.O. Box 3044 Sacramento, CA 95812-3044	Transmittal to Reviewing Agencies (No specific comments)
5/23	Doug Johnson	WalkOaklandBikeOakland.com	• EIR to address bicycling and pedestrian circulation. • Reduce or eliminate additional auto parking.
5/29	Debbie Pilas-Treadway Assoc. Governmental Program Analyst	State of California Native American Heritage Commission 915 Capitol Mall, room 364 Sacramento, CA 95814	Standard comment letter: • Contact Information Center for records search. • Prepare archaeological inventory survey if none already prepared. • Contact NAHC. • Include appropriate mitigation in case unknown archaeological finds are encountered.
6/9	Chris Pattillo Co-Chair, HALS Northern California Chapter *(LPAB Scoping Session)*	Historic American Landscape Survey Northern California Chapter 444 17th Street, Oakland, CA 94612	• Letter supporting project and its responsible treatment of historic garden. • EIR to include wind and shadow studies and their effects on garden.
6/10	Diane Stark Senior Transportation Planner	Alameda County Congestion Management Agency 1333 Broadway, Suite 220 Oakland, CA 94612	Standard comment letter • Use of ACCMA Countywide model. • Impacts on MTS • Adequacy of Mitigation Measures; transit LOS • Use of Transit Demand Measures. • Bicycle routes. • Noise from traffic.
6/16	Lisa Carboni District Branch Chief Local Development – Intergovernmental Review	State of California Business, Transportation and Housing Agency Department of Transportation 111 Grand Avenue P.O. Box 23660 Oakland, CA 94623-0660	Standard comment letter • Prepare detailed traffic impact study. • Coordinate scoping with agency
6/18	William R. Kirkpatrick Manager of Water Distribution Planning	East Bay Municipal Utility District 375 Eleventh Street Oakland, CA 94607-4240	• Letter acknowledges agency's intent to serve project with water service. • Confirms adequate wastewater capacity to serve project. • Project to comply with water conservation measures (AB 325, etc.) and best management practices.

Date	Respondent	Organization/Address	Comment Summary
6/23	Jean Roggenkamp Deputy Air Pollution Control Officer	Bay Area Air Quality Management District 939 Ellis Street San Francisco, California 94109	Standard comment letter. • Include District's attainment status for criteria pollutants. • Evaluations of the project's construction, operational, and cumulative AQ impacts. • TACs • Project's potential to increase energy demand. • LEED or sustainable construction methods • Evaluation of parking within a transit-rich area. • Greenhouse gas emissions (AB32).
6/23	Val Joseph Nenotti Deputy Planning Manger, Stations	San Francisco Bay Area Rapid Transit (BART) District 300 Lakeside Drive, P.O. Box 12688 Oakland, CA 94612-3543	• Project's proximity to BART station. • Impacts on capacity of 19th Street BART station. • Evaluate need for parking supply. • Bicycle parking facilities at BART staton. • Pedestrian capacity/circulation on 20th Street, including during construction period. • Greenhouse gas emissions reduction due to BART use.
6/26	Nancy Skowbo Deputy General Manager for Service Development	AC Transit 1600 Franklin Street Oakland, CA 94612	• Impacts on transit operations. • Traffic impacts from changes on 20th and Harrison (Measure DD Lake Merritt program). • Key transit intersections in the vicinity. • Cumulative impacts on bus routes • Use of TDM to reduce number of parking spaces. • Bicycle facilities; "car share" parking.
Date	**Respondent**	**Event**	**Comment Summary**
6/9	Landmarks Preservation Advisory Board	NOP/EIR Scoping Meeting	• Cumulative traffic • Wind • Historic resources • Shadow on lake and open space • Pedestrian safety
6/18	Planning Commission	NOP/EIR Scoping Meeting	• Change to "Y" driveway at 20th Street intersection to improve pedestrian safety. • Luminous (i.e., glass) skin – glare. • Relocation of 24 Hour Fitnesss • Changes in retail square footage. • LEED certified? • Fiscal feasibility to enforce parking and conditions of approval. • Lack of pedestrian access. • Pedestrian experience (blank walls, safety) • Dust emissions from construction on park users. • Construction circulation and effects on nearby intersections (Webster @ 21st). • Density as mitigation; encourage public transit • Aesthetics with context from DT and Lake Merritt • Access to open space. • Skyline context (visual)

APPENDIX A.7

Comment Letters in Response to NOP

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

ARNOLD SCHWARZENEGGER
GOVERNOR

CYNTHIA BRYANT
DIRECTOR

Notice of Preparation

May 23, 2008

To: Reviewing Agencies

Re: Kaiser Center Project
SCH# 2008052103

Attached for your review and comment is the Notice of Preparation (NOP) for the Kaiser Center Project draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Margaret Stazione
City of Oakland
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Project Analyst, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# **2008052103**
Project Title Kaiser Center Project
Lead Agency Oakland, City of

Type **NOP** Notice of Preparation

Description The project would result in two office towers of approximately 436 feet or 34 stories tall in place of the "20th Street Mall" and 566 feet or 42 stories tall in place of the "Webster Street Mall". Approximately 22,500 square feet of retail space would be constructed on the ground floor along the Webster and 20th Street frontages. The project would add approximately 852 net new parking spaces. The project would result in a net increase of public open space by approximately 4,500 square feet. All existing development on the 2.2-acre project site would be demolished and replaced as part of the proposed project.

Lead Agency Contact

Name Margaret Stazione
Agency City of Oakland
Phone (510) 238-4932 ***Fax***
email mstanzione@oaklandnet.com
Address 250 Frank H. Ogawa Plaza, Suite 3315
City Oakland ***State*** CA ***Zip*** 94612

Project Location

County Alameda
City Oakland
Region
Cross Streets Webster and 20th Streets
Parcel No. 008-0652-00-105
Township ***Range*** ***Section*** ***Base***

Proximity to:

Highways
Airports
Railways
Waterways
Schools
Land Use

Project Issues Aesthetic/Visual; Traffic/Circulation; Recreation/Parks; Air Quality; Archaeologic-Historic; Biological Resources; Geologic/Seismic; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Water Quality; Landuse; Noise; Population/Housing Balance; Public Services; Cumulative Effects; Growth Inducing

---

Reviewing Agencies Resources Agency; Department of Conservation; Department of Parks and Recreation; San Francisco Bay Conservation and Development Commission; Department of Water Resources; Department of Fish and Game, Region 3; Native American Heritage Commission; California Highway Patrol; Caltrans, District 4; Integrated Waste Management Board; Department of Toxic Substances Control; Regional Water Quality Control Board, Region 2

Date Received 05/23/2008 ***Start of Review*** 05/23/2008 ***End of Review*** 06/23/2008

SCH# 2008052103

esources Agency

Resources Agency
Nadell Gayou

Dept. of Boating & Waterways
David Johnson

California Coastal Commission
Elizabeth A. Fuchs

Colorado River Board
Gerald R. Zimmerman

Dept. of Conservation
Sharon Howell

California Energy Commission
Dale Edwards

Cal Fire
Allen Robertson

Office of Historic Preservation
Wayne Donaldson

Dept of Parks & Recreation
Environmental Stewardship Section

Central Valley Flood Protection Board
Mark Herald

S.F. Bay Conservation & Dev't. Comm.
Steve McAdam

Dept. of Water Resources
Resources Agency
Nadell Gayou

____
Conservancy

sh and Game

Depart. of Fish & Game
Scott Flint
Environmental Services Division

Fish & Game Region 1
Donald Koch

Fish & Game Region 1E
Laurie Harnsberger

- [ ] Fish & Game Region 2
  Jeff Drongesen
- [x] Fish & Game Region 3
  Robert Floerke
- [ ] Fish & Game Region 4
  Julie Vance
- [ ] Fish & Game Region 5
  Don Chadwick
  Habitat Conservation Program
- [ ] Fish & Game Region 6
  Gabrina Gatchel
  Habitat Conservation Program
- [ ] Fish & Game Region 6 I/M
  Gabrina Getchel
  Inyo/Mono, Habitat Conservation Program
- [ ] Dept. of Fish & Game M
  George Isaac
  Marine Region

Other Departments

- [ ] Food & Agriculture
  Steve Shaffer
  Dept. of Food and Agriculture
- [ ] Depart. of General Services
  Public School Construction
- [ ] Dept. of General Services
  Robert Sleppy
  Environmental Services Section
- [ ] Dept. of Health Services
  Veronica Malloy
  Dept. of Health/Drinking Water

Independent Commissions,Boards

- [ ] Delta Protection Commission
  Debby Eddy
- [ ] Office of Emergency Services
  Dennis Castrillo
- [ ] Governor's Office of Planning & Research
  State Clearinghouse
- [x] Native American Heritage Comm.
  Debbie Treadway
- [ ] Public Utilities Commission
  Ken Lewis
- [ ] Santa Monica Bay Restoration
  Guangyu Wang
- [ ] State Lands Commission
  Marina Brand
- [ ] Tahoe Regional Planning Agency (TRPA)
  Cherry Jacques

Business, Trans & Housing

- [ ] Caltrans - Division of Aeronautics
  Sandy Hesnard
- [ ] Caltrans - Planning
  Terri Pencovic
- [x] California Highway Patrol
  Shirley Kelly
  Office of Special Projects
- [ ] Housing & Community Development
  Lisa Nichols
  Housing Policy Division

Dept. of Transportation

- [ ] Caltrans, District 1
  Rex Jackman
- [ ] Caltrans, District 2
  Marcelino Gonzalez
- [ ] Caltrans, District 3
  Jeff Pulverman
- [x] Caltrans, District 4
  Tim Sable
- [ ] Caltrans, District 5
  David Murray
- [ ] Caltrans, District 6
  Moses Stites
- [ ] Caltrans, District 7
  Vin Kumar
- [ ] Caltrans, District 8
  Dan Kopulsky
- [ ] Caltrans, District 9
  Gayle Rosander
- [ ] Caltrans, District 10
  Tom Dumas
- [ ] Caltrans, District 11
  Jacob Armstrong
- [ ] Caltrans, District 12
  Ryan P. Chamberlain

Cal EPA

Air Resources Board

- [ ] Airport Projects
  Jim Lerner
  - [ ] Transportation Projects
    Ravi Ramalingam
  - [ ] Industrial Projects
    Mike Tollstrup
- [x] California Integrated Waste Management Board
  Sue O'Leary
- [ ] State Water Resources Control Board
  Regional Programs Unit
  Division of Financial Assistance
- [ ] State Water Resources Control Board
  Student Intern, 401 Water Quality Certification Unit
  Division of Water Quality
- [ ] State Water Resouces Control Board
  Steven Herrera
  Division of Water Rights
- [x] Dept. of Toxic Substances Control
  CEQA Tracking Center
- [ ] Department of Pesticide Regulation

Regional Water Quality Control Board (RWQCB)

- [ ] RWQCB 1
  Cathleen Hudson
  North Coast Region (1)
- [x] RWQCB 2
  Environmental Document Coordinator
  San Francisco Bay Region (2)
- [ ] RWQCB 3
  Central Coast Region (3)
- [ ] RWQCB 4
  Teresa Rodgers
  Los Angeles Region (4)
- [ ] RWQCB 5S
  Central Valley Region (5)
  - [ ] RWQCB 5F
    Central Valley Region (5)
    Fresno Branch Office
  - [ ] RWQCB 5R
    Central Valley Region (5)
    Redding Branch Office
- [ ] RWQCB 6
  Lahontan Region (6)
  - [ ] RWQCB 6V
    Lahontan Region (6)
    Victorville Branch Office
- [ ] RWQCB 7
  Colorado River Basin Region (7)
- [ ] RWQCB 8
  Santa Ana Region (8)
- [ ] RWQCB 9
  San Diego Region (9)
- [ ] Other ________________

Last Updated on 03/03/2008

Stanzione, Margaret

From: Doug J. [doug@walkoaklandbikeoakland.org]

Sent: Friday, May 23, 2008 5:47 PM

To: Stanzione, Margaret

Cc: wobo FOUNDERS; Wlassowsky, Wlad; Patton, Jason; Patton, Gary

Subject: NOP: Kaiser Center Project 300 Lakeside

I submit the following comments on the need to address both bicycling and pedestrian circulation and the project description for the area around the enormous project planned for 300 Lakeside (Notice of Preparation May 22, 2008).

First, all planning for the site and adjoining streets must reference and address both the city's bicycle and its pedestrian master plan recommendations for this area. There are a number of critical bicycle routes and pedestrian improvements in this vicinity that must be developed along with this project.

In addition, given the building's two-three block distance from 19th St BART and dozens of high quality bus lines, it is entirely inappropriate to add auto parking at the proposed scale (900+ spaces). Transportation demand management strategies can move employees to the project area without clogging our streets and increasing carbon emissions.

We look forward to the study and additional opportunities to provide comments and we hope - support - when the project warrants it.

Kind regards,
Doug Johnson
WalkOaklandBikeOakland.org
President

STATE OF CALIFORNIA Gray Davis, *Governor*

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
(916) 657-5390 - Fax

May 29, 2008

Margaret Stazione
City of Oakland
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

RE: SCH # 2008052103 – Kaiser Center project, Alameda County

Dear Ms. Stazione:

The Native American Heritage Commission has reviewed the above mentioned NOP. To adequately assess the project-related impact on archaeological resources, the Commission reccomends the following action be required:

1. Contact the appropriate Information Center for a records search. The record search will determine:
   - Whether a part or all of the project area has been previously surveyed for cultural resources.
   - Whether any known cultural resources have already been recorded on or adjacent to the project area.
   - Whether the probability is low, moderate, or high that cultural resources are located within the project area.
   - Whether a survey is required to determine whether previously unrecorded cultural resources are present.

2. The final stage of the archaeological inventory survey is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
   - Required the report containing site significance and mitigation be submitted immediately to the planning department.
   - Required site forms and final written report be submitted within 3 months after work has been completed to the Information Center.

3. Contact the Native American Heritage Commission for:
   - A Sacred Lands File Check.
   - A list of appropriate Native American Contacts for consultation concerning the project site and assist in the mitigation measures.

Lack of surface evidence of archeological resources does not preclude the existence of archeological resources. Lead agencies should include provisions for accidentally discovered archeological resources during construction per California Environmental Quality Act (CEQA) §15064.5 (f). Health and Safety Code §7050.5 and Public Resources Code §5097.98 mandates the process to be followed in the event of an accidental discovery of any human remains in a location other than a dedicated cemetery and should be included in all environmental documents. If you have any questions, please contact me at (916) 653-4038.

Sincerely,

Debbie Pilas-Treadway
Associate Governmental Program Analyst

CC: State Clearinghouse

HALS
Historic American Landscape Survey
Northern California Chapter
444 17th Street, Oakland, CA 94612
Telephone: 510/465-1284

June 9, 2008

Members of the Landmarks Board
250 Frank Ogawa
Oakland, CA 94612

RE: Kaiser Center Scoping

Dear Landmarks Board Member,

I write on behalf of the Northern California Chapter of the Historic American Landscapes Survey (HALS) regarding the proposed changes to the Henry J. Kaiser Center and its roof garden. For the past two years our members have been engaged in documenting this roof garden for HALS because we feel it is an important cultural resource. Designed in the 1960s by Osmundson and Staley, Landscape Architects this garden incorporates many innovative technologies.

I had the opportunity to meet with representatives of The SWIG Company and am pleased to see that their plans include retention of most of the garden area, reconstruction of the portion that will be impacted by construction, the addition of over 4000 square feet of new garden area in a design style similar to the original, and significantly improved public access to the garden via a new stairway off 20th Street.

We support the proposed development and its responsible treatment of this important historic garden. The Environmental Impact Report (EIR) should include detailed wind and shade studies that analyze the impacts on the garden. How will the new towers impact the plants viability to thrive, how will the new construction impact users comfort in the garden spaces, how will increased use due to the improved access impact the garden? These impacts can certainly be addressed in the design phase, but it is important to understand these impacts.

Sincerely,

Chris Pattillo

Chris Pattillo
Co-Chair, HALS Northern California Chapter

Co-chairs:

Betsy Flack	Cathy Garrett	Chris Pattillo
The Garden Conservancy	PGAdesign inc.	PGAdesign inc.
bflack@gardenconservancy.org	garrett@pgadesign.com	pattillo@pgadesign.com

ALAMEDA COUNTY
CONGESTION MANAGEMENT AGENCY

1333 BROADWAY, SUITE 220 • OAKLAND, CA 94612 • PHONE: (510) 836-2560 • FAX: (510) 836-2185
E-MAIL: mail@accma.ca.gov • WEB SITE: accma.ca.gov

June 10, 2008

Mr. Gary V. Patton
Deputy Director
Planning and Zoning
City of Oakland
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612-2032
gpatton@oaklandnet.com

SUBJECT: Comments on the Notice of Preparation of a Draft Environmental Impact Report (DEIR) for Kaiser Center Project

Dear Mr. Patton:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for a Draft Environmental Impact Report (DEIR) for the Kaiser Center Project on 300 Lakeside Drive, at the northeast corner of Webster and 20th Streets in the City of Oakland. The 2.2.acre project site is a portion of the 7-acre Kaiser Center. The project would involve redeveloping the site to include approximately 1.47 million square feet of office, 22,500 square feet of ground-floor retail, 852 net new parking spaces, and a relocation and 4,500 square foot expansion of the rooftop garden open space. It would result in two office towers of approximately 34 stories (436 feet) tall in place of the "20th Street Mall" and 42 stories (566 feet) tall in place of the "Webster Street Mall." The project requires approvals for a subdivision and a Planned United Development.

The ACCMA respectfully submits the following comments:

- The City of Oakland adopted Resolution No. 69475 on November 19, 1992 establishing guidelines for reviewing the impacts of local land use decisions consistent with the Alameda County Congestion Management Program (CMP). Based on our review of the NOP, the proposed project appears to generate at least 100 p.m. peak hour trips over existing conditions. If this is the case, the CMP Land Use Analysis Program requires the City to conduct a traffic analysis of the project using the Countywide Transportation Demand Model for projection years 2015 and 2030 conditions. Please note the following paragraph as it discusses the responsibility for modeling.
    - The CMA Board amended the CMP on March 26th, 1998 so that local jurisdictions are responsible for conducting the model runs themselves or through a consultant. The ACCMA has a Countywide model that is available for this purpose. The City of Oakland and the ACCMA signed a Countywide Model Agreement on November 16, 2007. Before the model can be used for this project, a letter must be submitted to the

ACCMA requesting use of the model and describing the project. A copy of a sample letter agreement is available upon request.

- Potential impacts of the project on the Metropolitan Transportation System (MTS) need to be addressed. (See 2007 CMP Figures E-2 and E-3 and Figure 2). The DEIR should address all potential impacts of the project on the MTS roadway and transit systems. These include I-880, I-580, I-80, I-980, SR 24, Harrison Street, Webster Street, Grand Avenue, Broadway, San Pablo Avenue, Telegraph Avenue, 14th Street, as well as BART and AC Transit. Potential impacts of the project must be addressed for 2015 and 2030 conditions.
  - Please note that the ACCMA does not have a policy for determining a threshold of significance for Level of Service for the Land Use Analysis Program of the CMP. Professional judgment should be applied to determine the significance of project impacts (Please see chapter 6 of 2007 CMP for more information).

- The adequacy of any project mitigation measures should be discussed. On February 25, 1993, the CMA Board adopted three criteria for evaluating the adequacy of DEIR project mitigation measures:
  - Project mitigation measures must be adequate to sustain CMP service standards for roadways and transit;
  - Project mitigation measures must be fully funded to be considered adequate;
  - Project mitigation measures that rely on state or federal funds directed by or influenced by the CMA must be consistent with the project funding priorities established in the Capital Improvement Program (CIP) section of the CMP or the Regional Transportation Plan (RTP).

  The DEIR should include a discussion on the adequacy of proposed mitigation measures relative to these criteria. In particular, the DEIR should detail when proposed roadway or transit route improvements are expected to be completed, how they will be funded, and what would be the effect on LOS if only the funded portions of these projects were assumed to be built prior to project completion.

- Potential impacts of the project on CMP transit levels of service must be analyzed. (See 2007 CMP, Chapter 4). Transit service standards are 15-30 minute headways for bus service and 3.75-15 minute headways for BART during peak hours. The DEIR should address the issue of transit funding as a mitigation measure in the context of the CMA's policies as discussed above.

- The DEIR should also consider demand-related strategies that are designed to reduce the need for new roadway facilities over the long term and to make the most efficient use of existing facilities (see 2007 CMP, Chapter 5). The DEIR should consider the use of TDM measures, in conjunction with roadway and transit improvements, as a means of attaining acceptable levels of service. Whenever possible, mechanisms that encourage ridesharing, flextime, transit, bicycling, telecommuting and other means of reducing peak hour traffic trips should be considered. The Site Design Guidelines Checklist may be useful during the review of the development proposal. A copy of the checklist is enclosed.

- The EIR should consider opportunities to promote countywide bicycle routes identified in the Alameda Countywide Bicycle Plan, which was approved by the ACCMA Board on October 26, 2006. The approved Countywide Bike Plan is available at http://www.accma.ca.gov/pages/HomeBicyclePlan.aspx

- For projects adjacent to state roadway facilities, the analysis should address noise impacts of the project. If the analysis finds an impact, then mitigation measures (i.e., soundwalls) should be incorporated as part of the conditions of approval of the proposed project. It should not be assumed that federal or state funding is available.

Thank you for the opportunity to comment on this Notice of Preparation. Please do not hesitate to contact me at 510.836.2560 if you require additional information.

Sincerely,

Diane Stark

Diane Stark
Senior Transportation Planner

file: CMP - Environmental Review Opinions - Responses - 2008

DEPARTMENT OF TRANSPORTATION
111 GRAND AVENUE
P. O. BOX 23660
OAKLAND, CA 94623-0660
PHONE (510) 622-5491
FAX (510) 286-5559
TTY 711

Flex your power!
Be energy efficient!

June 16, 2008

ALA980033
ALA-980-1.4
SCH#2008052103

Ms. Margaret Stazione
City of Oakland
Community and Economic Development Agency
Planning Division
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

Dear Ms. Stazione:

ER 08-003/PUD 08-103 Kaiser Center Project – Notice of Preparation

Thank you for including the California Department of Transportation (Department) in the environmental review process for the Kaiser Center Project. The following comments are based on the Notice of Preparation. As lead agency, the City of Oakland is responsible for all project mitigation, including any needed improvements to State highways. The project's fair share contribution, financing, scheduling, and implementation responsibilities as well as lead agency monitoring should be fully discussed for all proposed mitigation measures and the project's traffic mitigation fees should be specifically identified in the Draft Environmental Impact Report.

Traffic Impact Study (TIS)
The Department is primarily concerned with impacts to the State Highway System. Specifically, a detailed Traffic Impact Study (TIS) should identify impacts to the State Highway System. The TIS should include, but is not limited to the following:

1. Information on the project's traffic impacts in terms of trip generation, distribution, and assignment. The assumptions and methodologies used in compiling this information should be addressed.

2. Average Daily Traffic (ADT) and AM and PM peak hour volumes on all significantly affected streets and highways, including crossroads and controlling intersections.

3. Schematic illustration of the traffic conditions for: 1) existing, 2) existing plus project, and 3) cumulative for the intersections in the project area.

4. Calculation of cumulative traffic volumes should consider all traffic-generating developments, both existing and future, that would affect the State Highway facilities being evaluated.

5. Mitigation measures should consider highway and non-highway improvements and services. Special attention should be given to the development of alternate solutions to circulation problems that do not rely on increased highway construction.

6. All mitigation measures proposed should be fully discussed, including financing, scheduling, implementation responsibilities, and lead agency monitoring.

We encourage the City of Oakland to coordinate preparation of the study with our office, and we would appreciate the opportunity to review the scope of work. Please see the Caltrans' *"Guide for the Preparation of Traffic Impact Studies"* at the following website for more information: http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf

We look forward to reviewing the TIS, including Technical Appendices, and environmental document for this project. Please send two copies to the address at the top of this letterhead, marked ATTN: Yatman Kwan, Mail Stop #10D.

Should you have any questions regarding this letter, please call Yatman Kwan of my staff at (510) 622-1670.

Sincerely,

Lisa Carboni

LISA CARBONI
District Branch Chief
Local Development - Intergovernmental Review

c: State Clearinghouse

EAST BAY
MUNICIPAL UTILITY DISTRICT

June 18, 2008

RECEIVED
JUN 23 2008
City of Oakland
Planning & Zoning Division

Margaret Stanzione, Planner IV
City of Oakland
Community and Economic Development Agency
250 Frank Ogawa Plaza, Suite 3315
Oakland, CA 94612

Re: Notice of Preparation of a Draft Environmental Impact Report – Kaiser Center Project, Oakland

Dear Ms. Stanzione:

East Bay Municipal Utility District (EBMUD) appreciates the opportunity to comment on the Notice of Preparation of a Draft Environmental Impact Report (EIR) for the Kaiser Center Project located in the City of Oakland. EBMUD has the following comments.

WATER SERVICE

EBMUD's Central Pressure Zone, with a service elevation between 0 and 100 feet, will serve the proposed development. When the development plans are finalized, the project sponsor should contact EBMUD's New Business Office and request a water service estimate to determine costs and conditions for providing water service to the proposed development. Engineering and installation of water services requires substantial lead-time, which should be provided for in the project sponsor's development schedule.

The project sponsor should be aware that EBMUD will not install piping or services in contaminated soil or groundwater (if groundwater is present at any time during the year at the depth piping is to be installed) that must be handled as a hazardous waste, or that may be hazardous to the health and safety of construction and maintenance personnel wearing Level D personal protective equipment. EBMUD will not install piping or services in areas where groundwater contaminant concentrations exceed specified limits for discharge to the sanitary sewer system and sewage treatment plants.

Applicants for EBMUD services requiring excavation in contaminated areas must submit copies of existing information regarding soil and groundwater quality within or adjacent to the project boundary. In addition, the applicant must provide a legally sufficient, complete and specific written remedial plan establishing the methodology, planning and design of all necessary systems for the removal, treatment, and disposal of all identified contaminated soil and/or groundwater. EBMUD will not design the installation of pipelines until such time as soil and groundwater quality data and remediation plans are received and reviewed and will not install pipelines until remediation has been carried out and documentation of the effectiveness of the remediation has been received and reviewed. If no soil or groundwater quality data exists or the information supplied by the applicant is insufficient EBMUD may require the applicant to perform sampling and analysis to characterize the soil being excavated and groundwater that may be encountered during excavation or perform such sampling and analysis itself at the applicant's expense.

WASTEWATER PLANNING

EBMUD's Main Wastewater Treatment Plant is anticipated to have adequate dry weather capacity to treat the proposed wastewater flow from this project, provided this wastewater meets the standards of EBMUD's Environmental Services Division. However, the City of Oakland's Infiltration/Inflow (I/I) Correction Program set a maximum allowable peak wastewater flow from each subbasin within the City and EBMUD agreed to design and construct wet weather conveyance and treatment facilities to accommodate these flows. EBMUD prohibits discharge of wastewater flows above the allocated peak flow for a subbasin because conveyance and treatment capacity for wet weather flows may be adversely impacted by flows above this agreed limit. The developer for this project needs to confirm with the City of Oakland Public Works Department that there is available capacity within the subbasin flow allocation and that it has not been allocated to other developments. The projected peak wet weather wastewater flows from this project need to be determined to assess the available capacity within the subbasin and confirmation included in the EIR. Suggested language to include in the EIR is as follows: "The City of Oakland Public Works Department has confirmed that there is available wastewater capacity within Subbasin *(insert subbasin number here)* that is reserved for this project."

In general, the project should address the replacement or rehabilitation of the existing sanitary sewer collection system to prevent an increase in I/I. Please include a provision to control or reduce the amount of I/I in the environmental documentation for this project. The main concern is the increase in total wet weather flows, which could have an adverse impact if the flows are greater than the maximum allowable flows from this subbasin.

WATER CONSERVATION

The proposed project presents an opportunity to incorporate water conservation measures. EBMUD would request that the City include in its conditions of approval a requirement that the project sponsor comply with Assembly Bill 325, "Model Water

Efficient Landscape Ordinance," (Division 2, Title 23, California Code of Regulations, Chapter 2.7, Sections 490 through 495) of the Landscape Water Conservation Guidelines. EBMUD staff would appreciate the opportunity to meet with the project sponsor to discuss water conservation programs and best management practices applicable to the integrated projects. A key objective of this discussion will be to explore timely opportunities to expand water conservation via early consideration of EBMUD's conservation programs and best management practices applicable to the project.

If you have any questions concerning this response, please contact David J. Rehnstrom, Senior Civil Engineer, Water Service Planning at (510) 287-1365.

Sincerely,

David J. Rehnstrom

FOR William R. Kirkpatrick
Manager of Water Distribution Planning

WRK:NJR:sb
sb08_166.doc

cc: The Swig Company, LLC
c/o Tomas Schoenberg
220 Montgomery Street, 20th Floor
San Francisco, CA 94104

BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT
SINCE 1955

June 23, 2008

Margaret Stanzione, Planner IV
City of Oakland, Planning Division
Community and Economic Development Agency
250 Frank H. Ogawa Plaza Suite 3315
Oakland, CA 94612

Subject: Notice of Preparation of a Draft Environmental Impact Report for the Kaiser Center Project (Case No. ER 08-003/PUD 08-103)

Dear Ms. Stanzione:

Bay Area Air Quality Management District (District) staff has reviewed your agency's Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the Kaiser Center Project (Project). The Project is located in downtown Oakland at the northeast corner of Webster and 20th Streets. We understand that the Project would result in the development of two office towers, 34 and 42 stories tall, with 1.47 million square feet of office and retail, and 852 new parking spaces. The Project would also result in a net increase of 4,500 square feet of public open space.

The District has the following specific comments on the environmental analysis that should be included in the EIR.

1. The EIR should provide background information regarding the District's attainment status for all criteria pollutants and the implications for the region if these standards are not attained by statutory deadlines. Information should also be included on the implementation status of the U.S. Environmental Protection Agency's (EPA) recently adopted, more protective $PM_{2.5}$ and ozone standards. A discussion of the health effects of air pollution, especially on sensitive receptors, should be provided.

2. The *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans (1999)* provide guidance on how to evaluate a project's construction, operational and cumulative air quality impacts. You may download a copy from the District's web site at: http://www.baaqmd.gov/pln/ceqa/index.htm. The EIR should provide a detailed analysis of the Project's potential effects on local and regional air quality from construction, operations and cumulative impacts for the Project and each of the alternatives analyzed. The EIR should estimate daily and annual volatile organic compounds (VOCs), nitrogen oxides (NOx), and particulate matter ($PM_{2.5}$ and PM_{10}) emissions from stationary, area and mobile sources resulting from long-term project operation. These estimates should be compared to the significance thresholds in the *BAAQMD CEQA Guidelines*. We recommend utilizing URBEMIS 2007, version 9.2.4, for estimating emissions.

3. The EIR should estimate and evaluate the potential health risk to current and future sensitive populations within the Project area from toxic air contaminants (TACs) as a result of Project construction and operation. We recommend you refer to California Air Resources Board's (ARB) *Air Quality and Land Use Handbook: A Community Health Perspective,* (http://www.arb.ca.gov/ch/landuse.htm) for guidelines on siting sensitive land uses. We recommend that the EIR evaluate any risks with siting land uses near major transportation corridors and other emission sources.

4. Construction equipment generates fugitive dust emissions, exhaust emissions of criteria pollutants, and TACs, specifically diesel particulate matter (DPM), a known carcinogen. The EIR should require that all construction activities associated with the Project comply with the dust mitigation measures in the District's CEQA guidelines. The EIR should also include all feasible mitigation measures to reduce construction equipment exhaust emissions to reduce significant exposure to TAC for the existing community. Such measures could include but are not limited to: maintaining properly tuned engines; minimizing the idling time of diesel powered construction equipment to two minutes; using alternative powered construction equipment (i.e., CNG, biodiesel, electric); using add-on control devices such as diesel oxidation catalysts or particulate filters; using equipment that meets ARB's most recent certification standard for off-road heavy duty diesel engines; phasing project construction; and limiting the operating hours of heavy duty equipment.

5. The EIR should evaluate the Project's potential to increase the demand for energy. Increased demand for electricity, natural gas, and gasoline may result in an increase of criteria air pollutant emissions from combustion, as well as an increase in greenhouse gas emissions. We recommend that the EIR discuss energy demand of the Project at build-out, including any cumulative impacts, such as the need to build peaker power plants to provide power during peak demand. When identifying strategies to minimize the Project's impact on energy and air quality, the EIR should include feasible mitigation measures that require a minimum level of green building measures for new development. This minimum level could be based on the Leadership in Energy and Environmental Design (LEED) standards or by setting a target percentage reduction below California Building Code's Title 24 energy standards. Green building measures could include but are not limited to using: super-efficient heating, ventilation, and air conditioning (HVAC) systems; light-colored and reflective roofing materials, pavement treatments and other energy efficient building materials; shade trees adjacent to buildings and in parking areas; photovoltaic panels on buildings; and natural and energy-efficient lighting.

6. Parking is a prominent feature of the Project design, with net new parking for approximately 852 vehicles proposed in addition to existing parking lots and garages. We recommend that the EIR carefully evaluate the Project's design with respect to onsite parking. The Project's location in a particularly transit-rich location represents a significant opportunity to incentivize transit use and reduce vehicle miles traveled and traffic congestion. Pricing strategies for both on-street and off-street parking, based on the market-demand, can encourage the use of carpooling, walking, bicycling and transit. Such strategies may include unbundling the cost of parking (i.e. charge for off-street parking separately from rents). The

Metropolitan Transportation Commission (MTC) has developed the *Toolbox/Handbook: Parking Best Practices & Strategies For Supporting Transit Oriented Development In the San Francisco Bay Area* to assist local jurisdictions in designing parking policies that support smart growth principles. We recommend that the City of Oakland commit to utilizing and incorporating parking policies contained in the Toolbox into the Project design and operation: http://www.mtc.ca.gov/planning/smart_growth/parking_seminar/Toolbox-Handbook.pdf.

7. We recommend that the EIR analyze greenhouse gas (GHG) emissions associated with implementation of the Project. The California Air Pollution Control Officers Association (CAPCOA) recently released a resource document addressing GHG emissions from projects subject to CEQA. The resource document, *CEQA and Climate Change,* contains an overview of available tools and models for evaluating GHG emissions and strategies for mitigating potentially significant GHG emissions from projects. The report may be downloaded at http://www.capcoa.org. The Project should seek to minimize its contribution to climate change by implementing all feasible mitigation measures to reduce GHG emissions, especially those measures targeting the Project's vehicle miles traveled, as transportation represents approximately 50 percent of the Bay Area's GHG emissions.

If you have any questions regarding these comments, please contact Nadine Wilmot, Environmental Planner, at (415) 749-5074.

Sincerely,

Jean Roggenkamp

Jean Roggenkamp
Deputy Air Pollution Control Officer

cc: BAAQMD Director Tom Bates
BAAQMD Director Scott Haggerty
BAAQMD Director Janet Lockhart
BAAQMD Director Nate Miley

BART

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
300 Lakeside Drive, P.O. Box 12688
Oakland, CA 94612-3534
(510) 464-6000

June 23, 2008

Revised

Margaret Stanzione
Planner IV
Community and Economic Development Agency
250 Frank H. Ogawa Plaza, Suite 3315
Oakland, CA 94612

Re: Comments on the Notice of Preparation for a Draft Environmental Impact Report for the Kaiser Center Project

Dear Ms. Stanzione,

Thank you for the opportunity to comment on the Notice of Preparation (NOP) for the Draft Environmental Report (DEIR) for the Kaiser Center Project, case number ER 08-003, PUD 08-103. We have reviewed the NOP and BART respectfully submits the following comments:

Comment 1:
This project would provide 1.47 million square feet of office space and 22,500 square feet of retail space two blocks from the 19th Street BART Station. BART is very supportive of new urban infill development projects in downtown Oakland near BART stations. The Transit Oriented Development Policy adopted by the BART Board of Directors on July 14, 2005 identifies "promoting high quality, more intensive development on and near BART-owned property...(to) increase ridership" as a vision for BART. Additionally, one of the goals identified in the policy framework for sustainability under BART's Strategic Plan is to "Promote sustainable transit-oriented development in the communities BART services to maximize the use of BART as the primary mode of transportation." This project will assist in achieving the vision and goal identified above.

Comment 2:
The DEIR should identify and analyze the impact that this project will have on the capacity of the 19th Street Oakland BART Station, including the following impacts:

- Additional transit trips generated by the project, including peak hour trips;
- Faregate queues during the weekday peak travel hour at the 20th Street exit and whether the project will create queues at a faregate requiring a passenger to wait more than 60 seconds to process their ticket;
- Passenger flow during weekday AM & PM peak hour through station access portals. This is especially critical for the 19th Street Station portal located at the northeast corner of 20th Street. This analysis should also indicate the impact that a portal expansion, if necessary would have on the sidewalk footprint.

- Vertical Circulation within the BART Station
- Station Platform Capacity

Comment 3:
The DEIR should identify ways to minimize the proposed 52% increase in parking provided for the Kaiser Center Project. Given the City's Transit First policy and the location of this project in a transit-rich environment, we would encourage City staff to consider requiring the developer to prepare a Transportation Demand Management (TDM) plan for the project. A TDM plan should consider a range of options to reduce vehicle trips, including discounted transit pass programs and the provision of dedicated carpool and carsharing spaces to reduce parking ratios for the project. As parking availability and pricing is an important determine of transit mode share, the TDM plan should also identify parking pricing strategies to encourage shifting trips to non-automobile modes of travel.

Comment 4:
Increased bicycle in Oakland has resulted in rapid growth in bicycle parking usage in downtown Oakland, including racks at the 19th Street BART Station. The project should meet the requirements for bicycle parking facilities, shower and locker facilities identified in the Oakland Bicycle Parking Ordinance proposed for adoption by the City Council in July 2008. The City should explore establishing a high-capacity bicycle parking facility or bikestation in the vicinity of the proposed project that could accommodate the long-term bicycle parking needs of this project and other proposed projects in the area.

Comment 5
The DEIR should also identify improvements to address pedestrian capacity issues along 20th Street and Broadway with the proposed project. These streets serve as primary pathways for BART patrons wishing to enter the 19th Street BART station. Pedestrian traffic along 20th Street during the weekday peak hour and in the mid-day (12 p.m. to 1 p.m.) period currently exceeds the available sidewalk width. Future growth and the proposed project will exacerbate this condition. It would be beneficial for the City, BART and the project applicant to work together to provide additional pedestrian capacity between Broadway and the Kaiser Center Project as part of the proposed project.

Comment 6
The increasing amount of infill development in downtown Oakland will result in more pedestrian traffic on city streets surrounding the proposed project. Many of these streets have roadway rights-of-way with significantly more capacity for automobile travel than needed. As part of the site design process, BART encourages the City to work with the project applicant to ensure that the full street right-of-way is allocated efficiently and adequately sized sidewalks are provided to accommodate future demand from this development and other projects in the surrounding area.

Comment 7
BART would like to work with the City and the project applicant to ensure that consideration is given to adding pedestrian and/or transit wayfinding elements to the project as part of any developer-funded enhancements. Such elements should incorporate BART's wayfinding standards for guidance to BART stations.

Comment 8
The proposed project site is located in an area well served by public transit and is located in close proximity to significant numbers of new residential units and other urban services. These factors should result in a lower level of Greenhouse Gas emissions per person than development in other parts of Alameda County or the Bay Area. The Air Quality/Climate Change impact should quantify these benefits of constructing more intense development in downtown Oakland.

Comment 9
The DEIR should address pedestrian access along 20th and Webster Streets during the construction period. As noted in Comment #4, the existing pedestrian demand both during the weekday peak hour and mid-day period currently exceeds the available sidewalk width along 20th Street. The City, BART and the project applicant should work together to ensure that an accessible pedestrian path is provided along these streets during the project's construction phase.

We look forward to working with the City of Oakland on this important project. If you have any questions, please contact F. Kenya Wheeler, Senior Planner at (510) 287-4782 or by e-mail at fwheele@bart.gov.

Thank you again for the opportunity to provide input on this project

Sincerely,

Val Joseph Menotti
Deputy Planning Manager, Stations

1600 Franklin Street, Oakland, CA 94612 - Ph. 510/891-4716 - Fax. 510/891-7157

Nancy Skowbo
Deputy General Manager - Service Development

June 26, 2008

Marge Stanzione
Planner IV
City of Oakland
Community and Economic Development Agency
Planning Division
250 Frank Ogawa Plaza, Suite 3315
Oakland, Ca. 94612

Subject: Notice of Preparation of an Environmental Impact Report - Kaiser Center Project

Dear Ms. Stanzione:

Thank you for the opportunity to comment on the Notice of Preparation of the Draft Environmental Impact Report for the Kaiser Center Project. The Project is proposed for the Kaiser Center block between 20th and 21st Streets, Harrison and Webster Streets. It would essentially double the floor area at the site, from 1.7 million square feet to over 3.2 million square feet. This would be achieved by building two office towers on the Webster Street side of the block. The taller of the two towers would be 42 stories tall. There would be 22,500 square feet of retail space in the new buildings. A net of 700 parking spaces would be added to the existing 1,340 parking spaces in the garage. However, the parking ratio - the number of parking spaces per 1,000 square feet of office and retail space - would decline.

AC Transit is generally supportive of adding employment opportunities in Downtown Oakland locations such as this. Downtown Oakland has the most extensive transit service - bus and BART - of any area in the East Bay. In addition, with residential growth in and around Downtown Oakland, increasing numbers of people have the opportunity to walk or bike to jobs in Downtown Oakland.

Potential for Impact on Transit Operations: It is the District's understanding that the circulation patterns on streets around the edge of the site would not be changed by the project. Therefore, the location of bus stops would not have to be moved. However, if any changes to circulation on bus routes are contemplated, these should be discussed as soon as possible with AC Transit.

Precisely because Downtown Oakland is such a major transit center, the project must be careful not to impact transit operations. Minimizing the traffic generated by the project, and managing that traffic appropriately, will be crucial. AC Transit operates 12 bus routes (exclusive of "allnighter" routes) within two blocks of the Kaiser Center site. The District has recently built the "Uptown Transit Center" on 20th Street between Broadway and Telegraph, which is served by 8 routes.

AC Transit is particularly concerned about impacts on existing and planned Rapid bus and Bus Rapid Transit routes. The District operates the 72R in this area on Broadway, 20th St., and San Pablo, and operates the 1R on Broadway, 20th St. and Telegraph. The 1R is proposed for conversion to fully Bus Rapid Transit (BRT) operation. AC Transit operates the NL to San Francisco on Grand, Harrison, 20th, and San Pablo - this route is proposed for upgrade to Rapid status.

The District also notes that the Measure DD Lake Merritt program proposes changes to the roadway at 20th & Harrison, which could affect the roads' capacity to absorb new traffic. The interaction of increased traffic volumes with the changed roadway must be analyzed.

Key Intersections: It is therefore critical that impacts be analyzed and any necessary mitigations identified for those streets, and the intersections in this area. The following intersections are particularly important:

- Grand & Harrison
- 20th & Harrison
- Grand & Broadway
- 20th & Broadway
- 20th & Telegraph

AC Transit is primarily concerned about changes in traffic volumes or patterns which could either cause delay for buses (and bus passengers) and/or disrupt the reliability of bus operations. As this analysis is done, it is important that the differential impacts of traffic congestion on bus operations be analyzed. Because most buses must repeatedly enter and exit travel lanes, traffic congestion can have a greater delaying impact on buses than on cars.

Cumulative Impacts on Bus Routes: The potential for cumulative impacts to bus routes must be considered and analyzed. For example, changes to MacArthur Boulevard would likely cause bus delays in that corridor, and potentially result in cumulative delays on bus routes in Downtown Oakland.

Transportation Demand Management (TDM), Ecopasses and Parking: AC Transit strongly urges that measures to mitigate traffic and parking impacts be seriously considered in the EIR. Kaiser Center, with its access to buses and BART, is ideally situated for a strong Transportation Demand Management (TDM) program. Purchase of AC Transit Ecopasses for Kaiser Center tenants should be seriously considered.

Under the Ecopass program, the Center would buy passes at a deeply discounted rate for all employees in the Center. Any employee could use the pass for unlimited free East Bay and Transbay bus rides. The District would be happy to provide further details on this program.

Kaiser Center should provide safe and accessible bicycle parking. The project should also include a carshare "pod". This would allow employees to commute on transit and use a car at midday, rather than forcing them to drive to work in order to have midday car access.

The addition of 850 parking spaces will inevitably attract additional traffic. However, with a strong TDM program, Kaiser Center can reduce the number of additional parking spaces (therefore also reducing project cost). In effect, parking spaces could be traded off for transit access.

Thank you for your interest. If you have any questions about this letter, please contact Nathan Landau in the Long Range Planning unit at 891-4792.

Yours Truly,

Nancy Skowbo
Deputy General Manager for Service Development

Cc: Tina Spencer
Jim Cunradi
Nathan Landau
Nichele Ayers

APPENDIX B
Wind Study Test Data

Kaiser Center
OAKLAND, CALIFORNIA

Wind Hazard Analysis

Existing
Wind Test Date: 27 April 2009

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded one hour per year (0.01141552512% of the time) for each measurement location. This assumes that a wi hazard occurs if a one-minute average speed of 36 mph is reached or exceeded a total of one hour per y

The third line of output for each location shows the criterion speed and the percentage of the time t criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Location	0.011414% Exc. Ground Speed	---Criterion--- Speed Exc.	---Criterion--- % Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
1				RATIOS	0.8124	0.7654	1.0874	0.8884	
	35.3			CONTRIB	0.32%	1.10%	98.38%	0.21%	5
		36.0	0.0069457	CONTRIB	0.41%	1.44%	97.94%	0.21%	3
2				RATIOS	0.7932	0.4623	0.9781	0.7445	
	31.9			CONTRIB	1.27%	0.00%	98.71%	0.02%	5
		36.0	0.0002900	CONTRIB	6.63%	0.00%	93.35%	0.02%	0
3				RATIOS	0.5691	0.5110	1.1034	0.7278	
	36.0			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0106097	CONTRIB	0.00%	0.00%	100.00%	0.00%	5
4				RATIOS	0.6323	0.5596	1.0371	0.7430	
	33.8			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0016108	CONTRIB	0.00%	0.00%	100.00%	0.00%	1
5				RATIOS	1.1845	0.5556	0.7987	0.8463	
	36.2			CONTRIB	99.97%	0.00%	0.00%	0.03%	5
		36.0	0.0111580	CONTRIB	99.97%	0.00%	0.00%	0.03%	5
6				RATIOS	0.7176	0.4284	0.8202	0.6554	
	26.7			CONTRIB	4.12%	0.00%	95.78%	0.10%	5
		36.0	0.0000051	CONTRIB	74.77%	0.00%	25.23%	0.00%	0
7				RATIOS	0.7448	0.4842	0.3955	0.5415	
	22.8			CONTRIB	94.10%	0.89%	0.00%	5.01%	5
		36.0	0.0000069	CONTRIB	100.00%	0.00%	0.00%	0.00%	0
8				RATIOS	0.7599	0.7117	0.3873	0.6196	
	25.4			CONTRIB	25.64%	66.55%	0.00%	7.81%	5
		36.0	0.0000421	CONTRIB	22.76%	77.24%	0.00%	0.00%	0
9				RATIOS	0.8638	1.1220	0.7509	0.9123	
	39.2			CONTRIB	0.19%	95.91%	0.00%	3.91%	5
		36.0	0.0372354	CONTRIB	0.21%	99.71%	0.00%	0.09%	16
10				RATIOS	0.8208	0.7405	0.9008	0.8207	
	29.8			CONTRIB	7.19%	11.12%	71.09%	10.60%	4
		36.0	0.0001169	CONTRIB	28.68%	51.32%	18.90%	1.11%	0
11				RATIOS	0.8136	1.2745	0.6272	0.9051	
	44.4			CONTRIB	0.00%	99.50%	0.00%	0.50%	5
		36.0	0.1529660	CONTRIB	0.02%	95.80%	0.00%	4.18%	67
12				RATIOS	0.4821	1.0843	0.7306	0.7657	
	37.8			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0218831	CONTRIB	0.00%	100.00%	0.00%	0.00%	10
13				RATIOS	0.2588	0.9910	0.7113	0.6537	
	34.5			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0054420	CONTRIB	0.00%	100.00%	0.00%	0.00%	2
14				RATIOS	0.7151	0.7884	0.5558	0.6865	
	27.5			CONTRIB	2.70%	97.11%	0.00%	0.19%	5
		36.0	0.0001619	CONTRIB	2.21%	97.79%	0.00%	0.00%	0

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded one hour per year (0.01141552512% of the time) for each measurement location. This assumes that a wi hazard occurs if a one-minute average speed of 36 mph is reached or exceeded a total of one hour per

The third line of output for each location shows the criterion speed and the percentage of the time t criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

0.011414% Exc. Location	Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
15				RATIOS	1.1858	0.6974	1.0165	0.9666	
	36.7			CONTRIB	90.44%	0.00%	4.81%	4.75%	5
		36.0	0.0128545	CONTRIB	87.69%	0.18%	6.81%	5.31%	6
16				RATIOS	1.1308	0.6173	1.1540	0.9674	
	37.9			CONTRIB	22.89%	0.00%	76.75%	0.36%	5
		36.0	0.0483687	CONTRIB	12.58%	0.00%	85.99%	1.43%	21
17				RATIOS	0.2900	0.5682	0.8684	0.5755	
	28.2			CONTRIB	0.00%	0.35%	99.65%	0.00%	5
		36.0	0.0000072	CONTRIB	0.00%	0.00%	100.00%	0.00%	0
18				RATIOS	0.5442	1.0649	0.4501	0.6864	
	37.1			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0165465	CONTRIB	0.00%	100.00%	0.00%	0.00%	7
19				RATIOS	0.3553	0.8861	0.5194	0.5869	
	30.7			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0009642	CONTRIB	0.00%	100.00%	0.00%	0.00%	0
20				RATIOS	0.6365	1.0666	0.6656	0.7896	
	37.2			CONTRIB	0.00%	99.05%	0.00%	0.95%	5
		36.0	0.0171257	CONTRIB	0.00%	99.05%	0.00%	0.95%	7
21				RATIOS	1.2511	0.9202	1.1148	1.0954	
	39.2			CONTRIB	73.02%	4.29%	10.06%	12.63%	5
		36.0	0.0408253	CONTRIB	45.59%	4.23%	35.56%	14.62%	18
22				RATIOS	0.8330	0.8465	1.1559	0.9451	
	37.8			CONTRIB	0.19%	2.16%	97.44%	0.21%	5
		36.0	0.0447084	CONTRIB	0.10%	1.06%	97.81%	1.04%	20
23				RATIOS	0.6875	1.2081	1.0282	0.9746	
	42.0			CONTRIB	0.00%	99.88%	0.10%	0.02%	5
		36.0	0.0918169	CONTRIB	0.00%	97.79%	1.35%	0.86%	40
24				RATIOS	0.9019	0.5594	0.7991	0.7535	
	27.9			CONTRIB	81.12%	0.35%	11.97%	6.56%	5
		36.0	0.0001554	CONTRIB	99.57%	0.00%	0.37%	0.06%	0
25				RATIOS	1.0026	0.9394	0.7182	0.8868	
	33.4			CONTRIB	26.33%	68.59%	0.00%	5.07%	5
		36.0	0.0032572	CONTRIB	26.51%	73.07%	0.00%	0.42%	1
26				RATIOS	0.4695	0.6428	0.7028	0.6050	
	23.3			CONTRIB	0.04%	46.23%	53.18%	0.56%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	100.00%	0.00%	0
27				RATIOS	0.7249	0.9042	0.6544	0.7612	
	31.4			CONTRIB	0.37%	99.55%	0.00%	0.08%	5
		36.0	0.0014142	CONTRIB	0.31%	93.19%	0.00%	6.49%	1
28				RATIOS	0.6555	1.3756	0.5091	0.8468	
	47.9			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.2980480	CONTRIB	0.00%	98.83%	0.00%	1.17%	131

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded one hour per year (0.01141552512% of the time) for each measurement location. This assumes that a wi hazard occurs if a one-minute average speed of 36 mph is reached or exceeded a total of one hour per y

The third line of output for each location shows the criterion speed and the percentage of the time t criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

0.011414% Exc. Location	Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
1				RATIOS	0.7862	0.7844	1.1144	0.8950	
	36.3			CONTRIB	0.13%	1.13%	98.61%	0.12%	5
		36.0	0.0145485	CONTRIB	0.11%	1.01%	98.75%	0.12%	6
2				RATIOS	0.7589	0.5716	1.0495	0.7933	
	34.2			CONTRIB	0.20%	0.00%	99.78%	0.02%	5
		36.0	0.0023210	CONTRIB	0.40%	0.00%	99.58%	0.02%	1
3				RATIOS	0.6218	0.6196	1.1089	0.7834	
	36.2			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0123513	CONTRIB	0.00%	0.00%	100.00%	0.00%	5
4				RATIOS	0.7018	0.5931	1.0261	0.7737	
	33.4			CONTRIB	0.08%	0.00%	99.90%	0.02%	5
		36.0	0.0011656	CONTRIB	0.23%	0.00%	99.76%	0.02%	1
5				RATIOS	1.1555	0.5367	0.6171	0.7698	
	35.4			CONTRIB	97.81%	0.00%	0.00%	2.19%	5
		36.0	0.0086603	CONTRIB	99.86%	0.00%	0.00%	0.14%	4
6				RATIOS	0.7117	0.5451	1.3298	0.8622	
	43.4			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.1723540	CONTRIB	0.00%	0.00%	98.17%	1.82%	75
7				RATIOS	0.8362	0.6614	0.5914	0.6964	
	25.8			CONTRIB	79.25%	14.68%	0.01%	6.05%	5
		36.0	0.0000477	CONTRIB	95.13%	0.00%	0.00%	4.87%	0
8				RATIOS	0.7357	0.4844	0.5466	0.5889	
	22.5			CONTRIB	94.78%	1.11%	0.08%	4.02%	5
		36.0	0.0000057	CONTRIB	100.00%	0.00%	0.00%	0.00%	0
9				RATIOS	1.0287	1.2087	0.8431	1.0268	
	42.1			CONTRIB	0.98%	98.93%	0.00%	0.09%	5
		36.0	0.0934429	CONTRIB	1.40%	96.51%	0.00%	2.08%	41
10				RATIOS	1.1571	0.8178	0.6070	0.8606	
	35.8			CONTRIB	90.64%	2.92%	0.00%	6.44%	5
		36.0	0.0097278	CONTRIB	90.83%	2.86%	0.00%	6.31%	4
11				RATIOS	1.3153	1.2189	0.7894	1.1079	
	43.8			CONTRIB	27.03%	59.41%	0.00%	13.56%	5
		36.0	0.1344230	CONTRIB	22.10%	72.49%	0.00%	5.41%	59
12				RATIOS	0.7199	0.9905	0.5946	0.7683	
	34.5			CONTRIB	0.07%	98.00%	0.00%	1.93%	5
		36.0	0.0055039	CONTRIB	0.07%	98.00%	0.00%	1.93%	2
13				RATIOS	0.4968	0.8855	0.9535	0.7786	
	31.9			CONTRIB	0.00%	55.27%	44.64%	0.09%	5
		36.0	0.0010797	CONTRIB	0.00%	88.42%	11.56%	0.02%	0
14				RATIOS	0.6894	0.7106	0.6986	0.6995	
	25.2			CONTRIB	6.30%	76.94%	4.88%	11.87%	4
		36.0	0.0000317	CONTRIB	0.00%	99.94%	0.03%	0.03%	0

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0.011414% Exc.		---Criterion---							
Loca-tion	Ground Speed	Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
15				RATIOS	1.1047	0.6753	0.9726	0.9175	
	34.3			CONTRIB	84.54%	0.28%	9.24%	5.94%	5
		36.0	0.0044321	CONTRIB	93.99%	0.00%	5.14%	0.87%	2
16				RATIOS	0.8846	0.6317	0.9836	0.8333	
	32.1			CONTRIB	6.44%	0.27%	92.69%	0.60%	5
		36.0	0.0004363	CONTRIB	25.89%	0.00%	73.64%	0.47%	0
17				RATIOS	0.2875	0.5855	0.8781	0.5837	
	28.5			CONTRIB	0.00%	0.47%	99.53%	0.00%	5
		36.0	0.0000102	CONTRIB	0.00%	0.00%	100.00%	0.00%	0
18				RATIOS	0.4589	0.4891	0.6144	0.5208	
	20.0			CONTRIB	0.30%	6.99%	89.50%	3.21%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	0.00%	0.00%	0
19				RATIOS	0.3010	0.7414	0.4215	0.4880	
	25.7			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0000612	CONTRIB	0.00%	100.00%	0.00%	0.00%	0
20				RATIOS	0.6531	0.7709	0.7795	0.7345	
	27.2			CONTRIB	0.72%	79.76%	12.50%	7.02%	5
		36.0	0.0001122	CONTRIB	0.00%	99.72%	0.24%	0.04%	0
21				RATIOS	1.1432	0.8895	0.6215	0.8847	
	35.6			CONTRIB	78.84%	11.03%	0.00%	10.14%	5
		36.0	0.0092256	CONTRIB	78.71%	11.09%	0.00%	10.20%	4
22				RATIOS	0.8117	0.8054	0.7005	0.7725	
	28.2			CONTRIB	12.19%	79.67%	0.14%	7.99%	5
		36.0	0.0002482	CONTRIB	11.26%	88.66%	0.00%	0.08%	0
23				RATIOS	0.7844	1.2045	0.8400	0.9430	
	41.8			CONTRIB	0.00%	99.99%	0.00%	0.01%	5
		36.0	0.0878265	CONTRIB	0.02%	99.47%	0.00%	0.51%	38
24				RATIOS	0.8378	0.6277	0.6950	0.7202	
	25.9			CONTRIB	81.16%	6.50%	1.60%	10.73%	5
		36.0	0.0000507	CONTRIB	92.10%	0.00%	0.00%	7.90%	0
25				RATIOS	1.0030	1.2146	0.9250	1.0475	
	42.2			CONTRIB	0.60%	99.24%	0.00%	0.16%	5
		36.0	0.0979598	CONTRIB	0.89%	96.25%	0.05%	2.81%	43
26				RATIOS	0.5419	1.1116	0.7675	0.8070	
	38.7			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0321155	CONTRIB	0.00%	100.00%	0.00%	0.00%	14
27				RATIOS	0.6892	1.0249	1.3461	1.0201	
	43.9			CONTRIB	0.00%	3.84%	96.14%	0.02%	5
		36.0	0.2002600	CONTRIB	0.00%	4.57%	94.56%	0.87%	88
28				RATIOS	1.5207	1.4752	0.4492	1.1484	
	52.0			CONTRIB	17.73%	80.60%	0.00%	1.67%	5
		36.0	0.6850750	CONTRIB	16.54%	81.49%	0.00%	1.98%	300

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Location	0.011414% Exc. Ground Speed	---Criterion--- Speed Exc.	---Criterion--- % Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
1				RATIOS	0.8143	0.7850	1.0874	0.8956	
	35.4			CONTRIB	0.33%	1.64%	97.76%	0.27%	5
		36.0	0.0069987	CONTRIB	0.42%	2.12%	97.20%	0.26%	3
2				RATIOS	0.7645	0.5247	1.0940	0.7944	
	35.7			CONTRIB	0.11%	0.00%	99.88%	0.01%	5
		36.0	0.0082045	CONTRIB	0.13%	0.00%	99.87%	0.01%	4
3				RATIOS	0.6361	0.5988	1.1144	0.7831	
	36.4			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.0143677	CONTRIB	0.00%	0.00%	100.00%	0.00%	6
4				RATIOS	0.7146	0.5758	1.0624	0.7843	
	34.6			CONTRIB	0.06%	0.00%	99.93%	0.01%	5
		36.0	0.0033605	CONTRIB	0.10%	0.00%	99.89%	0.01%	1
5				RATIOS	1.1725	0.5266	0.7062	0.8018	
	35.9			CONTRIB	99.99%	0.00%	0.00%	0.01%	5
		36.0	0.0101423	CONTRIB	99.99%	0.00%	0.00%	0.01%	4
6				RATIOS	0.7458	0.5051	1.3322	0.8611	
	43.3			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.1752360	CONTRIB	0.00%	0.00%	98.22%	1.77%	77
7				RATIOS	0.8579	0.6432	0.8067	0.7693	
	27.3			CONTRIB	52.48%	4.19%	29.83%	13.50%	5
		36.0	0.0000697	CONTRIB	98.64%	0.00%	1.10%	0.26%	0
8				RATIOS	0.7313	0.3877	0.6605	0.5932	
	22.6			CONTRIB	76.49%	0.00%	19.83%	3.68%	5
		36.0	0.0000051	CONTRIB	100.00%	0.00%	0.00%	0.00%	0
9				RATIOS	1.0508	1.1875	0.6605	0.9663	
	41.4			CONTRIB	1.76%	94.36%	0.00%	3.89%	5
		36.0	0.0792712	CONTRIB	2.33%	96.81%	0.00%	0.86%	35
10				RATIOS	1.2566	0.7759	0.6066	0.8797	
	38.6			CONTRIB	96.80%	0.40%	0.00%	2.80%	5
		36.0	0.0203786	CONTRIB	95.17%	0.61%	0.00%	4.23%	9
11				RATIOS	1.3037	1.1367	0.5815	1.0073	
	41.9			CONTRIB	51.03%	42.43%	0.00%	6.54%	5
		36.0	0.0741237	CONTRIB	36.89%	61.23%	0.00%	1.88%	32
12				RATIOS	0.7496	0.9872	0.5137	0.7502	
	34.3			CONTRIB	0.15%	98.44%	0.00%	1.41%	5
		36.0	0.0052086	CONTRIB	0.15%	98.44%	0.00%	1.41%	2
13				RATIOS	0.5061	0.9015	0.5575	0.6550	
	31.3			CONTRIB	0.00%	99.29%	0.00%	0.71%	5
		36.0	0.0012591	CONTRIB	0.00%	100.00%	0.00%	0.00%	1
14				RATIOS	0.6496	0.6951	0.5988	0.6479	
	24.2			CONTRIB	4.08%	90.20%	0.14%	5.58%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	0.00%	0.00%	0

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Location	0.011414% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	1.9040	1.9040	1.9040	1.9040	
15				RATIOS	1.0523	0.7393	0.7938	0.8618	
	32.4			CONTRIB	91.73%	2.77%	0.11%	5.39%	5
		36.0	0.0019584	CONTRIB	96.69%	2.99%	0.02%	0.29%	1
16				RATIOS	0.8810	0.6462	0.9149	0.8140	
	30.0			CONTRIB	16.71%	1.00%	75.56%	6.72%	5
		36.0	0.0001421	CONTRIB	74.36%	0.00%	24.92%	0.71%	0
17				RATIOS	0.2911	0.5849	0.6306	0.5022	
	21.1			CONTRIB	0.00%	55.83%	44.13%	0.04%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	0.00%	0.00%	0
18				RATIOS	0.5268	0.4514	0.5038	0.4940	
	17.1			CONTRIB	34.66%	22.24%	24.18%	18.92%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	0.00%	0.00%	0
19				RATIOS	0.2999	0.8671	0.3795	0.5155	
	30.1			CONTRIB	0.00%	100.00%	0.00%	0.00%	5
		36.0	0.0006890	CONTRIB	0.00%	100.00%	0.00%	0.00%	0
20				RATIOS	0.6300	0.6681	0.6561	0.6514	
	23.5			CONTRIB	4.14%	79.66%	5.62%	10.58%	5
		36.0	0.0000000	CONTRIB	0.00%	0.00%	0.00%	0.00%	0
21				RATIOS	1.1262	0.8324	0.5878	0.8488	
	34.9			CONTRIB	86.88%	5.58%	0.00%	7.54%	5
		36.0	0.0065600	CONTRIB	86.86%	5.59%	0.00%	7.55%	3
22				RATIOS	0.8042	0.7808	0.7675	0.7842	
	27.7			CONTRIB	14.44%	66.91%	4.10%	14.54%	5
		36.0	0.0001608	CONTRIB	14.96%	84.73%	0.10%	0.20%	0
23				RATIOS	0.8025	1.2096	0.6934	0.9019	
	42.1			CONTRIB	0.00%	98.94%	0.00%	1.05%	5
		36.0	0.0970516	CONTRIB	0.02%	93.59%	0.00%	6.38%	42
24				RATIOS	0.8178	0.6350	0.6428	0.6985	
	25.4			CONTRIB	79.86%	10.78%	0.27%	9.08%	5
		36.0	0.0000340	CONTRIB	92.82%	0.00%	0.00%	7.18%	0
25				RATIOS	0.9901	1.1460	0.9638	1.0333	
	40.0			CONTRIB	1.24%	98.12%	0.07%	0.58%	5
		36.0	0.0545477	CONTRIB	1.29%	94.41%	0.32%	3.98%	24
26				RATIOS	0.5503	1.0346	0.9726	0.8525	
	36.1			CONTRIB	0.00%	97.96%	2.01%	0.04%	4
		36.0	0.0108241	CONTRIB	0.00%	97.86%	2.10%	0.04%	5
27				RATIOS	0.7732	0.6635	1.5211	0.9860	
	49.7			CONTRIB	0.00%	0.00%	100.00%	0.00%	5
		36.0	0.5349980	CONTRIB	0.00%	0.00%	99.82%	0.18%	234
28				RATIOS	1.4946	1.4756	0.5712	1.1805	
	51.9			CONTRIB	13.84%	83.51%	0.00%	2.65%	5
		36.0	0.6763130	CONTRIB	14.48%	82.74%	0.00%	2.78%	296

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Location	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	*1.9040*	*1.9040*	*1.9040*	*1.9040*	
1				RATIOS	0.8124	0.7654	1.0874	0.8884	
	13.9			CONTRIB	9.62%	47.13%	32.29%	10.96%	4,380
		11.0	20.21	CONTRIB	11.74%	54.96%	20.28%	13.02%	8,852
2				RATIOS	0.7932	0.4623	0.9781	0.7445	
	10.2			CONTRIB	28.94%	12.93%	39.73%	18.40%	4,380
		11.0	7.91	CONTRIB	27.33%	8.78%	46.63%	17.25%	3,464
3				RATIOS	0.5691	0.5110	1.1034	0.7278	
	10.2			CONTRIB	7.98%	30.20%	44.88%	16.94%	4,380
		11.0	7.59	CONTRIB	7.79%	21.03%	54.76%	16.41%	3,326
4				RATIOS	0.6323	0.5596	1.0371	0.7430	
	10.8			CONTRIB	9.42%	36.64%	39.64%	14.30%	4,380
		11.0	9.55	CONTRIB	9.35%	35.54%	40.94%	14.17%	4,183
5				RATIOS	1.1845	0.5556	0.7987	0.8463	
	12.0			CONTRIB	46.03%	15.12%	22.98%	15.88%	4,380
		11.0	13.66	CONTRIB	39.70%	23.42%	20.21%	16.67%	5,983
6				RATIOS	0.7176	0.4284	0.8202	0.6554	
	9.2			CONTRIB	29.57%	16.52%	37.05%	16.87%	4,380
		11.0	5.55	CONTRIB	26.37%	6.32%	52.54%	14.78%	2,429
7				RATIOS	0.7448	0.4842	0.3955	0.5415	
	8.7			CONTRIB	35.41%	47.61%	7.43%	9.55%	4,380
		11.0	3.21	CONTRIB	52.68%	31.78%	4.11%	11.43%	1,406
8				RATIOS	0.7599	0.7117	0.3873	0.6196	
	11.3			CONTRIB	16.46%	76.80%	0.85%	5.88%	4,380
		11.0	11.08	CONTRIB	16.51%	76.60%	0.98%	5.91%	4,851
9				RATIOS	0.8638	1.1220	0.7509	0.9123	
	17.4			CONTRIB	4.50%	84.55%	5.99%	4.96%	4,380
		11.0	31.06	CONTRIB	9.71%	73.60%	7.84%	8.86%	13,604
10				RATIOS	0.8208	0.7405	0.9008	0.8207	
	13.0			CONTRIB	12.69%	52.21%	24.91%	10.18%	4,380
		11.0	17.71	CONTRIB	13.95%	55.48%	19.19%	11.38%	7,756
11				RATIOS	0.8136	1.2745	0.6272	0.9051	
	19.1			CONTRIB	1.22%	95.18%	0.57%	3.03%	4,380
		11.0	32.68	CONTRIB	7.30%	79.23%	5.17%	8.31%	14,315
12				RATIOS	0.4821	1.0843	0.7306	0.7657	
	16.5			CONTRIB	0.02%	90.47%	6.76%	2.75%	4,380
		11.0	26.09	CONTRIB	0.59%	84.73%	8.83%	5.85%	11,428
13				RATIOS	0.2588	0.9910	0.7113	0.6537	
	15.1			CONTRIB	0.00%	89.07%	9.02%	1.91%	4,380
		11.0	23.24	CONTRIB	0.00%	87.12%	9.39%	3.49%	10,178
14				RATIOS	0.7151	0.7884	0.5558	0.6865	
	12.5			CONTRIB	8.88%	78.17%	6.96%	5.99%	4,380

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Loca-tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
		11.0	16.10	CONTRIB	8.96%	76.99%	7.92%	6.13%	7,052
15				RATIOS	1.1858	0.6974	1.0165	0.9666	
	14.2			CONTRIB	34.12%	25.19%	26.77%	13.92%	4,380
		11.0	20.17	CONTRIB	26.94%	39.02%	19.00%	15.03%	8,833
16				RATIOS	1.1308	0.6173	1.1540	0.9674	
	13.5			CONTRIB	34.15%	13.60%	35.34%	16.91%	4,380
		11.0	17.37	CONTRIB	28.69%	28.82%	25.03%	17.47%	7,610
17				RATIOS	0.2900	0.5682	0.8684	0.5755	
	9.8			CONTRIB	0.02%	55.73%	36.63%	7.62%	4,380
		11.0	7.44	CONTRIB	0.00%	49.48%	43.97%	6.55%	3,260
18				RATIOS	0.5442	1.0649	0.4501	0.6864	
	15.8			CONTRIB	0.17%	97.89%	0.01%	1.93%	4,380
		11.0	23.57	CONTRIB	1.81%	92.16%	1.84%	4.18%	10,323
19				RATIOS	0.3553	0.8861	0.5194	0.5869	
	13.3			CONTRIB	0.00%	95.01%	2.86%	2.12%	4,380
		11.0	19.60	CONTRIB	0.05%	92.58%	4.68%	2.69%	8,585
20				RATIOS	0.6365	1.0666	0.6656	0.7896	
	16.2			CONTRIB	0.60%	91.27%	4.60%	3.53%	4,380
		11.0	26.30	CONTRIB	3.48%	82.71%	7.24%	6.56%	11,521
21				RATIOS	1.2511	0.9202	1.1148	1.0954	
	17.0			CONTRIB	23.18%	43.41%	22.32%	11.10%	4,380
		11.0	32.75	CONTRIB	18.28%	57.49%	12.82%	11.40%	14,347
22				RATIOS	0.8330	0.8465	1.1559	0.9451	
	15.0			CONTRIB	7.77%	50.94%	31.09%	10.21%	4,380
		11.0	26.02	CONTRIB	10.06%	61.99%	16.74%	11.22%	11,396
23				RATIOS	0.6875	1.2081	1.0282	0.9746	
	19.0			CONTRIB	0.28%	79.97%	15.23%	4.53%	4,380
		11.0	32.76	CONTRIB	3.78%	75.01%	11.83%	9.38%	14,348
24				RATIOS	0.9019	0.5594	0.7991	0.7535	
	11.2			CONTRIB	31.84%	28.49%	26.49%	13.18%	4,380
		11.0	10.89	CONTRIB	30.37%	31.10%	25.38%	13.15%	4,768
25				RATIOS	1.0026	0.9394	0.7182	0.8868	
	15.3			CONTRIB	14.73%	69.21%	8.80%	7.26%	4,380
		11.0	28.07	CONTRIB	14.27%	68.46%	7.92%	9.35%	12,294
26				RATIOS	0.4695	0.6428	0.7028	0.6050	
	10.5			CONTRIB	1.76%	68.01%	23.18%	7.04%	4,380
		11.0	8.66	CONTRIB	1.43%	67.14%	24.56%	6.87%	3,795
27				RATIOS	0.7249	0.9042	0.6544	0.7612	
	14.2			CONTRIB	5.67%	80.67%	8.24%	5.42%	4,380
		11.0	23.36	CONTRIB	6.51%	79.23%	7.88%	6.38%	10,233
28				RATIOS	0.6555	1.3756	0.5091	0.8468	
	20.4			CONTRIB	0.09%	98.38%	0.00%	1.54%	4,380

The ratios of pedestrian-level wind speeds to the reference height wind speeds at the old Alameda NAS meteorological station are shown in the first line of output for each location.

The second line of the output shows the pedestrian level wind speeds, in mph, which would be exceeded 10% of the time for each measurement location. This assumes wind comfort criteria of 11 mph for areas of substantial public pedestrian use and 7 mph for public seating areas. These criteria are not to be exceeded more than 10% of the time.

The third line of output for each location shows the criterion speed and the percentage of the time tl criterion would be exceeded. The rows labeled CONTRIB tabulate the percentage contribution to the total or the exceedance from each wind direction. The SUMs are the equivalent number of events.

Location	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	*1.9040*	*1.9040*	*1.9040*	*1.9040*	
1				RATIOS	0.7862	0.7844	1.1144	0.8950	
	14.1			CONTRIB	7.95%	48.64%	32.83%	10.59%	4,380
		11.0	21.12	CONTRIB	9.89%	57.61%	19.89%	12.62%	9,249
2				RATIOS	0.7589	0.5716	1.0495	0.7933	
	11.4			CONTRIB	15.92%	30.49%	38.24%	15.35%	4,380
		11.0	11.30	CONTRIB	16.10%	33.32%	35.01%	15.57%	4,949
3				RATIOS	0.6218	0.6196	1.1089	0.7834	
	11.7			CONTRIB	6.64%	40.76%	39.40%	13.20%	4,380
		11.0	11.76	CONTRIB	7.11%	43.15%	35.52%	14.22%	5,153
4				RATIOS	0.7018	0.5931	1.0261	0.7737	
	11.4			CONTRIB	11.56%	37.52%	37.25%	13.67%	4,380
		11.0	11.12	CONTRIB	12.06%	38.84%	34.79%	14.31%	4,870
5				RATIOS	1.1555	0.5367	0.6171	0.7698	
	11.2			CONTRIB	49.89%	20.13%	15.65%	14.33%	4,380
		11.0	10.78	CONTRIB	48.10%	22.28%	15.16%	14.47%	4,721
6				RATIOS	0.7117	0.5451	1.3298	0.8622	
	11.5			CONTRIB	12.01%	19.24%	48.01%	20.73%	4,380
		11.0	11.61	CONTRIB	12.20%	23.53%	43.13%	21.14%	5,084
7				RATIOS	0.8362	0.6614	0.5914	0.6964	
	11.5			CONTRIB	22.43%	55.08%	13.72%	8.78%	4,380
		11.0	11.67	CONTRIB	22.77%	55.44%	12.84%	8.95%	5,110
8				RATIOS	0.7357	0.4844	0.5466	0.5889	
	9.2			CONTRIB	31.51%	39.33%	18.31%	10.85%	4,380
		11.0	4.35	CONTRIB	37.08%	23.55%	27.07%	12.29%	1,903
9				RATIOS	1.0287	1.2087	0.8431	1.0268	
	19.0			CONTRIB	7.14%	80.40%	6.86%	5.60%	4,380
		11.0	35.22	CONTRIB	11.92%	69.81%	8.75%	9.52%	15,424
10				RATIOS	1.1571	0.8178	0.6070	0.8606	
	14.3			CONTRIB	32.28%	53.72%	5.46%	8.53%	4,380
		11.0	23.40	CONTRIB	22.20%	60.64%	6.75%	10.41%	10,251
11				RATIOS	1.3153	1.2189	0.7894	1.1079	
	19.6			CONTRIB	16.33%	73.28%	3.75%	6.64%	4,380
		11.0	37.85	CONTRIB	17.33%	65.49%	7.12%	10.06%	16,578
12				RATIOS	0.7199	0.9905	0.5946	0.7683	
	15.1			CONTRIB	3.15%	89.44%	3.07%	4.35%	4,380
		11.0	24.78	CONTRIB	5.98%	81.66%	6.11%	6.25%	10,853
13				RATIOS	0.4968	0.8855	0.9535	0.7786	
	14.4			CONTRIB	0.18%	71.15%	23.04%	5.63%	4,380
		11.0	23.56	CONTRIB	0.84%	76.97%	15.26%	6.93%	10,321
14				RATIOS	0.6894	0.7106	0.6986	0.6995	
	11.8			CONTRIB	9.43%	64.47%	18.14%	7.96%	4,380

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Loca- tion	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
		11.0	12.85	CONTRIB	9.73%	65.63%	16.36%	8.28%	5,628
15				RATIOS	1.1047	0.6753	0.9726	0.9175	
	13.6			CONTRIB	32.42%	27.48%	26.69%	13.40%	4,380
		11.0	18.21	CONTRIB	26.24%	38.36%	20.14%	15.25%	7,975
16				RATIOS	0.8846	0.6317	0.9836	0.8333	
	12.4			CONTRIB	20.50%	33.56%	32.83%	13.11%	4,380
		11.0	14.50	CONTRIB	22.01%	37.63%	25.58%	14.77%	6,350
17				RATIOS	0.2875	0.5855	0.8781	0.5837	
	10.1			CONTRIB	0.01%	56.62%	36.10%	7.27%	4,380
		11.0	7.95	CONTRIB	0.00%	51.81%	41.70%	6.49%	3,480
18				RATIOS	0.4589	0.4891	0.6144	0.5208	
	8.5			CONTRIB	7.12%	55.93%	27.62%	9.34%	4,380
		11.0	3.13	CONTRIB	3.25%	35.44%	51.69%	9.62%	1,372
19				RATIOS	0.3010	0.7414	0.4215	0.4880	
	11.1			CONTRIB	0.01%	95.72%	2.20%	2.08%	4,380
		11.0	10.33	CONTRIB	0.01%	95.60%	2.30%	2.10%	4,523
20				RATIOS	0.6531	0.7709	0.7795	0.7345	
	12.7			CONTRIB	5.80%	67.24%	19.65%	7.31%	4,380
		11.0	16.34	CONTRIB	6.20%	69.81%	16.08%	7.91%	7,156
21				RATIOS	1.1432	0.8895	0.6215	0.8847	
	15.0			CONTRIB	26.57%	60.88%	4.76%	7.79%	4,380
		11.0	27.57	CONTRIB	18.44%	66.07%	6.01%	9.48%	12,076
22				RATIOS	0.8117	0.8054	0.7005	0.7725	
	13.3			CONTRIB	11.35%	66.79%	14.42%	7.45%	4,380
		11.0	19.47	CONTRIB	12.14%	68.88%	10.86%	8.12%	8,529
23				RATIOS	0.7844	1.2045	0.8400	0.9430	
	18.5			CONTRIB	1.17%	86.86%	7.59%	4.38%	4,380
		11.0	32.54	CONTRIB	6.36%	75.30%	9.40%	8.94%	14,251
24				RATIOS	0.8378	0.6277	0.6950	0.7202	
	11.4			CONTRIB	23.36%	46.86%	19.38%	10.40%	4,380
		11.0	11.28	CONTRIB	23.72%	47.25%	18.44%	10.59%	4,940
25				RATIOS	1.0030	1.2146	0.9250	1.0475	
	19.2			CONTRIB	6.14%	77.99%	10.11%	5.76%	4,380
		11.0	35.67	CONTRIB	11.24%	69.26%	9.78%	9.72%	15,622
26				RATIOS	0.5419	1.1116	0.7675	0.8070	
	16.9			CONTRIB	0.08%	89.32%	7.50%	3.10%	4,380
		11.0	27.49	CONTRIB	1.50%	82.39%	9.26%	6.85%	12,042
27				RATIOS	0.6892	1.0249	1.3461	1.0201	
	17.4			CONTRIB	0.64%	60.17%	31.47%	7.72%	4,380
		11.0	30.56	CONTRIB	4.09%	68.47%	16.58%	10.85%	13,383
28				RATIOS	1.4946	1.4756	0.5712	1.1805	
	23.1			CONTRIB					4,381

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Location	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	---Criterion--- % Time Exc.		NNW	W	SSE	OTHER	SUM
				Profile Ratios:	*1.9040*	*1.9040*	*1.9040*	*1.9040*	
1				RATIOS	0.8143	0.7850	1.0874	0.8956	
	14.1			CONTRIB	9.15%	48.91%	31.30%	10.65%	4,380
		11.0	21.36	CONTRIB	11.21%	57.11%	19.19%	12.49%	9,355
2				RATIOS	0.7645	0.5247	1.0940	0.7944	
	10.9			CONTRIB	19.23%	21.07%	41.52%	18.18%	4,380
		11.0	9.75	CONTRIB	19.19%	20.40%	42.27%	18.13%	4,272
3				RATIOS	0.6361	0.5988	1.1144	0.7831	
	11.5			CONTRIB	7.71%	38.06%	40.21%	14.03%	4,380
		11.0	11.26	CONTRIB	8.12%	39.74%	37.30%	14.84%	4,931
4				RATIOS	0.7146	0.5758	1.0624	0.7843	
	11.3			CONTRIB	12.78%	33.47%	38.86%	14.89%	4,380
		11.0	10.99	CONTRIB	13.09%	35.20%	36.43%	15.28%	4,814
5				RATIOS	1.1725	0.5266	0.7062	0.8018	
	11.4			CONTRIB	49.60%	14.84%	19.86%	15.71%	4,380
		11.0	11.36	CONTRIB	46.87%	18.06%	18.92%	16.16%	4,975
6				RATIOS	0.7458	0.5051	1.3322	0.8611	
	11.2			CONTRIB	15.78%	12.38%	49.22%	22.62%	4,380
		11.0	10.61	CONTRIB	16.02%	13.67%	47.29%	23.01%	4,645
7				RATIOS	0.8579	0.6432	0.8067	0.7693	
	11.9			CONTRIB	21.47%	43.32%	23.93%	11.29%	4,380
		11.0	13.14	CONTRIB	22.34%	44.38%	21.44%	11.84%	5,754
8				RATIOS	0.7313	0.3877	0.6605	0.5932	
	8.4			CONTRIB	36.74%	14.88%	32.34%	16.05%	4,380
		11.0	4.14	CONTRIB	38.02%	3.39%	45.30%	13.28%	1,814
9				RATIOS	1.0508	1.1875	0.6605	0.9663	
	18.4			CONTRIB	8.79%	84.88%	1.33%	5.00%	4,380
		11.0	33.43	CONTRIB	13.05%	72.28%	5.61%	9.06%	14,643
10				RATIOS	1.2566	0.7759	0.6066	0.8797	
	14.1			CONTRIB	38.30%	46.17%	5.77%	9.76%	4,380
		11.0	21.88	CONTRIB	27.59%	53.37%	7.21%	11.83%	9,585
11				RATIOS	1.3037	1.1367	0.5815	1.0073	
	18.3			CONTRIB	20.65%	73.05%	0.32%	5.98%	4,380
		11.0	34.30	CONTRIB	18.82%	67.50%	4.22%	9.47%	15,023
12				RATIOS	0.7496	0.9872	0.5137	0.7502	
	15.0			CONTRIB	4.67%	90.50%	0.85%	3.98%	4,380
		11.0	24.18	CONTRIB	7.17%	83.42%	3.59%	5.82%	10,591
13				RATIOS	0.5061	0.9015	0.5575	0.6550	
	13.6			CONTRIB	0.35%	92.08%	4.33%	3.25%	4,380
		11.0	20.80	CONTRIB	1.12%	88.73%	6.22%	3.93%	9,111
14				RATIOS	0.6496	0.6951	0.5988	0.6479	
	11.3			CONTRIB	8.84%	69.72%	14.48%	6.96%	4,380

Kaiser Center
OAKLAND, CALIFORNIA

Wind Comfort Analysis

Cumulative
Wind Test Date: 27 April 2009

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Location	10.0% Exc. Ground Speed	---Criterion--- Speed Exc.	% Time Exc.		NNW	W	SSE	OTHER	SUM
		11.0	11.09	CONTRIB	8.95%	70.13%	13.86%	7.06%	4,856
15				RATIOS	1.0523	0.7393	0.7938	0.8618	
	13.6			CONTRIB	28.09%	43.97%	17.59%	10.35%	4,380
		11.0	19.32	CONTRIB	22.64%	50.56%	14.11%	12.68%	8,461
16				RATIOS	0.8810	0.6462	0.9149	0.8140	
	12.4			CONTRIB	20.63%	38.47%	28.68%	12.22%	4,380
		11.0	14.50	CONTRIB	21.84%	40.91%	23.80%	13.45%	6,352
17				RATIOS	0.2911	0.5849	0.6306	0.5022	
	9.5			CONTRIB	0.04%	71.61%	23.18%	5.16%	4,380
		11.0	6.06	CONTRIB	0.01%	67.68%	28.17%	4.14%	2,654
18				RATIOS	0.5268	0.4514	0.5038	0.4940	
	7.9			CONTRIB	15.82%	53.19%	21.12%	9.87%	4,380
		11.0	1.91	CONTRIB	17.02%	29.59%	41.33%	12.06%	838
19				RATIOS	0.2999	0.8671	0.3795	0.5155	
	12.9			CONTRIB	0.00%	98.82%	0.03%	1.14%	4,380
		11.0	18.01	CONTRIB	0.00%	97.91%	0.50%	1.59%	7,886
20				RATIOS	0.6300	0.6681	0.6561	0.6514	
	11.1			CONTRIB	8.56%	65.41%	18.25%	7.78%	4,380
		11.0	10.24	CONTRIB	8.59%	65.53%	18.07%	7.81%	4,486
21				RATIOS	1.1262	0.8324	0.5878	0.8488	
	14.3			CONTRIB	30.36%	57.12%	4.48%	8.04%	4,380
		11.0	23.89	CONTRIB	20.71%	63.45%	6.19%	9.65%	10,464
22				RATIOS	0.8042	0.7808	0.7675	0.7842	
	13.1			CONTRIB	11.49%	62.38%	17.81%	8.32%	4,380
		11.0	18.46	CONTRIB	12.36%	64.76%	13.79%	9.10%	8,087
23				RATIOS	0.8025	1.2096	0.6934	0.9019	
	18.3			CONTRIB	1.58%	92.51%	2.18%	3.73%	4,380
		11.0	31.63	CONTRIB	7.15%	77.77%	6.55%	8.53%	13,856
24				RATIOS	0.8178	0.6350	0.6428	0.6985	
	11.3			CONTRIB	22.28%	51.11%	16.95%	9.66%	4,380
		11.0	10.83	CONTRIB	22.49%	51.35%	16.39%	9.77%	4,742
25				RATIOS	0.9901	1.1460	0.9638	1.0333	
	18.5			CONTRIB	6.80%	72.71%	14.11%	6.38%	4,380
		11.0	34.28	CONTRIB	11.42%	68.09%	10.60%	9.88%	15,013
26				RATIOS	0.5503	1.0346	0.9726	0.8525	
	16.4			CONTRIB	0.13%	76.90%	18.24%	4.72%	4,380
		11.0	27.60	CONTRIB	1.70%	76.51%	13.29%	8.50%	12,088
27				RATIOS	0.7732	0.6635	1.5211	0.9860	
	13.5			CONTRIB	8.85%	25.81%	46.74%	18.60%	4,380
		11.0	17.36	CONTRIB	11.27%	37.71%	32.97%	18.05%	7,602
28				RATIOS	1.4946	1.4756	0.5712	1.1805	
	23.1			CONTRIB					4,380

APPENDIX C
Air Quality and GHG Data

AIR QUALITY EMISSIONS DATA

Averging of Construction Emissions **2012**

Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	218	1.65	16.47	8.66	0.85	0.78	0.02	2469
Averages =	218	1.65	16.47	8.66	0.85	0.78	0.02	2469.00
BAAQMD Threshold =		54	54	None	82	54	None	None
Significant?		No	No		No	No		NA

Averging of Construction Emissions **2013**

Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	43	5.48	55.76	26.95	2.47	2.27	0.05	8719
2	20	3.95	40.76	18.76	1.71	1.58	0.04	6250
3	196	2.29	12.58	41.38	0.65	0.59	0.05	5621
Averages =	259	2.95	21.92	37.24	1.03	0.95	0.05	6183.91
BAAQMD Threshold =		54	54	None	82	54	None	NA
Significant?		No	No		No	No		

Averging of Construction Emissions **2014**

Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	108	2.1	11.44	38.35	0.58	0.53	0.05	5623
2	153	51.09	21.09	47.02	1.36	1.24	0.05	6839
Averages =	261	30.82	17.10	43.43	1.04	0.95	0.05	6335.83
BAAQMD Threshold =		54	54	None	82	54	None	NA
Significant?		No	No		No	No		

Averging of Construction Emissions **2015**
Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	108	50.82	19.34	44.08	1.26	1.15	0.05	6841
Averages =	108	50.82	19.34	44.08	1.26	1.15	0.05	6841.00
BAAQMD Threshold =		54	54	None	82	54	None	
Significant?		No	No		No	No		

Averging of Construction Emissions **2015**
Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	219	0.9	6.84	5.48	0.4	0.37	0	1124
2								
Averages =	219	0.90	6.84	5.48	0.40	0.37	0.00	1124.00
BAAQMD Threshold =		54	54	None	82	54	None	None
Significant?		No	No		No	No		NA

Averging of Construction Emissions **2016**

Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	42	5.11	33.05	59.58	1.66	1.51	0.07	10788
2	23	4.27	26.78	54.27	1.31	1.19	0.06	9663
3	195	2.12	10.68	43.47	0.56	0.5	0.06	7314
Averages =	260	2.79	15.72	47.03	0.80	0.72	0.06	8082.98
BAAQMD Threshold =		54	54	None	82	54	None	NA
Significant?		No	No		No	No		

Averging of Construction Emissions **2017**

Frrom URBEMIS2007 Output

Time Slice	Days	ROG	Nox	CO	PM10	PM25	So2	CO2
1	108	1.95	9.6	40.44	0.51	0.45	0.06	7315
2	152	67.57	17.48	48.68	1.09	0.99	0.06	8551
Averages =	260	40.31	14.21	45.26	0.85	0.77	0.06	8037.58
BAAQMD Threshold =		54	54	None	82	54	None	NA
Significant?		No	No		No	No		

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser Phase 2 Construction.urb924

Project Name: Kaiser Constructin Phase 2

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2015 TOTALS (lbs/day unmitigated)	0.90	6.84	5.48	0.00	2.43	0.40	2.84	0.51	0.37	0.88	1,124.34
2015 TOTALS (lbs/day mitigated)	0.90	6.84	5.48	0.00	2.43	0.40	2.84	0.51	0.37	0.88	1,124.34
2016 TOTALS (lbs/day unmitigated)	5.11	33.05	59.58	0.07	8.34	1.66	10.00	1.79	1.51	3.30	10,787.65
2016 TOTALS (lbs/day mitigated)	5.11	33.05	59.58	0.07	5.90	1.66	7.57	1.28	1.51	2.79	10,787.65
2017 TOTALS (lbs/day unmitigated)	80.21	17.48	48.78	0.06	0.31	1.09	1.41	0.11	0.99	1.10	8,566.15
2017 TOTALS (lbs/day mitigated)	37.72	17.48	48.78	0.06	0.31	1.09	1.41	0.11	0.99	1.10	8,566.15
2018 TOTALS (lbs/day unmitigated)	79.95	16.00	45.86	0.06	0.31	0.99	1.31	0.11	0.90	1.01	8,567.05
2018 TOTALS (lbs/day mitigated)	37.78	16.00	45.86	0.06	0.31	0.99	1.31	0.11	0.90	1.01	8,567.05

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser Center Existing 2014.urb924

Project Name: Kaiser Center

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Strip mall	21.99	35.00	258.33	0.30	61.30	11.89	33,195.83
TOTALS (lbs/day, unmitigated)	21.99	35.00	258.33	0.30	61.30	11.89	33,195.83

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2014 Temperature (F): 70 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Strip mall		104.21	1000 sq ft	48.00	5,002.08	35,514.77
					5,002.08	35,514.77

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.4	0.4	99.4	0.2
Light Truck < 3750 lbs	12.3	0.8	97.6	1.6

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	19.8	0.5	99.5	0.0
Med Truck 5751-8500 lbs	6.4	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.8	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	0.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	51.7	48.3	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	7.1	7.1	7.1	7.1	7.1	7.1
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
Strip mall				2.0	1.0	97.0

Operational Changes to Defaults

Ambient summer temperature changed from 85 degrees F to 70 degrees F

Ambient winter temperature changed from 40 degrees F to 50 degrees F

Home-based work average speed changed from 35 mph to 30 mph

Home-based work urban trip length changed from 10.8 miles to 7.1 miles

Home-based shop average speed changed from 35 mph to 30 mph

Home-based shop urban trip length changed from 7.3 miles to 7.1 miles

Home-based other average speed changed from 35 mph to 30 mph

Home-based other urban trip length changed from 7.5 miles to 7.1 miles

Commercial-based commute average speed changed from 35 mph to 30 mph

Commercial-based commute urban trip length changed from 9.5 miles to 7.1 miles

Commercial-based non-work average speed changed from 35 mph to 30 mph

Commercial-based non-work urban trip length changed from 7.35 miles to 7.1 miles

Commercial-based customer average speed changed from 35 mph to 30 mph

Commercial-based customer urban trip length changed from 7.35 miles to 7.1 miles

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser Center Existing 2014.urb924

Project Name: Kaiser Center

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009 TOTALS (lbs/day unmitigated)	4.98	65.90	24.61	0.06	48.84	2.78	51.62	10.19	2.56	12.74	7,578.50
2010 TOTALS (lbs/day unmitigated)	51.43	9.77	7.48	0.00	0.01	0.60	0.61	0.00	0.55	0.55	1,169.93

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	0.43	0.48	1.94	0.00	0.01	0.01	559.61

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	21.99	35.00	258.33	0.30	61.30	11.89	33,195.83

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SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	22.42	35.48	260.27	0.30	61.31	11.90	33,755.44

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser ALt 1 Operational.urb924

Project Name: Kaiser Alt 1

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General office building	19.41	21.55	209.32	0.27	48.45	9.26	27,720.07
TOTALS (lbs/day, unmitigated)	19.41	21.55	209.32	0.27	48.45	9.26	27,720.07

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2015 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General office building		6.30	1000 sq ft	552.00	3,477.60	28,177.25
					3,477.60	28,177.25

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.4	0.2	99.6	0.2
Light Truck < 3750 lbs	12.3	0.8	97.6	1.6

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	19.8	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.4	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.8	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	15.4	84.6
Heavy-Heavy Truck 33,001-60,000 lbs	0.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	48.3	51.7	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General office building				35.0	17.5	47.5

Operational Changes to Defaults

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser ALt 1 Operational.urb924

Project Name: Kaiser Alt 1

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	3.62	3.70	4.64	0.00	0.02	0.02	4,418.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	19.41	21.55	209.32	0.27	48.45	9.26	27,720.07

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	23.03	25.25	213.96	0.27	48.47	9.28	32,138.88

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Operational Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser 2010 revise Project Operation.urb924

Project Name: Kaiser 2010 Project Operation

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

OPERATIONAL EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
General office building	33.88	31.88	340.22	0.63	110.91	21.09	63,420.84
TOTALS (lbs/day, unmitigated)	33.88	31.88	340.22	0.63	110.91	21.09	63,420.84

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2020 Temperature (F): 85 Season: Summer

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
General office building		6.04	1000 sq ft	1,320.00	7,972.80	64,599.61
					7,972.80	64,599.61

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	54.4	0.0	100.0	0.0
Light Truck < 3750 lbs	12.2	0.0	99.2	0.8

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Truck 3751-5750 lbs	19.9	0.0	100.0	0.0
Med Truck 5751-8500 lbs	6.4	0.0	100.0	0.0
Lite-Heavy Truck 8501-10,000 lbs	0.8	0.0	75.0	25.0
Lite-Heavy Truck 10,001-14,000 lbs	0.6	0.0	50.0	50.0
Med-Heavy Truck 14,001-33,000 lbs	1.3	0.0	23.1	76.9
Heavy-Heavy Truck 33,001-60,000 lbs	0.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.1	0.0	0.0	100.0
Motorcycle	2.9	37.9	62.1	0.0
School Bus	0.0	0.0	0.0	0.0
Motor Home	0.6	0.0	83.3	16.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	10.8	7.3	7.5	9.5	7.4	7.4
Rural Trip Length (miles)	16.8	7.1	7.9	14.7	6.6	6.6
Trip speeds (mph)	35.0	35.0	35.0	35.0	35.0	35.0
% of Trips - Residential	32.9	18.0	49.1			
% of Trips - Commercial (by land use)						
General office building				35.0	17.5	47.5

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Operational Changes to Defaults

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\Kaiser 2010 revise Project Operation.urb924

Project Name: Kaiser 2010 Project Operation

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	8.49	8.82	8.94	0.00	0.03	0.03	10,562.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	33.88	31.88	340.22	0.63	110.91	21.09	63,420.84

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	42.37	40.70	349.16	0.63	110.94	21.12	73,983.65

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Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\cls\Application Data\Urbemis\Version9a\Projects\kaiser with TDM 2010.urb924

Project Name: Kaiser 2010 Project Operation

Project Location: Alameda County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	8.49	8.82	8.94	0.00	0.03	0.03	10,562.81

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	31.36	28.66	305.86	0.56	99.71	18.96	57,015.75

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	39.85	37.48	314.80	0.56	99.74	18.99	67,578.56

APPENDIX D

Biological Resources Data

Appendix D Contents:

APPENDIX D.1

Lists of Special Status Species within Study Area – CDFG

	Scientific Name	Common Name	Element Code	Federal Status	State Status	Global Rank	State Rank	CNPS	CDFG
1	Accipiter cooperii	Cooper's hawk	ABNKC12040			G5	S3		
2	Ambystoma californiense	California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3		SC
3	Amsinckia lunaris	bent-flowered fiddleneck	PDBOR01070			G2	S2.2	1B.2	
4	Antrozous pallidus	pallid bat	AMACC10010			G5	S3		SC
5	Aquila chrysaetos	golden eagle	ABNKC22010			G5	S3		
6	Arctostaphylos pallida	pallid manzanita	PDERI04110	Threatened	Endangered	G1	S1	1B.1	
7	Astragalus tener var. tener	alkali milk-vetch	PDFAB0F8R1			G1T1	S1.1	1B.2	
8	Atriplex joaquiniana	San Joaquin spearscale	PDCHE041F3			G2	S2	1B.2	
9	California macrophylla	round-leaved filaree	PDGER01070			G2	S2	1B.1	
10	Carex comosa	bristly sedge	PMCYP032Y0			G5	S2?	2.1	
11	Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower	PDPGN04081			G2T2	S2.2	1B.2	
12	Chorizanthe robusta var. robusta	robust spineflower	PDPGN040Q2	Endangered		G2T1	S1.1	1B.1	
13	Cicindela hirticollis gravida	sandy beach tiger beetle	IICOL02101			G5T2	S1		
14	Circus cyaneus	northern harrier	ABNKC11010			G5	S3		SC
15	Clarkia concinna ssp. automixa	Santa Clara red ribbons	PDONA050A1			G5?T3	S3.3	4.3	
16	Clarkia franciscana	Presidio clarkia	PDONA050H0	Endangered	Endangered	G1	S1.1	1B.1	
17	Cordylanthus maritimus ssp. palustris	Point Reyes bird's-beak	PDSCR0J0C3			G4?T2	S2.2	1B.2	
18	Dipodomys heermanni berkeleyensis	Berkeley kangaroo rat	AMAFD03061			G3G4T1	S1		
19	Dirca occidentalis	western leatherwood	PDTHY03010			G2G3	S2S3	1B.2	
20	Elanus leucurus	white-tailed kite	ABNKC06010			G5	S3		
21	Emys marmorata	western pond turtle	ARAAD02030			G3G4	S3		SC
22	Eriogonum luteolum var. caninum	Tiburon buckwheat	PDPGN083S1			G5T3	S3.2	1B.2	
23	Eucyclogobius newberryi	tidewater goby	AFCQN04010	Endangered		G3	S2S3		SC
24	Euphydryas editha bayensis	Bay checkerspot butterfly	IILEPK4055	Threatened		G5T1	S1		
25	Fritillaria liliacea	fragrant fritillary	PMLIL0V0C0			G2	S2.2	1B.2	
26	Geothlypis trichas sinuosa	saltmarsh common yellowthroat	ABPBX1201A			G5T2	S2		SC
27	Gilia capitata ssp. chamissonis	blue coast gilia	PDPLM040B3			G5T2	S2.1	1B.1	
28	Helianthella castanea	Diablo helianthella	PDAST4M020			G3	S3.2	1B.2	
29	Helminthoglypta nickliniana bridgesi	Bridges' coast range shoulderband	IMGASC2362			G2T1	S1		
30	Hemizonia congesta ssp. congesta	seaside tarplant	PDAST4R065			G5T2T3	S2S3	1B.2	
31	Hoita strobilina	Loma Prieta hoita	PDFAB5Z030			G2	S2.1	1B.1	
32	Holocarpha macradenia	Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1.1	1B.1	
33	Horkelia cuneata ssp. sericea	Kellogg's horkelia	PDROS0W043			G4T1	S1.1	1B.1	

	Scientific Name	Common Name	Element Code	Federal Status	State Status	Global Rank	State Rank	CNPS	CDFG
34	Lasionycteris noctivagans	silver-haired bat	AMACC02010			G5	S3S4		
35	Lasiurus cinereus	hoary bat	AMACC05030			G5	S4?		
36	Laterallus jamaicensis coturniculus	California black rail	ABNME03041		Threatened	G4T1	S1		
37	Layia carnosa	beach layia	PDAST5N010	Endangered	Endangered	G2	S2.1	1B.1	
38	Leptosiphon rosaceus	rose leptosiphon	PDPLM09180			G1	S1.1	1B.1	
39	Masticophis lateralis euryxanthus	Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2		
40	Meconella oregana	Oregon meconella	PDPAP0G030			G2G3	S1.1	1B.1	
41	Melospiza melodia pusillula	Alameda song sparrow	ABPBXA301S			G5T2?	S2?		SC
42	Microcina leei	Lee's micro-blind harvestman	ILARA47040			G1	S1		
43	Monardella villosa ssp. globosa	robust monardella	PDLAM180P7			G5T2	S2.2	1B.2	
44	Northern Coastal Salt Marsh	Northern Coastal Salt Marsh	CTT52110CA			G3	S3.2		
45	Northern Maritime Chaparral	Northern Maritime Chaparral	CTT37C10CA			G1	S1.2		
46	Nyctinomops macrotis	big free-tailed bat	AMACD04020			G5	S2		SC
47	Phalacrocorax auritus	double-crested cormorant	ABNFD01020			G5	S3		
48	Plagiobothrys chorisianus var. chorisianus	Choris' popcorn-flower	PDBOR0V061			G3T2Q	S2.2	1B.2	
49	Plagiobothrys diffusus	San Francisco popcorn-flower	PDBOR0V080		Endangered	G1Q	S1.1	1B.1	
50	Potamogeton filiformis	slender-leaved pondweed	PMPOT03090			G5	S1S2	2.2	
51	Rallus longirostris obsoletus	California clapper rail	ABNME05016	Endangered	Endangered	G5T1	S1		
52	Rana boylii	foothill yellow-legged frog	AAABH01050			G3	S2S3		SC
53	Rana draytonii	California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3		SC
54	Reithrodontomys raviventris	salt-marsh harvest mouse	AMAFF02040	Endangered	Endangered	G1G2	S1S2		
55	Sanicula maritima	adobe sanicle	PDAPI1Z0D0		Rare	G2	S2.2	1B.1	
56	Scapanus latimanus parvus	Alameda Island mole	AMABB02031			G5T1Q	S1		SC
57	Serpentine Bunchgrass	Serpentine Bunchgrass	CTT42130CA			G2	S2.2		
58	Sternula antillarum browni	California least tern	ABNNM08103	Endangered	Endangered	G4T2T3Q	S2S3		
59	Streptanthus albidus ssp. peramoenus	most beautiful jewel-flower	PDBRA2G012			G2T2	S2.2	1B.2	
60	Taxidea taxus	American badger	AMAJF04010			G5	S4		SC
61	Trachusa gummifera	A leaf-cutter bee	IIHYM80010			G1	S1		
62	Trifolium depauperatum var. hydrophilum	saline clover	PDFAB400R5			G5T2?	S2.2?	1B.2	
63	Tryonia imitator	mimic tryonia (=California brackishwater snail)	IMGASJ7040			G2G3	S2S3		

APPENDIX D.2

Lists of Special Status Species within Study Area – USFWS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

July 26, 2010

Document Number: 100726095448

Martha Lowe
Environmental Science Associates
350 Frank H. Ogawa Plaza
Suite 300
Oakland, CA 94612

Subject: Species List for Kaiser Center

Dear: Ms. Lowe

We are sending this official species list in response to your July 26, 2010 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be October 24, 2010.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE® IN AMERICA

U.S. Fish & Wildlife Service

Sacramento Fish & Wildlife Office

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 100726095448

Database Last Updated: April 29, 2010

Quad Lists

Listed Species

Invertebrates

Branchinecta lynchi
vernal pool fairy shrimp (T)

Speyeria callippe callippe
callippe silverspot butterfly (E)

Fish

Acipenser medirostris
green sturgeon (T) (NMFS)

Eucyclogobius newberryi
tidewater goby (E)

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus kisutch
coho salmon - central CA coast (E) (NMFS)

Oncorhynchus mykiss
Central California Coastal steelhead (T) (NMFS)
Central Valley steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Rana draytonii
California red-legged frog (T)

Reptiles

Masticophis lateralis euryxanthus
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

Birds

Charadrius alexandrinus nivosus
western snowy plover (T)

Pelecanus occidentalis californicus

California brown pelican (E)

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Plants

Arctostaphylos pallida

pallid manzanita (=Alameda or Oakland Hills manzanita) (T)

Clarkia franciscana

Presidio clarkia (E)

Suaeda californica

California sea blite (E)

Quads Containing Listed, Proposed or Candidate Species:

OAKLAND EAST (465C)

OAKLAND WEST (466D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our Protocol and Recovery Permits pages.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our Map Room page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be October 24, 2010.

APPENDIX D.3

Lists of Special Status Species within Study Area – CNPS

CNPS Inventory of Rare and Endangered Plants						
ECOLOGICAL REPORT						
scientific	**family**	**life form**	**blooming**	**communities**	**elevation**	**CNPS**
Amsinckia lunaris	Boraginaceae	annual herb	Mar-Jun	•Coastal bluff scrub (CBScr) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)	3 - 500 meters	List 1B.2
Arctostaphylos pallida	Ericaceae	perennial evergreen shrub	Dec-Mar	•Broadleafed upland forest (BUFrs) •Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr)/siliceous shale, sandy or gravelly	185 - 465 meters	List 1B.1
Astragalus tener var. tener	Fabaceae	annual herb	Mar-Jun	•Playas (Plyas) •Valley and foothill grassland (VFGrs)(adobe clay) •Vernal pools (VnPls)/alkaline	1 - 60 meters	List 1B.2
Atriplex joaquiniana	Chenopodiaceae	annual herb	Apr-Oct	•Chenopod scrub (ChScr) •Meadows and seeps (Medws) •Playas (Plyas) •Valley and foothill grassland (VFGrs)/alkaline	1 - 835 meters	List 1B.2
Balsamorhiza macrolepis var. macrolepis	Asteraceae	perennial herb	Mar-Jun	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/sometimes serpentinite	90 - 1555 meters	List 1B.2
California macrophylla	Geraniaceae	annual herb	Mar-May	•Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/clay	15 - 1200 meters	List 1B.1

CNPS Inventory of Rare and Endangered Plants						
ECOLOGICAL REPORT						
scientific	**family**	**life form**	**blooming**	**communities**	**elevation**	**CNPS**
Chorizanthe cuspidata var. cuspidata	Polygonaceae	annual herb	Apr-Jul(Aug) Months in parentheses are uncommon.	•Coastal bluff scrub (CBScr) •Coastal dunes (CoDns) •Coastal prairie (CoPrr) •Coastal scrub (CoScr)/sandy	3 - 215 meters	List 1B.2
Chorizanthe robusta var. robusta	Polygonaceae	annual herb	Apr-Sep	•Chaparral (Chprl)(maritime) •Cismontane woodland (CmWld)(openings) •Coastal dunes (CoDns) •Coastal scrub (CoScr)/sandy or gravelly	3 - 300 meters	List 1B.1
Clarkia franciscana	Onagraceae	annual herb	May-Jul	•Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)(serpentinite)	25 - 335 meters	List 1B.1
Cordylanthus maritimus ssp. palustris	Scrophulariaceae	annual herb hemiparasitic	Jun-Oct	•Marshes and swamps (MshSw)(coastal salt)	0 - 10 meters	List 1B.2
Dirca occidentalis	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs) •Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs) •Riparian forest (RpFrs) •Riparian woodland (RpWld)/mesic	50 - 395 meters	List 1B.2
Eriogonum luteolum var. caninum	Polygonaceae	annual herb	May-Sep	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs)/serpentinite, sandy to gravelly	0 - 700 meters	List 1B.2

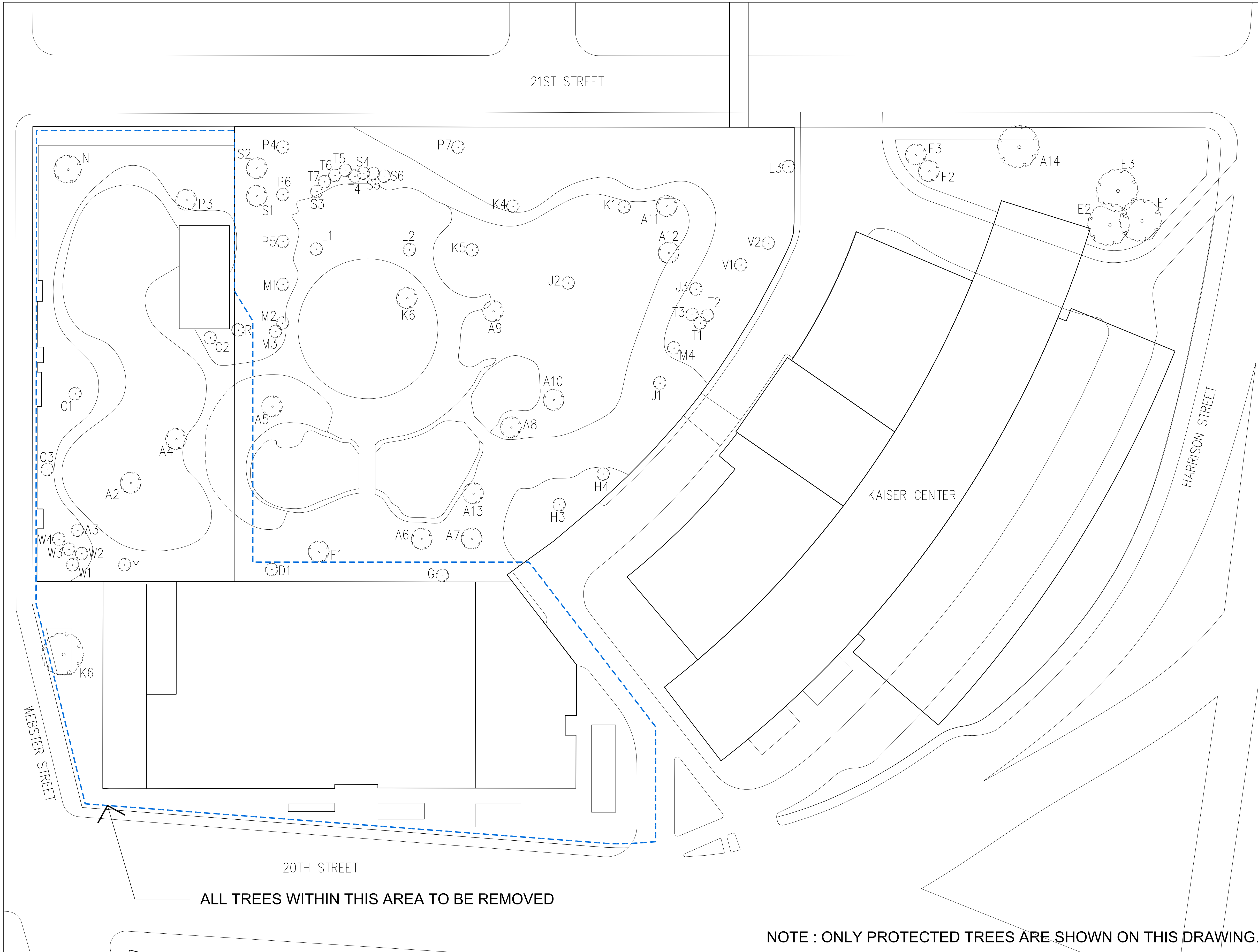
CNPS Inventory of Rare and Endangered Plants						
ECOLOGICAL REPORT						
scientific	**family**	**life form**	**blooming**	**communities**	**elevation**	**CNPS**
Fritillaria liliacea	Liliaceae	perennial bulbiferous herb	Feb-Apr	•Cismontane woodland (CmWld) •Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often serpentinite	3 - 410 meters	List 1B.2
Gilia capitata ssp. chamissonis	Polemoniaceae	annual herb	Apr-Jul	•Coastal dunes (CoDns) •Coastal scrub (CoScr)	2 - 200 meters	List 1B.1
Helianthella castanea	Asteraceae	perennial herb	Mar-Jun	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Riparian woodland (RpWld) •Valley and foothill grassland (VFGrs)	60 - 1300 meters	List 1B.2
Hoita strobilina	Fabaceae	perennial herb	May-Jul(Aug-Oct) Months in parentheses are uncommon.	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Riparian woodland (RpWld)/usually serpentinite, mesic	30 - 860 meters	List 1B.1
Holocarpha macradenia	Asteraceae	annual herb	Jun-Oct	•Coastal prairie (CoPrr) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)/often clay, sandy	10 - 220 meters	List 1B.1
Horkelia cuneata ssp. sericea	Rosaceae	perennial herb	Apr-Sep	•Closed-cone coniferous forest (CCFrs) •Chaparral (Chprl)(maritime) •Coastal dunes (CoDns) •Coastal scrub (CoScr)/sandy or gravelly, openings	10 - 200 meters	List 1B.1
Meconella oregana	Papaveraceae	annual herb	Mar-Apr	•Coastal prairie (CoPrr) •Coastal scrub (CoScr)	250 - 620 meters	List 1B.1

CNPS Inventory of Rare and Endangered Plants						
ECOLOGICAL REPORT						
scientific	**family**	**life form**	**blooming**	**communities**	**elevation**	**CNPS**
Micropus amphibolus	Asteraceae	annual herb	Mar-May	•Broadleafed upland forest (BUFrs) •Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/rocky	45 - 825 meters	List 3.2
Monardella villosa ssp. globosa	Lamiaceae	perennial rhizomatous herb	Jun-Jul(Aug) Months in parentheses are uncommon.	•Broadleafed upland forest (BUFrs)(openings) •Chaparral (Chprl)(openings) •Cismontane woodland (CmWld) •Coastal scrub (CoScr) •Valley and foothill grassland (VFGrs)	100 - 915 meters	List 1B.2
Monolopia gracilens	Asteraceae	annual herb	Mar-Jul	•Broadleafed upland forest (BUFrs)openings •Chaparral (Chprl)openings •Cismontane woodland (CmWld) •North Coast coniferous forest (NCFrs)openings •Valley and foothill grassland (VFGrs)/serpentine	100 - 1200 meters	List 1B.2
Plagiobothrys chorisianus var. chorisianus	Boraginaceae	annual herb	Mar-Jun	•Chaparral (Chprl) •Coastal prairie (CoPrr) •Coastal scrub (CoScr)/mesic	15 - 160 meters	List 1B.2
Plagiobothrys diffusus	Boraginaceae	annual herb	Mar-Jun	•Coastal prairie (CoPrr) •Valley and foothill grassland (VFGrs)	60 - 360 meters	List 1B.1
Potamogeton filiformis	Potamogetonaceae	perennial rhizomatous herb aquatic	May-Jul	•Marshes and swamps (MshSw)(assorted shallow freshwater)	300 - 2150 meters	List 2.2
Sanicula maritima	Apiaceae	perennial herb	Feb-May	•Chaparral (Chprl) •Coastal prairie (CoPrr)	30 - 240 meters	List 1B.1

CNPS Inventory of Rare and Endangered Plants						
ECOLOGICAL REPORT						
scientific	**family**	**life form**	**blooming**	**communities**	**elevation**	**CNPS**
				•Meadows and seeps (Medws) •Valley and foothill grassland (VFGrs)/clay, serpentinite		
Streptanthus albidus ssp. peramoenus	Brassicaceae	annual herb	(Mar)Apr-Sep(Oct) Months in parentheses are uncommon.	•Chaparral (Chprl) •Cismontane woodland (CmWld) •Valley and foothill grassland (VFGrs)/serpentinite	94 - 1000 meters	List 1B.2
Trifolium depauperatum var. hydrophilum	Fabaceae	annual herb	Apr-Jun	•Marshes and swamps (MshSw) •Valley and foothill grassland (VFGrs)(mesic, alkaline) •Vernal pools (VnPls)	0 - 300 meters	List 1B.2

APPENDIX D.4

Tree Removal Plan



ALL TREES WITHIN THIS AREA TO BE REMOVED

NOTE : ONLY PROTECTED TREES ARE SHOWN ON THIS DRAWING.

TREE	SPECIES	COMMON NAME	TRUNK DIAMETER
A2	OLEA EUROPEA	EUROPEAN OLIVE	30.1"
A3	OLEA EUROPEA	EUROPEAN OLIVE	11.5"
A4	OLEA EUROPEA	EUROPEAN OLIVE	43.3"
A5	OLEA EUROPEA	EUROPEAN OLIVE	24.4"
A6	OLEA EUROPEA	EUROPEAN OLIVE	34.1"
A7	OLEA EUROPEA	EUROPEAN OLIVE	22.9"
A8	OLEA EUROPEA	EUROPEAN OLIVE	36.0"
A9	OLEA EUROPEA	EUROPEAN OLIVE	45.5"
A10	OLEA EUROPEA	EUROPEAN OLIVE	35.0"
A11	OLEA EUROPEA	EUROPEAN OLIVE	33.9"
A12	OLEA EUROPEA	EUROPEAN OLIVE	32.0"
A13	OLEA EUROPEA	EUROPEAN OLIVE	27.3"
A14	OLEA EUROPEA	EUROPEAN OLIVE	33.6"
B	RHUS LANCEA	AFRICAN SUMAC	14.0"
C1	PITTOSPORUM UNDULATUM	VICTORIAN BOX	16.2"
C2	PITTOSPORUM UNDULATUM	VICTORIAN BOX	23.3"
C3	PITTOSPORUM UNDULATUM	VICTORIAN BOX	23.9"
D1	ACER PALMATUM	JAPANESE MAPLE	35.1"
E1	LIQUIDAMBAR STRYACIFLUA	SWEETGUM	14.3"
E2	LIQUIDAMBAR STRYACIFLUA	SWEETGUM	15.8"
E3	LIQUIDAMBAR STRYACIFLUA	SWEETGUM	15.9"
F1	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	23.3"
F2	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	18.5"
F3	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	17.4"
G	PODOCARPUS MACROPHYLIA	JAPANESE YEW PINE	11.3"
H3	MALUS FLORIBUNDA	JAPANESE FLOWERING CRABAPPLE	11.9"
H4	MALUS FLORIBUNDA	JAPANESE FLOWERING CRABAPPLE	9.2"
J1	QUERCUS SUBER	CORK OAK	29.0"
J2	QUERCUS SUBER	CORK OAK	16.0"
J3	QUERCUS SUBER	CORK OAK	31.5"
K1	RHUS LANCEA	AFRICAN SUMAC	14.3"
K4	RHUS LANCEA	AFRICAN SUMAC	21.2"
K5	RHUS LANCEA	AFRICAN SUMAC	18.5"
K6	RHUS LANCEA	AFRICAN SUMAC	14.0"
L1	PINUS MUGO	SWISS MOUNTAIN PINE	19.1"
L2	PINUS MUGO	SWISS MOUNTAIN PINE	21.0"
L3	PINUS MUGO	SWISS MOUNTAIN PINE	19.0"
M1	ARBUTUS UNEDO	STRAWBERRY TREE	32.4"
M2	ARBUTUS UNEDO	STRAWBERRY TREE	29.5"
M3	ARBUTUS UNEDO	STRAWBERRY TREE	21.7"
M4	ARBUTUS UNEDO	STRAWBERRY TREE	30.3"
N	BETULA PENDULA	EUROPEAN WHITE BIRCH	24.0"
P3	QUERCUS ILEX	HOLLY OAK	9.1"
P4	QUERCUS ILEX	HOLLY OAK	17.2"
P5	QUERCUS ILEX	HOLLY OAK	12.7"
P6	QUERCUS ILEX	HOLLY OAK	15.3"
P7	QUERCUS ILEX	HOLLY OAK	18.6"
R	PRUNUS CAROLINIANA	CAROLINA CHERRY LAUREL	19.4"
S1	GRISELINA LITTORALIS	KAPUKA	32.2"
S2	GRISELINA LITTORALIS	KAPUKA	18.5"
S3	GRISELINA LITTORALIS	KAPUKA	16.6"
S4	GRISELINA LITTORALIS	KAPUKA	29.3"
S5	GRISELINA LITTORALIS	KAPUKA	26.1"
S6	GRISELINA LITTORALIS	KAPUKA	26.1"
T1	FEIJOA SELLOWIANA	PINAPPLE GUAVA	25.5"
T2	FEIJOA SELLOWIANA	PINAPPLE GUAVA	29.3"
T3	FEIJOA SELLOWIANA	PINAPPLE GUAVA	8.4"
T4	FEIJOA SELLOWIANA	PINAPPLE GUAVA	21.0"
T5	FEIJOA SELLOWIANA	PINAPPLE GUAVA	24.2"
T6	FEIJOA SELLOWIANA	PINAPPLE GUAVA	19.8"
T7	FEIJOA SELLOWIANA	PINAPPLE GUAVA	16.6"
V1	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	26.3"
V2	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	22.8"
W1	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	13.3"
W2	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	16.3"
W3	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	12.1"
W4	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	14.5"

EXISTING TREE DESCRIPTION

ASK - 060R1

0 16' 32' 64'

June 24, 2009

Scale: 1" = 64'-0"

NORTH

KAISER CENTER

THE SWIG COMPANY

SOM

APPENDIX E
Cultural Resources Correspondence

Appendix E Contents:

APPENDIX E.1

Historic Resources Evaluation

Historic Resource Evaluation

Final Draft

Kaiser Center

300 Lakeside Drive
Oakland, California

February 2009

Prepared for
City of Oakland
Community & Economic Development Agency

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I. INTRODUCTION

This Historic Resource Evaluation (HRE) has been prepared at the request of the Swig Company for a project affecting the Kaiser Center, located at 300 Lakeside Drive (also 312-348 20th Street, 2000-2040 Webster Street, and 2059 Harrison Street), Oakland, California. The complex is on a large, irregularly shaped block bounded by 20th, Harrison, 21st, and Webster Streets. The Kaiser Center complex consists of a twenty-eight-story Office Tower, the three-story and basement 20th Street Mall Building, the two-and-three-story Webster Street Mall Building, a three-and-four-story parking garage, and the Roof Garden on the top level of the parking garage. The complex was designed by Welton Becket & Associates and completed in 1959. The Roof Garden was designed by the landscape architecture firm Osmundson & Staley and completed in 1960.

The current owner of the Kaiser Center has proposed to demolish the Mall Buildings and replace them with two office towers, a thirty-four-story tower at the northeast corner of Webster and 20th streets and a forty-two-story tower at the southeast corner of Webster and 21st streets. The roof garden will be reconfigured, removing approximately 18,369 square feet in the Webster and 21st street corner and adding 22,933 square feet along 20th Street. The garden would have a net gain of 4,564 square feet, and the proposed project provides for the inclusion of a grand staircase accessing the roof garden from 20th Street, which would improve public access to the garden. The project sponsor is also considering providing increased access to the roof garden through the new office towers.

This report provides a detailed description and historical context for the Kaiser Center, as well as an examination of the property's existing historical status. Included in this report is an evaluation of the building's eligibility for the California Register of Historical Resources (California Register) and an evaluation of the proposed project under the provisions of the California Environmental Quality Act (CEQA).

The primary author of this report was architectural historian, Cora Palmer, who meets the Secretary of the Interior's Standards for Professional Qualifications in Architectural History. Portions of this report were completed by Cultural Landscape Specialist Gretchen Hilyard and Cultural Resource Specialist, Cara Bertron. The project architects, Skidmore Owings & Merrill, have provided architectural drawings of the Proposed Project for inclusion in this report.

Page & Turnbull prepared this report using research collected at various local repositories, including the Oakland Cultural Heritage Survey, Kaiser Center Archives, the Oakland Public Library, and the University of California, Berkeley Environmental Design Archives.

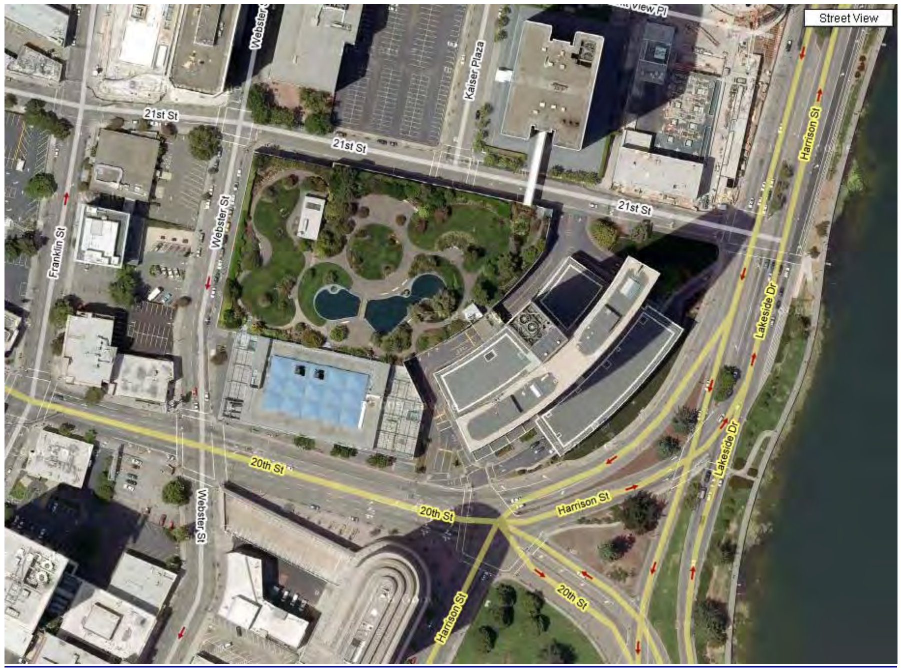

Figure 1. Aerial of subject property. Google Maps

Figure 2. Site Plan of subject property. SOM, altered by author.
Note that hatched area represents the Roof Garden.

II. Summary of Determination

According to the Oakland Cultural Heritage Survey, the Kaiser Center and Roof Garden appears to be individually eligible for listing in the National Register of Historical Places (National Register). The analysis in this report finds the complex to be individually eligible for listing in the California Register of Historical Resources (California Register) under Criteria 1 (Events), 2 (Persons), and 3 (Architecture). Therefore, the Kaiser Center complex is considered a historic resource under the California Environmental Quality Act (CEQA).

According to CEQA, a "project with an effect that may cause a substantial adverse change in the significance of an historic resource is a project that may have a significant effect on the environment." The significance of a historic resource is materially impaired when a project materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in the California Register. This report determines that the proposed project may cause a change to a historic resource and may have an adverse effect on the environment. However, if suggested mitigation measures were incorporated into the design, the impacts on a historic resource could be reduced to a less than significant level.

III. CURRENT HISTORIC STATUS

A. National Register of Historic Places

The National Register of Historic Places is the nation's most comprehensive inventory of historic resources. The National Register is administered by the National Park Service and includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level. Typically, resources over fifty years of age are eligible for listing in the National Register if they meet any one of the four criteria of significance and if they sufficiently retain historic integrity. However, resources under fifty years of age can be listed or determined eligible if it can be demonstrated that they are of "exceptional importance," or if they are contributors to a potential historic district. National Register criteria are defined in depth in *National Register Bulletin Number 15: How to Apply the National Register Criteria for Evaluation.* A resource can be considered significant on a national, state, or local level to American history, architecture, archaeology, engineering, and culture.

The Kaiser Center is not listed in the National Register of Historic Places. However, according to the Oakland Cultural Heritage Survey, the Kaiser Center appears to be potentially eligible for listing in the National Register both individually and as a contributor to a potential Lake Merritt Historic District.[1]

B. Oakland Cultural Heritage Survey

The Oakland Cultural Heritage Survey (OCHS) was established in 1981. Since that time, the OCHS has been evaluating resources according to a system adapted from both the San Francisco Downtown Inventory, and Harold Kalman's *The Evaluation of Historic Buildings* (Parks Canada, 1980). The categories, ratings, and guidelines for interpretation closely parallel those of *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, Sections IV, "How to Identify the Type of Significance of a Property;" and V, "How to Determine if a Property has Integrity". Properties are evaluated under seventeen headings in four general areas: Visual Quality/Design, History/Association, Continuity, and Integrity/Reversibility. Buildings are rated on a scale from "A": <u>Highest Importance</u> to "E": <u>Of no particular interest</u>; buildings less than 45 years old or modernized are classified "*" or "F."

[1] Please note that OCHS staff is currently re-examining the boundaries of the Lake Merritt Historic District.

The survey also identifies historic districts. Historic districts are classified in two categories: Areas of Primary Importance (API) and Areas of Secondary Importance (ASI). Both types of districts are historically or visually cohesive areas in which a high proportion of properties contribute to or reflect the area's principal historical or architectural themes. APIs appear eligible for the National Register as districts or historically related complexes while ASIs do not, although they are considered to warrant city preservation efforts. In addition, seriously altered properties that appear restorable may be counted as contributors in an ASI but not in an API. District ratings range from 1 to 3. A rating of 1 means the property is in an Area of Primary Importance (API) or National Register quality district. A rating of 2 means the property is in an Area of Secondary Importance (ASI) or district of local interest. A rating of 3 means the property is not in a historic district.

The Kaiser Center is listed in the OCHS with a rating of A1+, which indicates that the property has an "A"-rating, defined as a property of "Highest Importance." "A" buildings are labeled as buildings with "exceptional historical or architectural value which are clearly eligible individually for the National Register of Historic Places." The building's "1"rating signifies that the property is located within an API, and the "+" rating indicates the property is a contributor to the API.

<u>Lake Merritt District, Area of Primary Importance (API)</u>

The Lake Merritt District was surveyed as part of the OCHS in 1986. The District is considered an Area of Primary Importance (API), a district that appears eligible for the National Register of Historic Places. According to the OCHS Lake Merritt Historic District inventory form, "the district consists of Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries." (See **Appendix A** for a district boundary map and representative photographs of the Lake Merritt Historic District). The Kaiser Center was not over the fifty-year threshold at the time of the survey and therefore was not included as a contributor. However, due to its historic and architectural significance and relation to the lake, currently the Kaiser Center is considered a contributor to the Lake Merritt Historic District. It should be noted that OCHS Staff is currently re-examining the boundaries of the Lake Merritt Historic District.

C. City of Oakland Landmark Status

Like most cities, Oakland has a program for designating historic Landmarks and Preservation Districts. These are considered the most prominent historic properties in the city. They are nominated by their owners, the City, or the public, and are designated after public hearings by the Landmarks Board, Planning Commission, and City Council. These landmarks and historic districts are called "Designated Historic Properties." Since the program began in 1973, about 140 individual landmarks and nine districts have been designated, out of a total of nearly 100,000 buildings in the city.[2] The city has forty individual buildings and the Downtown district listed on the National Register of Historic Places, and a small group of State and National Historic Landmarks. These major landmarks have various legal protections against demolition or changes that would impair their significance.

The Kaiser Center has never been formally designated a City of Oakland Landmark. However, in 2003, members of the City of Oakland's Landmarks Preservation Advisory Board particularly interested in Modern design began the process of pursuing a Landmark nomination for the Kaiser Center. While the process was never completed, it likely indicates that the Kaiser Center would be determined eligible for listing as a City of Oakland Landmark.

[2] City of Oakland, CEDA, Oakland General Plan, Historic Preservation Element, Appendix C, Oakland Cultural Heritage Survey Evaluation Methods (Oakland: City of Oakland, Sept. 1993), C-3.

IV. DESCRIPTION[3]

A. Site

The Kaiser Center is located on a large irregularly shaped lot on the west side of Lakeside Drive bounded by Harrison, Webster, 20th, and 21st streets. The complex is located adjacent to Lake Merritt and is part of a group of high-rise commercial office buildings designed in the Modern style at the northwest shore of the lake. The Kaiser Center complex is made up of four elements: Mall Buildings that form a strong horizontal base, a curving high-rise Office Tower, a utilitarian parking lot, and a roof garden. The Office Tower's facade interprets the arc of Harrison Street which curves between 21st and 20th Street. The immediate area is composed of high-rise commercial office towers, mid-rise commercial buildings, the Cathedral of Christ the Light, parking lots and Snow Park. The area has a mid- and high-rise character and is made up of historic and non-historic buildings. The site slopes up from south to north; as a result, the building at the south end of the lot (20th Street Mall) is approximately one story lower than the building at the north end of the lot (Webster Street Mall). The site features planting beds and capitalizes on views to Lake Merritt to the southeast.

B. Office Tower Exterior

Figure 3. Kaiser Center Office Tower. View from southeast. Page & Turnbull, 2008

Completed in 1959, the Kaiser Center Office Tower is a twenty-eight-story office tower with three basements that features a T-shaped plan, and a curved main façade. The building is made up of two basic components: a T-shaped tower with a straight stem and curved wings; and an asymmetrically located two-story podium supported by square piers at the first floor that extends beyond the plane of the T-shaped tower and follows the curve of the main façade.

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[3] See Appendix A for additional photographs of the Kaiser Center.

The main façade of the tower features fourteen bays separated by burnished aluminum piers. Each bay includes six windows surrounded by gold toned and natural aluminum frames. The side facades of the curved plane feature concrete panels with dolomite, a rock-like mineral product, aggregate. Other than the penthouse floor which features a higher ceiling height, all floors and bays on the main façade are identical. The straight vertical portion or stem of the tower features the same fenestration pattern as the main façade at the east and west façade and the same concrete panels with dolomite aggregate at the north and south façades. The north façade features signage reading, "Kaiser."

The first floor of the podium is supported by square piers, effectively creating a *porte cochere* at the front facade, and features a space which is occupied by the auditorium and tenant office space. The building's *porte cochere* features square piers with metal cladding, dolomite panels, and stucco walls and ceilings with recessed incandescent lighting at the recessed portion. The first floor lobby includes an aluminum storefront with glazed aluminum doors featuring rectangular aluminum hardware that reads, "Kaiser Center." To the left of the *porte cochere* are retail spaces which feature glazed aluminum storefronts capped by a cantilevered canopy clad in stucco which features recessed incandescent lighting.

To the rear of the main façade is a two-story podium that is supported by square piers with metal cladding. This portion of the podium parallels the curve of the main façade and includes office space and features a skybridge with access to the parking garage. This podium features a glazed curtain wall with burnished aluminum panels, similar to but simpler than the main façade.

<u>Parking Garage</u>

The parking garage is a three-and-four-story reinforced concrete rectangular plan building with a curved east façade that parallels the tower. The building is utilitarian and the only ornamentation present on

Figure 4. Parking Garage, north façade. View from northwest.
Page & Turnbull, 2008

the parking garage is a grid of narrow aluminum ribs and aluminum signage reading, "Kaiser Center Garage." The top level of the building is occupied by the Kaiser Center Roof Garden.

C. Office Tower Interior

<u>Lobby</u>

The first floor lobby is a one-story and mezzanine space that features terrazzo floors, marble walls, oversize round piers, and two escalators. The escalators have been enclosed with marble cladding and a circular fountain has been installed in the escalator enclosure. The lobby features round raised planters, a seating area, and a coffee kiosk. Many of the lobby features were replaced in a renovation designed by Charles Jennings that took place in the mid-1990s.

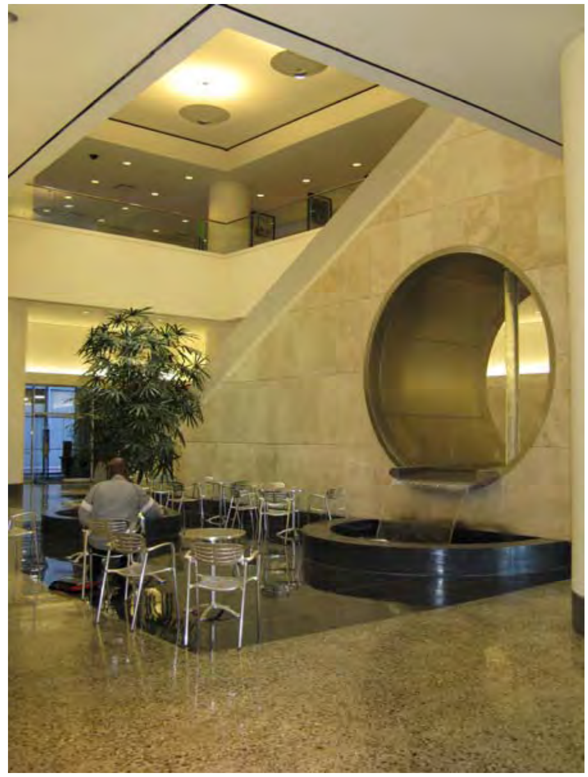

Figure 5. Lobby, view from southeast. Page & Turnbull, 2008

<u>First Floor Retail</u>

The first floor of the tower includes a single level of retail with mixed use commercial space on a mezzanine level. This portion of the complex features terrazzo floors and walls, square piers, glazed aluminum storefronts with clear and frosted glass, spray acoustical ceilings, large replacement pendant light fixtures, and glazed aluminum doors with decorative aluminum door handles, some exterior door hardware features cut outs reading, "Kaiser Center."

<u>Second Floor Lobby</u>

The second floor lobby features plaster walls and ceilings, oversize round piers, and terrazzo floors. The second floor functions as a mezzanine and a glass half wall with metal handrail surrounds the central opening which is occupied by the central lobby escalators. The opening includes oversize replacement pendant lights and the remainder of the ceiling includes recessed incandescent lighting. The second floor lobby features interpretive plaques, a bust of Henry J. Kaiser, a film on Kaiser, and comics celebrating Kaiser's legacy.

<u>Auditorium</u>

The corridor leading to the auditorium features polished stone wall panels, decorative aluminum wall cladding, and hanging incandescent light fixtures. The auditorium was occupied and not available during the time of the site visit.

Figure 6. Tenant space, showing original aluminum door. Page & Turnbull, 2008

<u>Office Spaces</u>

Typical office spaces include a curving corridor with offices flanking the central lobby space. The majority of offices have undergone multiple tenant improvements and feature partition walls, carpeted floors, recessed fluorescent lighting, and hollow-core wood doors. However, some offices retain original details such as aluminum partition systems, aluminum doors in a variety of finishes, and suspended ceilings with original perforated aluminum ceiling tiles.

D. Mall Buildings, Exterior

The Mall Buildings appear as a strong horizontal base that is contrasted by the verticality of the Office Tower. Constructed in 1959, the 20th Street Mall Building is a three-story and basement building located at the corner of 20th and Webster streets with a rectangular plan and flat roof. The building features oversize circular piers and glazed aluminum storefronts at the first floor giving the main mass of the building the appearance of floating. The first floor features stucco and white brick veneer cladding. The second floor has no fenestration but feature dolomite concrete panels with aluminum cantilevered canopies and vertical granite panels and aluminum fins above the entrances. The penthouse level occupies approximately three-quarters of the floor plate and is set back from the plane of the lower floors. The penthouse level features stucco cladding and closely arranged aluminum sash windows. The remainder of the penthouse level features an aluminum pergola. As of the date of this evaluation, a portion of this floor is vacant, but has traditionally been occupied by a restaurant that accesses the roof garden.

Constructed in 1959, the Webster Street Mall Building is a two-and-three-story building located at the corner of 21st and Webster streets with a rectangular plan and a flat roof covered by the roof garden. The first floor features stucco cladding and fixed full-height aluminum windows. The upper two floors feature slightly protruding dolomite concrete panels with no fenestration. Similar to the 20th Street Mall Building, the main mass of the building appears to float above the first floor.

Figure 7. 20th Street Mall Building, view from southeast.
Page & Turnbull, 2008

E. Mall Buildings, Interior

The first floor of the 20th Street Mall Building includes terrazzo floors, gypsum board walls, some clad with brick veneer, a projecting paneled frieze, and spray acoustical ceiling. Lighting fixtures include recessed fluorescent and incandescent lights. Storefronts are glazed aluminum with glazed aluminum doors. The central space includes narrow, free-standing escalators. Other unique finishes, such as the

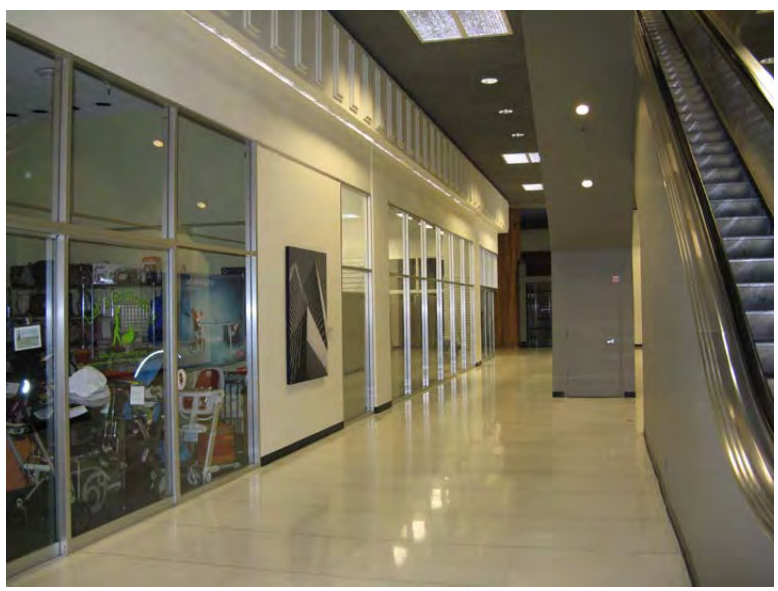

Figure 8. 20th Street Mall Building, interior. View of escalator lobby.
Page & Turnbull, 2008

wood-clad column at the 20th Street lobby, were tenant improvements. The interior of the 20th Street Mall Building retains few original finishes, limited to terrazzo floors. The second and third floors include escalators, gypsum board walls and ceilings, carpeted floors, rubber base, and recessed fluorescent and incandescent lighting. Office spaces have been significantly altered over time and include partition walls, carpeted floors, rubber base, suspended ceilings, and recessed fluorescent lighting.

The Webster Street Mall has also undergone similar alterations and the first floor features gypsum board walls with dolomite panels, terrazzo and rubber base, fully glazed aluminum storefronts, glazed aluminum doors, metal doors, spray acoustical ceilings, and recessed fluorescent lighting. The original finishes include terrazzo floors and dolomite panels. The Webster Street Mall is situated slightly above the 20th Street Mall due to the change in grade.

The staircase connecting the two sections of the Mall features terrazzo treads and risers, and aluminum handrails. The corridor features display cases with aluminum surrounds. The main entrance to the 24 Hour Fitness is recessed and features a marble surround with a replacement aluminum storefront. The northern section of the corridor features polychrome asphalt tiles in a random pattern and stairs with tubular aluminum handrails up to a secondary entry to the gym. This northern section of the Mall includes a glazed aluminum storefront with glazed aluminum door and sidelight. This portion of the corridor features a suspended ceiling, recessed fluorescent lighting, and access to the parking garage.

F. Roof Garden

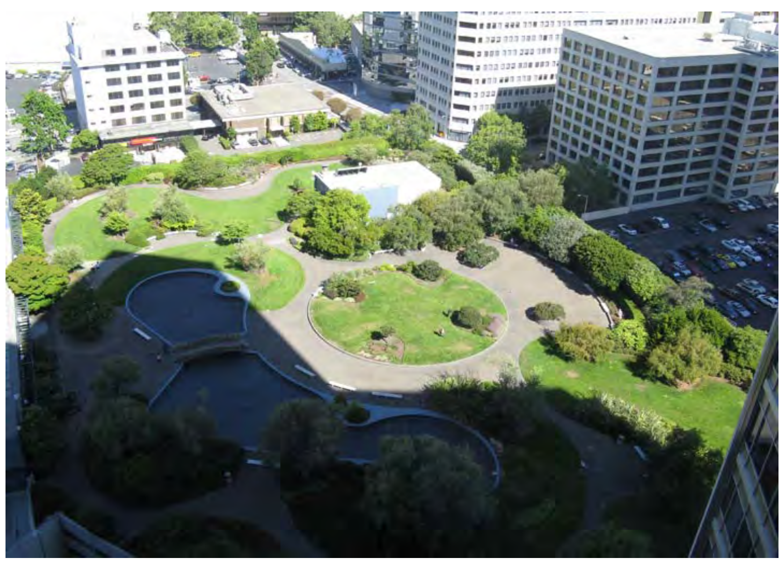

Figure 9. Roof Garden, view from tower. Page & Turnbull, 2008

The Kaiser Center roof garden was constructed between 1959 and 1960 and is located on the top level of the parking garage at the northwest corner of the complex. The roof garden is rectangular in plan, except at the eastern edge, where the garden parallels the arc of the tower's main façade. The garden features curvilinear aggregate pathways, a series of irregularly-shaped undulating lawns, a circular lawn located in the center of the garden, low concrete curbing, specimen trees, shrub plantings, concrete benches and related site furnishings, and an 8,800 square foot reflecting pool. The pool features a wood bridge which was added between 1973 and 1975. A visual axis begins at the main entrance to the garden at the 20th Street Mall Building and runs through the reflecting pool and central circular lawn. A concrete HVAC building is located in the northwest corner of the garden. The building is approximately eighteen feet in height, clad in stucco and capped by a flat roof. The HVAC building is screened by specimen trees to alleviate the visual intrusion of this building within the garden.

V. HISTORIC CONTEXT

This historic context statement contains three sections; an overview of the history of Oakland since its incorporation, a brief history of the Kaiser Center site including a construction chronology, and an account of individual persons and trends significant to the development of the Kaiser Center.

A. Oakland History

On March 25, 1852, the town of Oakland was incorporated.[4] Named for an oak grove that stretched from Lake Merritt to the bay, the city encompassed the present-day downtown and West Oakland to 22nd Street.[5] It had less than one hundred citizens, who elected Horace W. Carpentier, a graduate of Columbia University's law school and early developer, as the city's first mayor.[6]

Oakland saw rapid growth and improvement after transportation connections were established with other communities.[7] Ferry service to San Francisco began in 1854, and San Antonio and Clinton were connected with Oakland by a bridge built in 1856. Commercial and industrial businesses were established near the wharves, and a railroad ran through downtown Oakland by 1863.[8]

In 1868, Oakland was chosen as the western terminus for the Transcontinental Railroad. Beginning in 1869, the train, a "great 'Iron Horse' with tireless lungs," brought tourists and workers to California and made Oakland a major port city and manufacturing center.[9] West Oakland became a shipping hub for western U.S. factories and a processing and manufacturing center for raw commodities such as agricultural products and lumber. As Oakland became an increasingly popular industrial core, residential and commercial communities expanded in the city limits. In 1873, Oakland became the county seat of Alameda County.[10] By 1880, the city's population rose to 34,555, more than twenty times what it was in 1860.[11] Many of the new residents were San Francisco commuters drawn by Oakland's relatively low density and the ferry service across the bay and railroad workers, many of whom were African Americans.[12]

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[4] *Ibid.*, 27.
[5] Historic Preservation Element, 1-4.
[6] Bagwell, 27.
[7] Historic Preservation Element, 1-4.
[8] *Ibid.*, 1-5.
[9] Rather, 53-54.
[10] Historic Preservation Element, 1-5.
[11] Bagwell, 59.
[12] Historic Preservation Element, 1-5.

Promotional materials advertised Oakland's "world-renowned" climate, the prosperity of its citizens, its paved streets and extensive streetcar lines, and the culture found in "the Athens of America."[13] It was home to several colleges, including the College of California (the precursor of the University of California), Mills Seminary (later Mills College), and St. Mary's College. By 1895, the city held four daily newspapers in English, fifty churches, fourteen schools, and four theaters or opera houses. Hospitals, literary societies, and a public library rounded out Oakland's cultural offerings.

The city expanded by annexing existing settlements and developing new districts.[14] Clinton, San Antonio, and Lynn (or Brooklyn) were annexed in 1872, pushing Oakland's city limits out to 36th Street.[15] Fruit Vale (later Fruitvale) and Jingletown grew around fruit orchards to the east, and Melrose, Fitchburg, and Elmhurst developed around railroad stations.[16] The small Temescal community expanded in the 1860s with the installation of a telegraph line down present-day Telegraph Avenue and the establishment of a streetcar line to the University of California Berkeley. Klinknerville, later Golden Gate, developed around Stanford and San Pablo avenues. Recreational facilities like the Tubbs Hotel and Idora Park spurred expansion into areas such as East Oakland and North Oakland. Neighborhoods north of Lake Merritt were annexed in 1891, and Temescal, Golden Gate, and other North Oakland neighborhoods were annexed in 1897.[17] By 1900, Oakland's population numbered almost 67,000.

The 1906 Earthquake and Fire sent thousands of San Francisco residents to the East Bay for temporary and permanent housing. Oakland continued to grow geographically, increasing nearly to its present size in 1909, with the annexation of the hills area, Fruitvale, Melrose, Elmhurst, and the area south to San Leandro.[18] With that move, the city's area increased from 22.9 to 60.25 square miles. Meanwhile, private developers saw an opportunity to plan communities for both the affluent and working classes in North Oakland, West Oakland, and East Oakland neighborhoods.

Post-earthquake development reinforced the city center at 14th Street and Broadway. The First National Bank of Oakland (now the Broadway Building), the Oakland Bank of Savings, the Security Bank Building, the Oakland Hotel, and the Federal Realty Building (now Cathedral Building) were constructed in this area between 1907 and 1914. Oakland's City Hall was the first city hall in the

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[13] Rather, 63.
[14] Bagwell, 59.
[15] Historic Preservation Element, 1-5.
[16] *Ibid.*, 1-6.
[17] *Ibid.*, 1-7.
[18] *Ibid.*, 1-7.

United States designed as a skyscraper. Other civic projects included the Civic Auditorium, new fire stations, and parks around the city.[19]

In 1910, the City of Oakland assumed control of its waterfront, which was previously held by private entities. The change of ownership prompted the expansion of the Port of Oakland. The increased presence of the port, combined with the rail network and its geographic position, boosted the city to a leading industrial and warehousing center.[20] During World War I, Oakland's shipyards provided a "fleet of steel and concrete ships that…within the short space of a year put the Oakland estuary in the national limelight."[21] By 1918, at least 50,000 people were employed by the shipyards.

The 1920s saw continuing prosperity in Oakland.[22] Civic works abounded, including a new lighting system turned on by Charles Lindbergh, and land for an airport was purchased. Several automobile manufacturers located assembly plants in East Oakland, making Oakland "the Detroit of the West."[23] The city was proclaimed "One of the Nation's Richest, Greatest Communities" in 1929.

Development slowed during the Great Depression, but Oakland grew into a major shipbuilding center during World War II.[24] Henry J. Kaiser, the developer of the Kaiser Center, was influential in shipbuilding in area. In fact, the Kaiser Shipyards in Richmond were responsible for constructing more ships during World War II than any other shipyard in the United States.[25] The city expanded with wartime workers, including many African Americans who migrated from the south. The Bay Bridge, which opened in 1936, eased the commute to San Francisco and likely attracted more Oakland residents. In 1945, the city's population was 405,301.

After the war, the Port continued to grow, largely because of its ability to capitalize on the rise of containerized shipping. This shipping method favored the Port's large landholdings, spacious waterfront, and access to rail and truck transportation routes over the older, more crowded Port of San Francisco.[26] By the late 1960s, Oakland had the second largest container port in the world.[27]

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[19] Ibid., 1-8.
[20] Ibid.
[21] Florence B. Crocker, *Who Made Oakland?* (Oakland: Clyde Dalton, 1925), quoted in Rather, 87.
[22] Rather, 89.
[23] Historic Preservation Element, 1-8.
[24] *Ibid*., 1-9.
[25] For more information on Henry Kaiser, please see **V. Historic Context,** ***F: Henry J. Kaiser, page 32.***
[26] Michael Corbett with Marjorie Dobkin and William Kostura. "National Register of Historic Places Registration Form: Port of San Francisco Embarcadero Historic District" (January 2006), 21.
[27] Corbett, 43.

Transportation has directly impacted Oakland's physical development. The postwar emphasis on the automobile led to the development of suburbs and new freeways to reach these outlying areas.[28] Freeway construction and redevelopment enticed or forced businesses and residents away from the city center and destroyed historic fabric in downtown and West Oakland.

In the 1970s, Oakland became the headquarters of the Bay Area Rapid Transit (BART) system.[29] A tight real estate market in San Francisco in the early 1980s sparked new development and preservation projects in Oakland, especially downtown.[30] Homebuyers began seriously considering Oakland neighborhoods, many of which retained strong local character.[31]

Although the 1989 Loma Prieta earthquake damaged many of Oakland's historically significant buildings, in recent years there has been an effort to attract residents to downtown, redevelopment projects have been undertaken around the city, crime has decreased, and homeownership has increased.[32]

B. Site History

<u>Lake Merritt</u>

Lake Merritt was originally a wide, tidal estuary known as Laguna Peralta. At low tide, the marsh would turn into a mud flat and due to its location on the Pacific Flyway; it was (and remains) a stopping place for thousands of migratory birds. In 1867, Dr. Samuel Merritt, then Mayor of Oakland, donated 155 acres of tidal water from the headwaters of Indian Slough to the City. It became known as Merritt's Lake and later Lake Merritt. In 1870 the area was declared a National Wildlife Refuge, said to be the first in North America. Merritt envisioned the estuary as a regular level lake, and proposed a dam at what is now 12th Street to reduce the tidal flow. Merritt had the dam constructed mostly with his own money, and later the lake was deepened by dredging and a retaining wall was built around the lake's perimeter. The road around the lake was paved some time between 1907 and 1915.

After the lake was dammed its shores became an attractive real estate location. By the 1860s to 1870s, the perimeter of the lake was home to the city's wealthy residents who had large houses and boat

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[28] Historic Preservation Element, 1-9.
[29] Annalee Allen, *Oakland* (San Francisco: Arcadia Publishing, 2005), 109.
[30] Bagwell, 260-262.
[31] *Ibid*., 263.
[32] Historic Preservation Element, 1-9; Mayor Jerry Brown, "Oakland Now: State of the City Report 1999-2005" (Oakland: City of Oakland, 2006), 6, 8, 11.

houses on the lakeshore. The Camron-Stanford House was constructed in 1876 by Merritt and was one of the first of many stately homes that lined the lake.

<u>College of the Holy Names</u>

The subject property was first developed when the Convent of the Sacred Heart was constructed in 1868. Father Michael King, the priest of the Church of the Immaculate Conception, purchased the five-acre campus site in 1866 for $4,922.[33] Though the site on Lake Merritt was considered "far out in the country, wild and brush-covered," King envisioned a large convent and novitiate that would not fit on the city blocks near the church. Two years later, the two-and-a-half-story convent was built in time for the arrival of the Sisters of the Holy Names. An addition to the convent was constructed later that year; it likely contained additional living quarters and classrooms. In 1873, a four-story multi-purpose building was built to house the sisters' growing school, and a chapel was constructed in 1885.[34] An auditorium and music hall building was constructed in 1909.[35]

Figure 10. Sanborn Fire Insurance Map, 1899
Altered by author to show
approximate boundaries of subject property

According to the 1889 Sanborn Fire Insurance Maps, the area surrounding the subject property was sparsely developed with residential buildings. The blocks to the south included one and two-story single family dwellings, the larger more ornate homes were located near the lake and included guest houses and boat houses. The blocks to the north included a three-story single family dwelling, a one-story dwelling, and three one-story shed buildings.

In 1903, the area surrounding the subject property remained sparsely developed. The 1903 Sanborn Fire Insurance Map indicates the proposed Harrison Street at the edge of Lake Merritt. The blocks to

[33] "Site of College of the Holy Names" (n.d.), 1.
[34] One article puts the construction date of the four-story building at 1871. ("Negotiations Start for Purchase of Holy Names College Lakeside Campus" (*Oakland Tribune*, n.d.))
[35] *Ibid.*

the north included an old water tankhouse and a two-story dwelling. The blocks to the south include elaborate single-family residences. The block to the east of Alice Street included a large parcel with a two-story single family dwelling, outhouse and servants building, playhouse, boat house, outbuildings, arbor, and ornamental gardens. The block to the west of Alice Street included one- and two-story single-family dwellings.

In 1912, the area surrounding the subject property was primarily residential, with some industrial uses west of Franklin Street. The blocks to the north included a three-story apartment building on Harrison Street, one and two-story single family dwellings, and a Home for the Aged of the Little Sisters of the Poor. The blocks to the south of the subject property were occupied by apartment buildings and single family homes.

According to the 1950 Sanborn Fire Insurance Maps, the area surrounding the subject property was occupied by a mixture of commercial and residential buildings. The block to the north included a Buick car dealership and car-related businesses including a gas station, and auto repair. The block also included a Federal government building, small offices, a store, and multiple family apartment buildings as well as single family homes and a boarding house.[36]

<u>Purchase of the Kaiser Center Site</u>

By the mid-1950s, the Holy Names campus was considered close to downtown. Various commercial interests began to discuss the potential of purchasing the site, which covered a large parcel over a city block in area.[37] On June 27, 1955, Kaiser Industries acquired the Holy Names site for a reported sum of $2,560,000.[38] Kaiser had based his headquarters in Oakland since 1921 and at the time of the acquisition the main office was located at 1924 Broadway. After the sale, the College of the Holy Names was relocated to a hillside site at Redwood Road and Mountain Boulevard. The Kaiser Center site was cleared beginning on June 24, 1957.

C. Design of the Kaiser Center

<u>Kaiser Center Buildings</u>

From the beginning, Henry J. Kaiser, the magnate of the Kaiser industrial empire, intended to consolidate the Kaiser offices located around Oakland. Welton Becket and Associates, a Los Angeles

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[36] Sanborn Fire Insurance Map, Oakland, 1950, v 2, sheet 156.
[37] "Negotiations Start for Purchase of Holy Names College Lakeside Campus" (*Oakland Tribune*, n.d.)
[38] "Kaiser Buys College Site on Lake for Huge Project" (*Oakland Tribune*, June 28, 1955).

architecture firm that designed prominent office and hotel buildings, was hired as the project architect.[39] Welton Becket had recently designed Kaiser's Hawaiian Village, a resort in Honolulu, Hawaii; therefore the Kaiser Center appears to have been a continuation of their working relationship.

At the time of the commission, it had not been determined whether the Kaiser Center would be designed with a large footprint and low profile or as a tower.[40] In 1956, a model of the Kaiser Center was unveiled that showed the building configuration and design, including a twenty-five-story office tower and a hotel.[41] Kaiser had told Becket that the building should be "an outstanding piece of architecture…a showcase in the use of Kaiser products," and Becket complied.[42] The building employed 1,000 tons of anodized aluminum; 8,000 tons of steel; 60,000 cubic yards of concrete; 98,000 tons of aggregates and dolomite; and 250,000 yards of gypsum products from Kaiser Industries.[43] Aluminum alone was used in exterior curtain walls and as sheets, strips, fluted panels, and artwork.[44] As a result of these efforts, the Kaiser Center contained 80 percent Kaiser products or Kaiser raw materials.[45]

<u>Kaiser Center Roof Garden</u> [46]

The Kaiser Center roof garden is sometimes credited to Henry J. Kaiser, the magnate of the Kaiser industrial empire, who purportedly wanted a more pleasant view from his twenty-eighth-floor office than a rooftop parking lot. A later account credits Edgar F. Kaiser, Henry Kaiser's son, with the impetus for the garden as a semi-public park.[47] Edgar Kaiser had previously worked in a New York office that overlooked the Rockefeller Center roof gardens, and it is likely that his support of his father's idea helped make the roof garden a reality.

Whoever made the decision, it was made before construction on the Kaiser Center began; the top floor of the parking garage was not designed for parking, and plans for the garden were developed as early as 1956. References in Kaiser's papers include a proposal for a hotel overlooking a roof garden

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[39] Theodore Osmundson, Jr., "Kaiser Center Roof Garden" (*Landscape Architecture*, October 1962), 15; "I Want a Showcase" (*Oakland Tribune*, September 27, 1960), K-7.
[40] "Kaiser Buys College Site."
[41] "Raft Foundation for Kaiser Building" (*Oakland Tribune*, May 11, 1956).
[42] "I Want a Showcase" (*Oakland Tribune*, September 27, 1960), K-7.
[43] "Kaiser Center…A Kaiser Product" (Kaiser Center brochure, ca. 1964).
[44] Alfred Frankenstein, "Glass Curtain for Aluminum" (*San Francisco Chronicle*, September 27, 1960).
[45] "I Want a Showcase."
[46] Unless otherwise noted, all material in this section is drawn from the Historic American Landscape Survey (HALS) research material on the Kaiser Center Roof Garden.
[47] Theodore Osmundson, *Roof Gardens: History, Design, and Construction* (New York: W.W. Norton & Company, 1999), 92.

on the parking garage. A 1957 Kaiser press release announced that the garage roof would include an outdoor ice skating rink and an aluminum geodesic dome. The Oakland City Planning Commission approved the plans in April 1957. The Commission's approval was subject to three conditions, and the first two dealt with roof areas: "All roof areas up to and including the roof of the top floor will be properly landscaped…No tar and gravel roofs will be visible."[48] Perhaps as a tradeoff the commission granted variances on height and setback requirements, and part of Lake Merritt was filled for project-related street widening. However, regardless of the conditions placed on development, it appears the only roof area to be landscaped was the Kaiser Center Roof Garden.[49]

In 1956, the landscape firm Osmundson & Staley, that had previously completed work for Edgar Kaiser at his house in Lafayette, was recommended to design the roof garden. Osmundson & Staley assembled a project team that included Theodore Osmundson, John H. Staley, David Arbegast, John Sue, and Walt Guthrie.

Design of the Roof Garden

Associate David Arbegast served as the principal designer for the roof garden project. He produced twenty plans for the three-and-one-half-acre garden, which were reviewed by A. B. Ordway, Vice President of Kaiser Industries. Ordway was not in favor of the garden installation and rejected most of the original plans. Finally, he chose one design from the final three in 1959.

According to Staley, the garden plan was organized along a north-south axis running from the main garden entrance at the third floor of the 20th Street Mall across the reflecting pool to the central circular lawn and plaza.[50] The 16-inch-deep reflecting pool, which a 1960 *Oakland Tribune* article described as the approximate shape of Lake Merritt, was designed to contain water circulated by perimeter jets. Curving concrete walkways wound around the planting areas, which were mounded around the trees and in some lawn spaces.

All plans for landscaping, planting, grading, and irrigation were completed by John Sue. Sue added more graded mounds to Arbegast's original design, which was essentially flat save for mounds of soil around the trees. The garden's gently undulating landscape reflects this change. Sue left the firm before the garden installation was completed, and Walt Guthrie may have worked on the plans after Sue's departure from the firm.

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[48] "Initial Plans Approved for Giant Kaiser Center" (*Oakland Tribune*, April 11, 1957).
[49] No documentation was located which could clarify why only one of the three original conditions of approval was met.
[50] John Staley to Jack Rasmussen (KCI Public Relations, September 20, 1960), quoted in Historic American Landscape Survey (HALS) research material

Materials and Plants

Weight was a primary consideration in the roof garden design, as the Kaiser Center roof was not designed to support large loads. The roof had a load-bearing capacity of just 135 pounds per square foot, with a capacity of 15,000 pounds per square foot for the supporting columns and roof drains. To accommodate the limited capacity, a specialized version of the University of California's Basic Mix B (also called Soil Mix and Soiless) was developed by the U.C. Davis Soils Laboratory in concert with Osmundson & Staley. Developed to be lighter than ordinary soil and the original Basic Mix B, the mix substituted fine expanded shale for heavier sand. It also contained crushed lava rock, peat moss, and fertilizers. The soil mix proved effective at retaining air and water, maintaining an aerated growing medium.[51]

The load-bearing capacity affected the tree species chosen for the garden. The selected trees had fibrous root systems that can spread out horizontally. Forty-two olive, holly oak, Japanese maple, and southern magnolia trees were installed as "specimen trees" over load-bearing columns. Nearly 13,500 small flowering plants and shrubs in thirty varieties were planted around the garden.[52] Plants included 1,800 small shrubs (such as rhododendrons and azaleas), 735 rose bushes, and 10,700 ground cover plants.

The concrete paving, which covers about 30,000 square feet, was composed of lightweight materials with a surface of exposed Kaiser river gravel stained black with oxide. Benches in the garden were made of lightweight cement with white Kaiser Dolomite aggregate at the surface. The twenty-four large boulders included in the garden are lightweight pumice stone.

The garden was originally lit at night with walk lights, pedestal lights, and mercury vapor lights that highlighted the trees. Automatic underground irrigation was controlled by timers.[53]

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[51] Osmundson, *Roof Gardens*, 172.
[52] "Kaiser Center Features Aeriel [sic] Garden."
[53] "The View from Above" (*Architectural Review*, February 1964), 144.

Construction

Figure 11. Kaiser Center Roof Garden, ca. 1960. Kaiser Center Archives

John Staley supervised the roof garden installation. Loose construction materials such as soils and wet concrete were lifted by a construction elevator that filled vehicles waiting on the roof. Heavy equipment was restricted to paths on the grid line of supporting columns, and tractors, loaders, and spreaders were required to have rubber tires.

After the basic garden design was laid out on the roof's concrete surface, the garden was built up with layers of materials. Concrete forms were poured for elements such as the pond curbs. A four-inch layer of lightweight aggregate drain rock was spread over the entire roof surface to facilitate drainage. A filter layer of rice straw covered the rock layer, holding the soil in place until a natural structure developed.[54] Normal topsoil was used to cover relatively shallow areas such as lawns, which were six inches deep.[55] The lightweight U.C. mix was used to build the rolling landscape and tree mounds to depths of thirty inches.[56] Together, these soil types constituted six thousand cubic yards of fill. After plants were installed, fir bark chips were spread over planting beds and ground cover.

Drainage was an important consideration. Every other supporting column contained a downspout that led to a storm sewer in the basement.[57] When the garden was installed, the existing roof drains were extended upward to be flush with the roof garden grade. Where that was not possible, a new catch basin was installed at the low point and the water was piped to a roof drain.

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[54] Ibid.
[55] Ibid., 93.
[56] "Landscaping is distinctive" (*Oakland Tribune*, September 27, 1960), 32-K.
[57] Osmundson, "Kaiser Center Roof Garden."

Cranes lifted trees to the roof. The trees were placed over supporting columns, as these were the only places that could support their weight. They were planted in their plank delivery boxes, which formed part of a wood subsurface bracing system that made visible guylines unnecessary. The designers expected a natural subsurface system to stabilize the trees by the time the bracing decayed.

The 3½-acre roof garden atop the parking garage opened to the public on October 3, 1960.[58] One reporter marveled, "One has no sense of being on a roof at all, but in a small park from which the immense, skyward lunge of Becket's building can be seen…"[59] The Kaiser Center roof garden received early recognition: in 1962, the American Society of Landscape Architects awarded the garden the Industrial Landscape Design award.[60] The garden was documented by a variety of publications, including *Sunset* magazine, *Landscape Architecture*, and *Landscape Design and Construction*. Overall, the garden was highly regarded by landscape architects, and was the center piece of the Kaiser Center complex.

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[58] "'Park in the Sky' to Open at Kaiser Center" (*Oakland Tribune*, October 2, 1960).
[59] Frankenstein.
[60] Osmundson, "Kaiser Center Roof Garden."

D. Construction Chronology

<u>Kaiser Center Buildings</u>

Construction of the steel-frame, aluminum-and-glass-clad Kaiser Center began in May 1958 and was completed in late 1959.[61] Final construction costs reached $46 million, and Henry Kaiser could boast of having the largest building west of Chicago, with 976,000 square feet of space.[62] The first employees moved into the office tower on December 20, 1959.[63] The Kaiser Center officially opened on September 27, 1960.[64] It included a twenty-eight-story office tower, with three basement levels; a three-story department store; and a five-level, 1,200-car parking garage.

Figure 12. Kaiser Center, ca. 1960. Kaiser Center Archives

Ordway Building

By 1967, the growth of the Kaiser industries created the need for additional office space.[65] An office tower was planned to the north of the existing tower. The twenty-eight-story new tower was called the Ordway Building after A. B. Ordway, the vice president of Kaiser Industries.[66] Designed by Skidmore, Owings & Merrill, construction of the Ordway Building began in 1968 and was completed in 1970. The building cost $30 million and, like the Kaiser Center, employed Kaiser products extensively.[67]

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61 "Kaiser Center" (likely Kaiser publication, received in Oakland Public Library on August 14, 1959); "Twenty-Eight Stories High" (*Oakland Tribune*, January 7, 1959); "New Kaiser Center" (*San Francisco Examiner*, August 27, 1959).
62 "New Kaiser Center"; "Glass Curtain for Aluminum" (*San Francisco Chronicle*, September 27, 1960); "Gross Area Near Million Square Feet" (*Christian Science Monitor*, October 16, 1959).
63 "Kaiser Starts Move to New Headquarters" (*Oakland Tribune*, December 20, 1959).
64 "Glass Curtain for Aluminum."
65 "City Hails Kaiser's New High Rise" (*Oakland Tribune*, August 20, 1967).
66 "A. B. Ordway Opens New Building Named for Him" (*Oakland Tribune*, February 28, 1971).
67 "New Kaiser Tower – 28 Stories High" (*Oakland Tribune*, September 5, 1968); "Pedestrian Bridge" (*Oakland Tribune*, August 9, 1970); "Ordway Building Vital Statistics" (*Oakland Tribune*, February 28, 1971).

Master Plans

Even before the Ordway Building opened, the consulting firm of Cushman & Wakefield was engaged to prepare a long-range plan for the Kaiser Center.[68] The plan, released in early 1971, recommended an $85 million expansion project including a third office tower, motor hotel, engineering center, and a combined industrial museum and library.[69] No new construction resulted from the Cushman & Wakefield plan, likely due to an economic slowdown.

More master plans were developed for the Kaiser Center complex in 1982 and 1987. Both master plans saw a natural growth for an office campus in the form of additional skyscraper office towers connected with pedestrian walkways, roof top gardens, and sky bridges. According to the 1987 document, "The Master Plan builds on the unique quality of the existing complex and provides the framework to make Kaiser Center one of the world's finest corporate urban centers."[70]

Figure 13. Master Plan Model, 1986. Kaiser Center Archives

The 1987 Master Plan completed by David Stringer & Associates of Honolulu, Hawaii called for the addition of four major towers connected to the existing Kaiser Center with a large pedestrian plaza. The Master Plan recommended closing vehicular access to 21st, 22nd, and Kaiser Plaza and creating the Kaiser Center as a pedestrian-oriented office park. The Ordway Building, at the center of the planned development, was envisioned to become the focus of the plaza. In addition to new construction, the Master Plan also called for the remodeling of the Mall Buildings. However, these master plans were never realized.

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68 John Dengel, "Kaiser Plans Major Expansion" (*Oakland Tribune*, April 28, 1970).
69 Bill Martin, "Kaiser Maps $85 Million Expansion" (*Oakland Tribune*, February 28, 1971).
70 Kaiser Center, Inc., *Kaiser Center Master Plan.* 1986.

Later Alterations

In the 1990s, the lobby of the office tower was renovated according to designs by Charles F. Jennings, Architect. The lobby renovations included new marble wall cladding, removal of the aluminum finishes in the elevators, enclosures for the escalators, the insertion of a new circular fountain in the escalator enclosure, and the replacement of hanging pendant lighting fixtures in the lobby and first floor retail at the office tower.

In 2003, Summit Commercial, a Los Angeles real estate company, acquired the Kaiser Center for $100 million.[71] Swig Company of San Francisco purchased the Kaiser Center in 2005 for $200 million.[72] The Kaiser Center remains in use as a commercial complex with a central office tower with retail at the first floor, a three-and-four-story parking garage with Roof Garden, and two Mall Buildings with retail and office space.

<u>Mall Buildings</u>

Designed for the White House Department Store, the Mall Buildings were vacated by the original tenant early in their history; the White House was replaced by the Joseph Magnin Department Store in 1961. In 1965, the Joseph Magnin Department Store was replaced by multiple tenants. After the Loma Prieta Earthquake, repairs and cosmetic changes were made to the Mall Buildings. Charles F. Jennings, Architect designed the alterations which included aluminum covers over the columns; granite veneer tile, aluminum fins and canopies above the entries of both buildings; and a new pyramidal roof above a portion of the 20th Street Mall Building. Over time the Mall Buildings have been occupied by retail shops, an airline center, banks, restaurants, and office space. Due to the changes in use, the Mall Buildings have undergone significant interior alterations due to tenant improvements.

20th Street Mall

According to building permits, tenant improvements affecting the interior of the 20th Street Mall took place in 1965, 1966, 1978, 1981, 1989, 1990, 1993. Such extensive interior remodeling is characteristic of commercial spaces that commonly change use over time. Exterior alterations at 344 20th Street took place as early as 1966, when the owners received a permit to install new canopies at 20th Street, Webster Street, and the Driveway entry. In April 1966, the owners received a permit to

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[71] "Oakland's Landmark Kaiser Center Is Sold" (*San Francisco Chronicle*, March 19, 2003).
[72] "Swig Co. of S.F. Acquires Kaiser Center in Oakland" (*San Francisco Chronicle*, June 16, 2005).

add new windows at the 3rd floor. Both of the 1966 improvements were designed by Welton Becket and constructed by MacDonald & Nelson, builders.

The 20th Street Mall Building was damaged in the 1989 Loma Prieta Earthquake and exterior changes included the repair and replacement of elements damaged in the earthquake. These damaged elements included: exterior soffits, the trellis at the roof of the 20th Street Mall, and a stairwell.

Webster Street Mall

According to building permits, tenant improvements affecting the interior of the Webster Street Mall took place in 1961, 1963, 1972, 1979, 1981, 1985, 1986, 1987, 1991. According to building permits, the 20th Street Mall underwent exterior changes as early as 1961 when the building was remodeled by architect Victor Gruen to serve as the Joseph Magnin department store. The owners received a permit to remove existing glass windows in 1981. In 1982, the owners received a permit to insert automatic teller machines (ATMs) into the exterior walls.

<u>Kaiser Center Roof Garden</u>

The original design included a semicircular wood and aluminum garden shelter and an aluminum and concrete bridge across the reflecting pool. These elements were not built when the garden was installed in 1960. A wooden bridge was constructed across the pool sometime between 1973 and 1975.

Around 1967, an interpretive sign was installed showing the garden plan and a list of plants. In 1974, a storage shed was added to the HVAC and elevator housing building. A handicap access ramp may have been added at that time. The 1989 Loma Prieta earthquake damaged some garden walks, which were repaired.[73] A few trees have been replaced.[74]

E. Office Center Development on Lake Merritt

The construction of the Kaiser Center marked the beginning of the expansion of the city's office center from downtown Oakland to the shores of Lake Merritt. Prior to the Kaiser Center, nearly all large commercial buildings were centered on Broadway and between 11th and 20th Streets.

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[73] Osmundson, *Roof Gardens*, 171.
[74] *Ibid.*, 171.

According to the *Architect & Engineer*, "Kaiser Center, just southeast of downtown, is in itself a second skyline slightly stronger than the first."[75] The Kaiser Center marked the first development of modern high-rise office towers on the northwest shore of Lake Merritt. The Ordway Building (1970), also constructed by Kaiser was built across Merritt View Place from the Kaiser Center, and the buildings were connected by a sky bridge. Other modern office buildings were constructed in the area including the twenty-seven-story Lake Merritt Plaza (1986) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s, including the twenty-five-story Kaiser Engineering Building (1984) and the twenty-story Pacific Bell Building (1985), are located on prominent intersections in the immediate area.

F. Henry J. Kaiser

Henry J. Kaiser was born to German immigrants on May 9, 1882 on a farm in upstate New York.[76] Kaiser grew up as the youngest of four children, and the only boy. He quit school at age 13 and found a job at a dry-goods store in a nearby town. Three years later, he began working in a photography studio, and invested in his own studio in Lake Placid, New York, in 1901. At the age of 19, he moved to Florida, where he managed several photography studios until his future father-in-law, lumberman Edgar Fosburgh, commanded him to go west in 1906. Kaiser, hoping for the hand of Bess Fosburgh after he had established himself in a more "substantial" business than photography, went west.

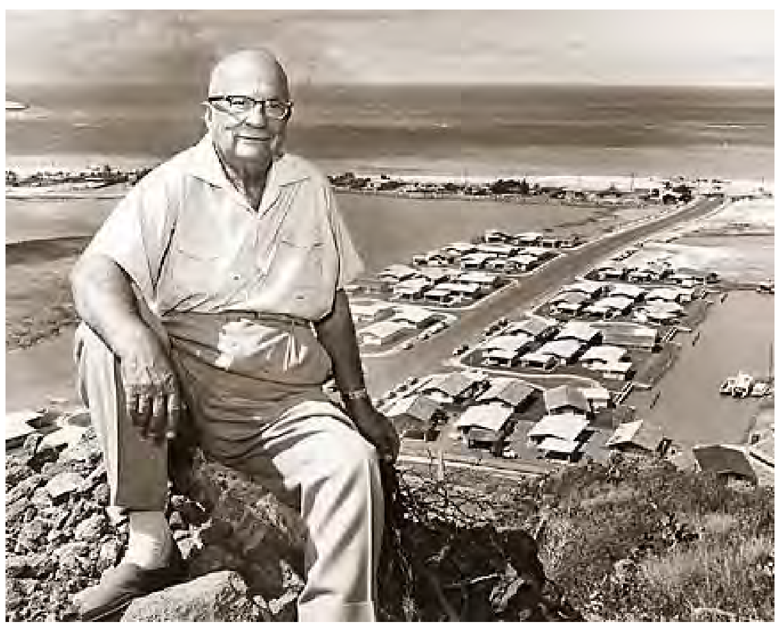

Figure 14. Henry J. Kaiser, *Honolulu Star Bulletin*

He landed in a hardware store in Spokane, where he worked for four years. Kaiser and Bess Fosburgh were married in 1907, and their son Edgar was born in 1908. In 1910, Kaiser joined a fuel company, then a construction company in

[75] "Lakeside Colossus," *Western Architect and Engineer* 1.1 (December 1960): 17.
[76] Mark S. Foster, *Henry J. Kaiser: Builder in the Modern American West* (Austin, TX: University of Texas Press, 1989).

1911. The construction company built roads, providing Kaiser with the experience he would need to open a road-paving contracting business in Vancouver in 1914.

It was a good time to be in the paving business. The U.S. passed a federal highway bill in 1916, creating the beginning of the national highway system. State and local governments followed the national lead and funded many road improvements, especially in areas beyond town limits where roads were often rutted and unpaved. Americans bought cars and took to the open road in droves. Kaiser prioritized speed, quality, and constant improvement in his work and soon won paving contracts in Washington, Oregon, California, and even Cuba. In 1921 he located the headquarters of his growing company in Oakland, California.

By the late 1920s, Kaiser won contracts to lay pipeline for natural gas companies in the southern Great Plains. He also began building dams, steady business during the otherwise bleak Depression-era economy. His first project was the Hoover Dam; later, he was involved in building the footings for the Bay Bridge.

After Kaiser lost the contract for the Shasta Dam in 1938, he launched a cement company to provide the raw materials for building the dam. This was his first foray into manufacturing durable goods. By 1942, when World War II broke out, he was preparing to compete in magnesium, steel, aircraft, and shipping.

Kaiser opened shipyards in Richmond, California and Portland, Oregon in 1940 and 1941, with yards built at Ryan Point in Vancouver, Washington and Swan Island in Portland, Oregon in 1942. The shipyards first built British ships but later turned out American ships at a prodigious rate, launching one Liberty Ship per month out of Richmond. Competition between the Kaiser shipyards helped break production records, and improvements in shipbuilding techniques also contributed. Kaiser further developed the British subassembly method of prefabricating parts of ships apart from the ship's hull. He also took lessons from the Ford assembly method to achieve greater efficiency and worker productivity. Furthermore, to help meet the demand for steel for shipbuilding, Kaiser moved into the steel business.

Kaiser anticipated peacetime needs and quickly moved to adapt his wartime ventures to meeting those needs. His steel plant produced overtime, shipping steel to Los Angeles and San Francisco. In 1945, the Kaiser Permanente Medical Care Program which was formerly offered to shipyard workers, opened enrollment to the general public. Kaiser began constructing steel-frame homes through

Kaiser Community Homes, a project that lasted only a few years. He coordinated the manufacture of automobiles and cargo planes, increased magnesium production, and launched a successful aluminum business.

In 1954, Henry Kaiser moved to Hawaii, where he became involved in building hotels, beaches, a new city, a hospital, and a cement plant. He also invested in radio and television in the islands. Edgar F. Kaiser took over the management of the Kaiser empire when his father "retired" to Hawaii.[77] Henry Kaiser died in 1967, but the success of Kaiser Industries continued. By the early 1980s, Kaiser Companies were successful multi-national businesses with highly diversified interests ranging from aluminum and steel to engineering to television broadcasting to real estate development.

G. Welton Becket

Welton Becket was born in Seattle on August 8, 1902.[78] He was determined to be an architect at an early age, and studied architecture at the University of Washington. After his graduation in 1927, Welton Becket studied at the École des Beaux Arts, Fontainebleau, for a year, and then worked several years as a junior designer for firms in Los Angeles and Seattle. He settled in Los Angeles permanently in 1933, forming a partnership with established Los Angeles architect Charles F. Plummer and Washington classmate Walter Wurdeman. The trio gained considerable local publicity with their design for the Pan Pacific Auditorium in 1935, which won a large international competition and facilitated their entry into Hollywood film circles. The following years saw a series of residential commissions for movie stars such as James Cagney, Cesar Romero, and Robert Montgomery. These were generally executed in traditional Period Revival styles.

Incorporated as Wurdeman and Becket after Plummer's death in 1939, the firm prospered and expanded during the World War II era, completing public housing and defense projects and positioning themselves well for the region's post-war construction boom. A commission to build the widely-publicized House of Tomorrow in 1943 in Los Angeles helped highlight the firm.

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[77] "Edgar F. Kaiser, 1908-1981" (Oakland Symphony Program, February 1982).
[78] William Dudley Hunt, Jr., *Total Design* (San Francisco: McGraw-Hill Book Company, 1972).

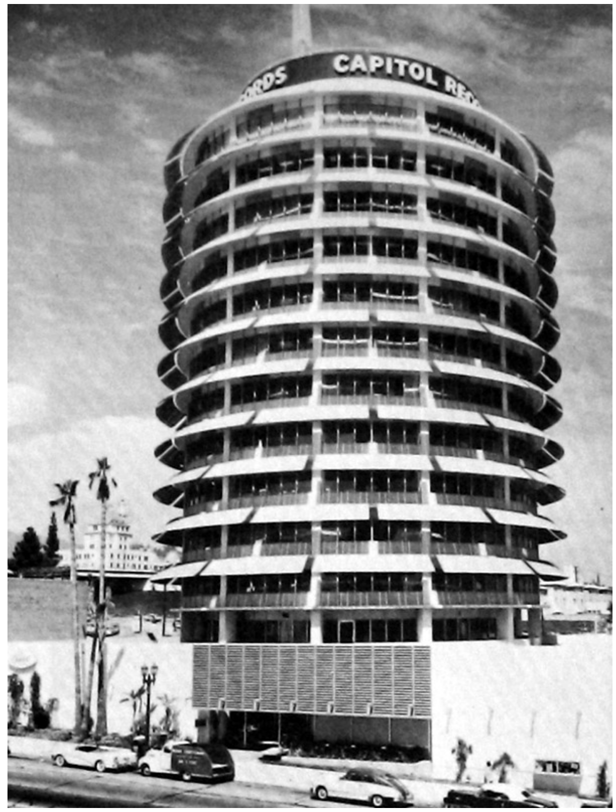

Figure 15. Capitol Records Building.
Progressive Architecture.

Now focused on larger commercial and office projects, Wurdeman and Becket's work of the mid- to late-1940s took on aspects of the Late Moderne and International styles. Their best-known commissions included Bullock's Department Store in Pasadena (1944) and office buildings for General Petroleum (1946) and Prudential Insurance (1947) in Los Angeles. These projects soon led to others as the firm expanded its reputation, capacity, and experience in designing many building types.

Following Wurdeman's untimely death in 1949, Becket took over sole leadership of the firm as Welton Becket and Associates. It grew to be one of the largest architectural firms in the United States, with headquarters in Los Angeles and offices in San Francisco, New York, Houston, and Chicago. Welton Becket and Associates completed numerous high-profile projects around Los Angeles, including such icons of mid-twentieth century Modernism as the Capitol Records Building (1954-56) and the Cinerama Dome, the world's first concrete geodesic dome (1963-1964). The firm was also responsible for the Beverly Hilton Hotel (1955), Memorial Sports Arena (1959), Los Angeles International Airport Theme Building (1962, with Pereira & Luckman and Paul R. Williams), and the Federal Office Building in Los Angeles (1966, with Paul R. Williams and A.C. Martin & Associates).

In addition to the Kaiser Center, commissions in the San Francisco Bay Area included a variety of building types, primarily office buildings and shopping centers. Office buildings in San Francisco include the Bethlehem Steel Company Headquarters Building at 100 California Street (1959) and the Aetna Life and Casualty Company Building at 600 Market Street (1969). The Stonestown Mall, the firm's first shopping center, was located in San Francisco. Stonestown Mall was designed in 1949 and "pioneered the concept of the large regional shopping center with stores clustered around a central mall."[79] The Hillsdale Shopping Center in San Mateo was completed in stages during 1954-1967. Despite later alterations, the Hillsdale Shopping Center retains its original pedestrian mall. The Stanford Shopping Center in Stanford was completed in 1957. The Serramonte Center in Daly City (1967) was a contemporary suburban shopping center which features an enclosed, pedestrian mall. Other commissions in the Bay Area included 'The Meadows,' a planned unit development in Lucas Valley, Marin County (1965); and the Cathedral at the Crossroads in Castro Valley, Alameda County (1969).

Welton Becket was named master planner for UCLA in 1948 and continued as supervising architect for the campus until 1968. At UCLA, Becket worked closely with Ralph D. Cornell (later Cornell, Bridgers and Troller), supervising landscape architect for the campus, and the companies collaborated on a number of independent projects, such as the Pomona Civic Center and the Ford Motor Company in Dearborn, Michigan.

While working with Walter Wurdeman in the 1930s, Becket embraced the philosophy of "total design," which guided the firm's approach thereafter. He encouraged clients to allow the firm to control all aspects of a design, including master/site planning, engineering, all interior work, finishes, fixtures, and landscaping, so that a unified and coherent building would be achieved.

Becket died in 1969, and his son MacDonald Becket assumed leadership of the firm. In 1987, Ellerbe Associates acquired Welton Becket Inc. to become Ellerbe Becket Inc. The firm continues today as Ellerbe-Becket.[80]

H. Theodore Osmundson, Landscape Architect

Theodore Osmundson received a degree in Landscape Architecture from Iowa State University in 1943. Along with Douglas Baylis, Robert Royston, and Lawrence Halprin, Osmundson worked in the office of Thomas Church in San Francisco in the 1940s and was a part of the first generation of Bay Area modern landscape architects. In the 1950s, he became a partner in the firm of Osmundson & Staley of Berkeley. In the 1960s, Osmundson and his son, Gordon, were principals in the firm Theodore Osmundson & Associates. Osmundson's projects included urban parks, institutional grounds, residences, and office parks. In addition to the Kaiser Center Roof Garden, likely his most

[79] Ibid, 13.
[80] This biography is excerpted from the Historic American Building Survey of the Los Angeles Music Center prepared by Teresa Grimes. It was obtained through the Music Center/Performing Arts Center of Los Angeles County (http://www.musiccenter.org/about/wb.html, accessed June 16, 2008).

important commission, Osmundson also designed the roof garden for the Standard Oil Building in San Francisco, the roof garden for the Pacific Telephone and Telegraph Company in Sacramento; Marine World in Redwood City; and a master plan for the California State University, Chico campus. In 1967, he was elected president of the American Society of Landscape Architects (ASLA), and was the youngest person at that time to assume the responsibility. He served as ASLA president until 1979. He received the ASLA medal in 1983 and the ASLA president's medal in 1987. He has taught at the University of California at Berkeley and Harvard and has lectured extensively. Publications by Osmundson include major sections of the *Reader's Digest Practical Guide to Home Landscaping* 1972, "Roof and Deck Landscapes" in *Time-Saver Standards* (1988), *Roof Gardens* (1990), and many articles in *Landscape Architecture*.[81] In 1999, Osmundson's book *Roof Gardens: History, Design, and Construction* was published.

I. Modern Office Towers

After World War II as before the war, office towers in America continued to search for new heights. The corporate world of post-War America, which had been spurred on by new ideas and innovation, manifested itself in unabashedly modern glass and steel towers. The masonry cladding and exuberant ornamentation which was common in earlier office buildings such as the Empire State Building in New York City (1931) and the Tribune Tower in Oakland (1923) was replaced by glazed curtain walls and a Modern design aesthetic which eschewed nearly all ornamentation. The forward-looking designs conjured up efficiency, cleanliness, organization and standardization, and were considered suitable icons for 1950s corporate America.

Figure 16. Crown Zellerbach Building, ca. 1959.
National Trust Guide: San Francisco

[81] William A. Mann, *Landscape Architecture: An Illustrated History in Timelines, Site Plans, and Biography* (Hoboken, NJ: John Wiley & Sons, 1993), 360.

The Lever House (1951) designed by Gordon Bunshaft of Skidmore, Owings, and Merrill in New York City was an early archetypal example of the International style commercial high rise. The building featured many elements characteristic of the Modern style. The building included a podium for its mezzanine offices, which created a courtyard at the ground level. The main slab of the building rose vertically, clad in glass and chrome. The building had nearly identical fenestration; the only variation was the expression of mechanical areas with a different glazing pattern. Common variations of commercial skyscrapers included *pilotis* or structural columns at the first floor, effectively raising the volume and creating a courtyard area; and concrete or aggregate panel cladding, especially at secondary façades.

<u>Modern Office Towers in the San Francisco Bay Area</u>

The San Francisco Bay Area followed the commercial office tower trend during the post-war era as evidenced by the number of Modern skyscrapers constructed in the area. One of the earliest and most significant commercial buildings constructed during this time in San Francisco's Financial District was the Crown Zellerbach Building at 1 Bush at Market Street which was completed in 1959, the same year as the Kaiser Center. Designed by Hertzka & Knowles and Skidmore, Owings, and Merrill, the nineteen-story building was the first International style glass curtain wall tower in San Francisco. The services were located in a mosaic tile clad tower. Utilities, elevators, and stairways were located in the attached service tower which allowed the office floors to be entirely open and free of columns. The building is set in a triangular landscaped plaza with a circular one-story building used for branch bank operations.

Like many office buildings across the United States including the Kaiser Center, the Crown Zellerbach building followed the basic tenets of Modern office building architecture and exhibited common design features, such as a park-like landscaped plaza, columns at the first floor elevating the mass of the building, geometrical massing, an emphasis on verticality, glass curtain walls with uniform bays, sparingly used masonry veneer cladding, and relatively few decorative details.

J. Modern Bay Area Landscape Architecture

In the late 1930s and 1940s, a group of landscape architects led by Thomas Church began to formalize the practice of landscape architecture in the San Francisco Bay Area. The first generation of Bay Area modern landscape architects included Church, Robert Royston, Dan Kiley, James Rose, and Garret Eckbo, as well as Douglas Baylis, Robert Royston, and Lawrence Halprin, and Theodore Osmundson, who all worked in the office of Thomas Church in San Francisco in the 1940s.

The influence of Thomas Church and his contemporaries led to the creation of the California Style, which continues to dominate the practice of modern landscape architecture in the Bay Area. The California Style emphasizes the concept of indoor/outdoor living achieved by gardens that "appeared as subtle extensions of the architecture into the landscape."[82] Modern landscape designs in the Bay Area were created in attempts to unite aesthetic and functional requirements to provide useable landscaped spaces for inhabitants. This concept broke with the tradition of earlier garden design history, where designers often focused on collections of species and aesthetics, instead of functionality and space.[83] Typical characteristics of modern landscape design include: the use of simple materials such as brick and concrete, geometrically-shaped lawns, curvilinear paths, the use of undulating topography to create movement through the site, hierarchical circulation, terraces, trimmed hedges, shrubs, specimen trees, and pools.[84]

The majority of the designs by modern landscape architects in the early years of the movement were for private residential gardens. However, as the influence of modern landscape architecture and the California Style dispersed, modern landscape architects were commissioned to design larger-scale projects for institutional clients including universities, cities, and private companies such as Kaiser.

[82] Dorothee Imbert, "Thomas Church: Defining Styles—The Early Years" *Studies in the History of Gardens & Designed Landscapes* vol. 20(2) (Summer 2000), 96.
[83] Marc Treib, "Introduction" *Studies in the History of Gardens & Designed Landscapes* vol. 20(2) (Summer 2000), 93.
[84] Imbert, 103.

VI. EVALUATION

A. California Register of Historical Resources

The California Register of Historical Resources (California Register) is an inventory of significant architectural, archaeological and historical resources in the State of California. Resources can be listed in the California Register through a number of methods. State Historical Landmarks and National Register-eligible properties are automatically listed on the California Register.[85] Properties can also be nominated to the California Register by local governments, private organizations or citizens. This includes properties identified in historical resource surveys with Status Codes of 1 to 5 and resources designated as local landmarks through city or county ordinances. The evaluative criteria used by the California Register for determining eligibility are closely based on those developed for use by the National Park Service for the National Register. In order for a property to be eligible for listing in the California Register, it must be found significant under one or more of the following criteria:

> *Criterion 1 (Event)*: Resources that are associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.
>
> *Criterion 2 (Persons)*: Resources that are associated with the lives of persons important to local, California, or national history.
>
> *Criterion 3 (Architecture)*: Resources that embody the distinctive characteristics of a type, period, region, or method of construction, or represent the work of a master, or possess high artistic values.
>
> *Criterion 4 (Information Potential)*: Resources or sites that have yielded or have the potential to yield information important to the prehistory or history of the local area, California or the nation.

<u>Criterion 1 (Events)</u>

The Kaiser Center appears to be eligible under Criterion 1 (Events) as a complex that reflects "events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States." In this case, the event is the influence of the Kaiser Industries on the history of California and the West Coast. As the only remaining headquarters building of Kaiser Industries, the multinational corporation that influenced the World War II war effort, infrastructure in California, and throughout the West Coast, and changed the health care industry, the Kaiser Center is a significant landmark testifying to an important industrial

[85] National Register-eligible properties include properties that have been listed on the National Register, and properties that have formally been found eligible for listing.

institution that helped Oakland remain a significant site of commercial and industrial activities in the post-War era.

The complex is also significant as a reminder of the expansion of Oakland's Downtown office core to include Grand Avenue and Lake Merritt. The Kaiser Center led the expansion of the downtown office core to include Lake Merritt. The Kaiser Center was the first modern commercial skyscraper complex to be located on Lake Merritt. Other modern office towers were located on the lake, including the Ordway Building (1970), the twenty-seven-story Lake Merritt Plaza (1986) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s which are located on prominent intersections in the immediate area.

Criterion 2 (Persons)

The Kaiser Center appears eligible for the California Register under Criterion 2 (Persons) for its association with Henry J. Kaiser. Kaiser is significant as an innovative industrialist with a larger than life personality who built more ships than any other builder during World War II, completed massive construction projects like the Hoover Dam, headed the first company to manufacture steel on the West Coast, and developed a health care organization for workers that became a model for Health Maintenance Organizations (HMOs) across the country. Kaiser was influential in the design of the Kaiser Center; purportedly telling the management team and the architects to "double it" when asked his opinion of the proposed size of the building. Kaiser is also frequently credited for the creation of the roof garden. Additionally, Kaiser held his offices, where he oversaw his multitude of companies and had an apartment at the 27th floor of the building. While many of Kaiser's industrial buildings, such as the shipyards in Richmond, and Portland, Oregon, and ten Kaiser Aluminum fabrication facilities still exist in the United States, the Kaiser Center in Oakland is the only remaining corporate headquarters connected to Kaiser Industries. Kaiser's earlier Oakland headquarters building, at 1924 Broadway, was demolished in the 1990s and therefore the Kaiser Center is an important building that expresses the importance of Oakland as the world headquarters of Kaiser Industries.

Criterion 3 (Architecture)

The Kaiser Center appears eligible for the California Register under Criterion 3 for embodying the distinctive characteristics of the Modern style. The Kaiser Center is a well-preserved example of the style as applied to a corporate headquarters complex. Characteristic features of the complex include its variety of building types: office tower, retail wings, and parking garage all designed as a coordinated whole; its site in a landscaped plaza with views to Lake Merritt. The complex appears as a strong horizontal base that is contrasted by a vertical office tower. The office tower features structural piers elevating the building's mass above the plaza, a mezzanine podium at the base, a T-shaped plan, a sweeping curved façade, flat roof, polychrome aluminum and glazed wall surfaces, aggregate concrete panels at secondary facades, and standardized bays with little variation. The Mall Buildings are completed in the same style and feature rectangular plans, flat roofs, structural piers elevating the building's mass above the first floor, and dolomite panel cladding. The materials used throughout the complex were selected to showcase the variety of Kaiser manufactured materials including aluminum and dolomite.

The Kaiser Center is also important as a designed office and retail complex, with an office tower, retail, landscaped open space, and parking incorporated on one site. Kaiser's headquarters was not envisioned as solely an office building, but as a group of associated buildings and landscapes that were intended to be used by both Kaiser Industries employees and Oakland community members.

In addition to being an example of a type, the Kaiser Center is also significant as the work of a master, Welton Becket & Associates. Welton Becket & Associates was an important modernist architecture firm working throughout the United States. The firm specialized in corporate headquarters, hotels, and cultural centers and was the largest architecture firm in the United States in the 1950s. The Kaiser Center is an excellent example of Welton Becket's work for corporate clients, who relied upon the firm to embody the corporation's philosophy in physical form. Welton Becket's design for the Kaiser Center showcases not only the materials produced by Kaiser Industries but also the characteristics Kaiser Industries were known for: innovation, in the use of a curved façade; and concern for employee well-being embodied in the inclusion of a roof garden.

The roof garden is significant for its design and as the largest contiguous roof garden in North America at the time of its construction. The garden features many of the hallmarks of modern landscape design including undulating topography, curvilinear pathways, geometrically shaped lawns, simple materials such as concrete pathways, planters, and benches; trimmed hedges, shrubs, specimen trees, and an asymmetrical pool. The design by Osmundson & Staley is indicative of the Bay Area Modern landscape architecture popularized by designers such as Thomas Church, Robert Royston, and Lawrence Halprin. The Kaiser Center roof garden by Osmundson & Staley exemplifies the mid-century California Style first popularized by Church and his contemporaries in the 1940s. The California Style emphasized the importance of indoor/outdoor living and relied heavily on a modern landscape architectural vocabulary to achieve this effect. The decision to include a roof garden as part of the Kaiser Center complex marked an important recognition of the potential of the roof garden to create a more healthful and attractive office environment within the city.

Criterion 4 (Information Potential)

The analysis of the Kaiser Center for eligibility under California Register Criterion 4 (Information Potential) is beyond the scope of this report. This Criterion is typically reserved for archeological resources, and therefore it is not evaluated as part of this report.

Integrity

The process of determining integrity is similar for both the California Register and the National Register. The California Register uses the same seven variables, or aspects of a property, to define integrity as the National Register: location, design, setting, materials, workmanship, feeling and association. According to the National Register Bulletin, *How to Apply the National Register Criteria for Evaluation*, these seven aspects of integrity are defined as follows:

- **Location** is the place where the historic property was constructed.
- **Design** is the combination of elements that create the form, plans, space, structure and style of the property.
- **Setting** addresses the physical environment of the historic property inclusive of the landscape and spatial relationships of the building/s.
- **Materials** refer to the physical elements that were combined or deposited during a particular period of time and in a particular pattern of configuration to form the historic property.
- **Workmanship** is the physical evidence of the crafts of a particular culture or people during any given period in history.
- **Feeling** is the property's expression of the aesthetic or historic sense of a particular period of time.
- **Association** is the direct link between an important historic event or person and a historic property.

The Kaiser Center

Office Tower

The Kaiser Center office tower retains a high degree of integrity of location, setting, design, materials, workmanship, feeling, and association. The property remains situated on its original lot with the same access pattern, site layout, and designed and natural landscape features as when the building was first constructed. The driveway, access walks, rooftop garden, and foot paths around the property remain largely unchanged, or with similar designs in new materials.

The building has had minimal modifications to the exterior since construction. The office building retains original exterior finishes and materials. The building remains in office use, and retains the appearance and feeling of a mid twentieth-century Modern office building. The lobby underwent a renovation in the mid-1990s and many changes were made including the replacement of wall cladding, enclosing the escalator and inserting a new circular fountain, new lighting, and interpretive panels. Despite these changes, the lobby's double height space, second floor mezzanine, and central escalator retain a sense of the original space. The majority of the tower's public spaces have been retained other than the original cafeteria space which has been converted to tenant office space. The interior public spaces, such as hallways, have retained many character-defining features including polished stone paneled walls or terrazzo walls, terrazzo floors, spray acoustical ceilings, glazed aluminum storefronts and period hardware. The interior of the office spaces have been altered over time to accommodate tenant needs. However, the offices retain the characteristic curve, and the windows and exterior walls remain unchanged. Some of the offices retain original features such as aluminum partition wall systems, ribbed aluminum doors, and perforated aluminum ceiling tiles.

Mall Buildings

The Mall Buildings retain a high degree of integrity of location, setting, design, workmanship, feeling, and association. The Mall Buildings remain in their original location and their setting remains intact. The interior of the buildings have been substantially altered due to tenant improvements, but the exterior of the buildings have undergone few substantial alterations which were typically limited to storefront alterations, changes in signage, and the installation of ornament above the entrances. Overall, the Mall Buildings retain sufficient integrity to convey their historical significance.

Roof Garden

The Kaiser Center Roof Garden retains a high degree of integrity of location, setting, design, materials, workmanship, feeling, and association. The only additions to the garden appear to have been the bridge over the pool which was incorporated in the design in the 1970s. The cooling tower and elevator shaft building which is an eighteen foot building with a flat roof, stucco cladding, and paired metal doors remains intact. Many of the original hardscape design components of the garden remain intact including the low perimeter walls, aggregate paths, planters, benches, and an original water fountain. While many of the plant materials have been replaced over time, the replacement plantings have been consistent with the original design and have not compromised the garden's historic integrity.

The "Fifty Year Rule"

In order to be determined eligible for listing in the National Register, resources less than fifty years of age must be shown to have "exceptional importance." This is not the case with the California Register. According to the California Office of Historic Preservation:

> In order to understand the historic importance of a resource, sufficient time must have passed to obtain a scholarly perspective on the events or individuals associated with the resource. A resource less than fifty years old may be considered for listing in the California Register if it can be demonstrated that sufficient time has passed to understand its historical importance.[86]

The Kaiser Center is just under fifty years of age, but the complex has exceptional importance for its association with the expansion of Oakland's office core to include Lake Merritt, with Kaiser Industries, with Henry J. Kaiser, and for its Modern design. The Kaiser Center is significant as the first Modern skyscraper in Oakland on the shore of Lake Merritt. The complex is also significant for its connection to Henry J. Kaiser and Kaiser Industries as the headquarters of Kaiser Industries. The complex is also significant for its design including the building's Modern design, use of Kaiser Industries products, and as an example of the work of Welton Becket & Associates. The Kaiser Center Roof Garden is significant as the largest contiguous roof garden in North America at the time of its construction, as an example of Bay Area modern landscape architecture, and is significant for its association with landscape architects Osmundson & Staley.

B. Character-Defining Features

For a property to be eligible for national or state designation under criteria related to type, period, or method of construction, the essential physical features (or character-defining features) that enable the property to convey its historic identity must be evident. These distinctive character-defining features are the physical traits that commonly recur in property types and/or architectural styles. To be eligible, a property must clearly contain enough of those characteristics to be considered a true representative of a particular type, period, or method of construction, and these features must also retain a sufficient degree of integrity. Characteristics can be expressed in terms such as form, proportion, structure, plan, style, or materials.

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[86] California Office of Historic Preservation, *How to Nominate a Resource to the California Register of Historical Resources*, 11.

The character-defining features of the Kaiser Center include, but are not limited to:

Office Tower

- Site on Lake Merritt
- Site Landscaping
- Height
- Massing
- T-shaped plan
- Curved main façade
- Curtain walls
- Polychrome aluminum cladding
- Aggregate wall panels
- Interior aluminum detailing, including but not limited to: original aluminum doors, elevator bank walls, perforated aluminum ceiling tiles
- Interior aggregate panels
- Terrazzo floors

Mall Buildings

- Height
- Massing
- Rectangular plans
- Aggregate wall panels
- Appearance of main massing of the buildings "floating" above the first floor
- Terrazzo floors

Roof Garden

- Axial plan (north-south axis from 20th Street Mall garden entrance to central lawn)
- Central lawn with surrounding curvilinear paths
- Low perimeter wall with concrete base and aluminum railing
- Irregularly shaped pool
- Curvilinear aggregate walkways
- Raised planters
- Irregular-shaped lawns
- Original furnishings including benches and water fountain

- Undulating topography
- Perimeter plantings (creating a buffer of privacy)

C. Significance Diagrams

Please see Significance Diagrams in Appendix C.

This section discusses a series of diagrams illustrating the relative zones of significance present at the Kaiser Center. For the purposes of this analysis, Page & Turnbull surveyed the building, including all exterior façades and public interior spaces, and evaluated their relative significance by placing them in three categories: Primary Significant (Primary), Secondary Significant (Secondary) and Non-Contributing. These categories are defined below.

Primary Significant

Definition: Spaces, elements or materials characterized by a high degree of architectural significance and a high degree of historic integrity.

Preliminary Guideline: All primary significant exterior and interior features and materials should be retained and preserved, or where alterations have occurred, be restored. Deteriorated materials shall be repaired rather than replaced. Where replacement is necessary due to extensive material deterioration or failure, replacement materials shall match the original materials and forms.

Secondary Significant

Definition: Elements characterized by a lesser degree of architectural significance, yet retain a high degree of historic integrity, or historically important, yet altered elements.

Preliminary Guideline: It is recommended that secondary significant elements be retained wherever possible. Where required, alterations and additions shall be designed to be compatible with the existing elements and materials. New materials and assemblies at reconstructed areas shall be similar to the original.

Non-Contributing

Description: Non-Contributing elements are generally non-historic elements or elements that have been altered to the extent that their original character is absent.

Preliminary Guideline: Non-Contributing elements are not specifically limited by preservation recommendations, except to note that the overall character of alterations to an historic building must meet the general requirements set forth in the *Secretary of the Interior's Standards.*

Please see Significance Diagrams in Appendix C.

VII. Evaluation of Project-Specific Impacts under CEQA

This section will analyze the project-specific impacts of the proposed project on the environment, as required by CEQA. Included as part of this evaluation is an examination of the Proposed Project pursuant to the *Secretary of the Interior's Standards for the Treatment of Historic Properties*.

A. Status of Existing Property as a Historic Resource under CEQA

In the City of Oakland, an historical resource under CEQA is a resource that meets **any** of the following criteria:

1) A resource listed in, or determined to be eligible for listing in, the California Register of Historical Resources;

2) A resource included in Oakland's Local Register of historical resources (defined below), unless the preponderance of evidence demonstrates that it is not historically or culturally significant;

3) A resource identified as significant (e.g., rated 1-5) in a historical resource survey recorded on a Department of Parks and Recreation Form 523, unless the preponderance of evidence demonstrates tat it is not historically or culturally significant;

4) Meets the criteria for listing on the California Register of Historical Resources; **or**

5) A resource that is determined by the City Council to be historically or culturally significant even though it does not meet the other four criteria listed here.

The City of Oakland's Local Register (Historic Preservation Element Policy 3.8) includes the following:

- All Designated Historic Properties (Landmarks, Heritage Properties, Study List Properties, Preservation Districts, and S-7 and S-20 Preservation Combining Zone Properties ; and
- Those Potential Designated Historic Properties that have an existing rating of A or B or are located within an Area of Primary Importance.[87]

[87] Public Resources Code Section 21084.1, citing sections 5020.1(k) and 5024(g); CEQA Guidelines section 15064.5; Oakland's Historic Preservation Element.

Based on our analysis, (pages 7-9, 40-45) the Kaiser Center appears to qualify as a historical resource under CEQA.

B. Determination of Significant Adverse Change under CEQA

According to CEQA, a "project with an effect that may cause a substantial adverse change in the significance of an historic resource is a project that may have a significant effect on the environment."[88] Substantial adverse change is defined as: "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historic resource would be materially impaired."[89] The significance of an historical resource is materially impaired when a project "demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance" and that justify or account for its inclusion in, or eligibility for inclusion in, the California Register.[90] Thus, a project may cause a substantial change in a historic resource but still not have a significant adverse effect on the environment as defined by CEQA as long as the impact of the change on the historic resource is determined to be less-than-significant, negligible, neutral or even beneficial.

C. Compliance with the Secretary of the Interior's Standards for Rehabilitation

The Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines for Rehabilitating Historic Buildings (Standards) provide guidance for reviewing proposed work on historic properties.[91] The Standards are used by Federal agencies in evaluating work on historic properties. The Standards have also been adopted by local government bodies across the country for reviewing proposed rehabilitation work on historic properties under local preservation ordinances. The Standards are a useful analytic tool for understanding and describing the potential impacts of substantial changes to historic resources. Conformance with the Standards does not determine whether a project would cause a substantial adverse change in the significance of an historic resource. Rather, projects that

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[88] CEQA Guidelines subsection 15064.5(b).
[89] CEQA Guidelines subsection 15064.5(b)(1).
[90] CEQA Guidelines subsection 15064.5(b)(2).
[91] W. Brown Morton III, Gary L. Hume, Kay D. Weeks, and H. Ward Jandl, *Secretary of the Interior's Standards for Rehabilitation & Illustrated Guidelines for Rehabilitating Historic Buildings* (Washington, D.C.: U.S. Department of the Interior, National Park Service, Cultural Resources, Preservation Assistance Division, 1992). The *Standards*, revised in 1992, were codified as 36 CFR Part 68.3 in the July 12, 1995 Federal Register (Vol. 60, No. 133). The revision replaces the 1978 and 1983 versions of 36 CFR 68 entitled *The Secretary of the Interior's Standards for Historic Preservation Projects*. The 36 CFR 68.3 *Standards* are applied to all grant-in-aid development projects assisted through the National Historic Preservation Fund. Another set of *Standards*, 36 CFR 67.7, focuses on "certified historic structures" as defined by the IRS Code of 1986. *The Standards* in 36 CFR 67.7 are used primarily when property owners are seeking certification for Federal tax benefits. The two sets of *Standards* vary slightly, but the differences are primarily technical and are not substantive in nature. The *Guidelines*, however, are not codified in the Federal Register.

comply with the Standards benefit from a regulatory presumption that they would have a less-than-significant adverse impact on an historic resource.[92] Projects that do not comply with the Standards may or may not cause a substantial adverse change in the significance of an historic resource. The following analysis applies each of the Standards to the proposed project.

The Secretary of the Interior offers the following four sets of Standards to guide the treatment of historic properties: Preservation, Rehabilitation, Restoration, and Reconstruction. According to the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, the four distinct treatments are defined as:

> **Preservation**: The *Standards for Preservation* "require retention of the greatest amount of historic fabric, along with the building's historic form, features, and detailing as they have evolved over time."
>
> **Rehabilitation**: The *Standards for Rehabilitation* "acknowledge the need to alter or add to a historic building to meet continuing new uses while retaining the building's historic character."
>
> **Restoration**: The *Standards for Restoration* "allow for the depiction of a building at a particular time in its history by preserving materials from the period of significance and removing materials from other periods."
>
> **Reconstruction**: The *Standards for Reconstruction* "establish a limited framework for re-creating a vanished or non-surviving building with new materials, primarily for interpretive purposes."[93]

Typically, one set of standards is chosen for a project based on the project scope. In this case, the proposed project scope includes altering Kaiser Center to meet the evolving use of the complex while retaining its character-defining features. Therefore, in the case of this project affecting the Kaiser Center, the *Standards for Rehabilitation* should be applied, and the Guidelines for Rehabilitating Historic Buildings should be followed.

D. Proposed Project Description

The proposed project includes the redevelopment of portions of the Kaiser Center site. The project would add approximately 1,474,992 square feet of new development. The project includes the demolition of the 20th Street and Webster Street Mall Buildings which comprise approximately 280,002 square feet of retail/commercial space. The project includes the construction of two towers:

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[92] CEQA Guidelines subsection 15064.5(b)(3).
[93] Kay D. Weeks and Anne E. Grimmer, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (Washington, D.C.: U.S. Department of the Interior, 1995), 2.

a thirty-four-story tower (436 feet) with an irregularly shaped footprint at the northeast corner of Webster and 20th streets, and a forty-two-story tower (566 feet) at the southeast corner of Webster and 21st streets. These proposed additions are largely consistent with earlier master plans that envisioned the Kaiser Center as a campus of office towers.

The proposed project would also include the construction of approximately 22,500 square feet of ground floor retail and an addition of 828 parking spaces. The 122,606 square foot roof garden located above the parking garage and Mall Buildings would be reconfigured, removing approximately 18,369 square feet in the Webster and 21st Street corner and adding 22,933 square feet along 20th Street. Approximately 15,157 square feet of the garden, in the Webster and 20th Street corner, would be a reconstruction. The garden would have a net gain of 4,564 square feet, and the proposed project provides for the inclusion of a grand staircase accessing the roof garden from 20th Street, which would improve public access to the garden. The project sponsor is also planning to increase access to the roof garden through the new office towers. Please see **Figures 17 and 18** below for details of the alterations and additions to the Roof Garden.

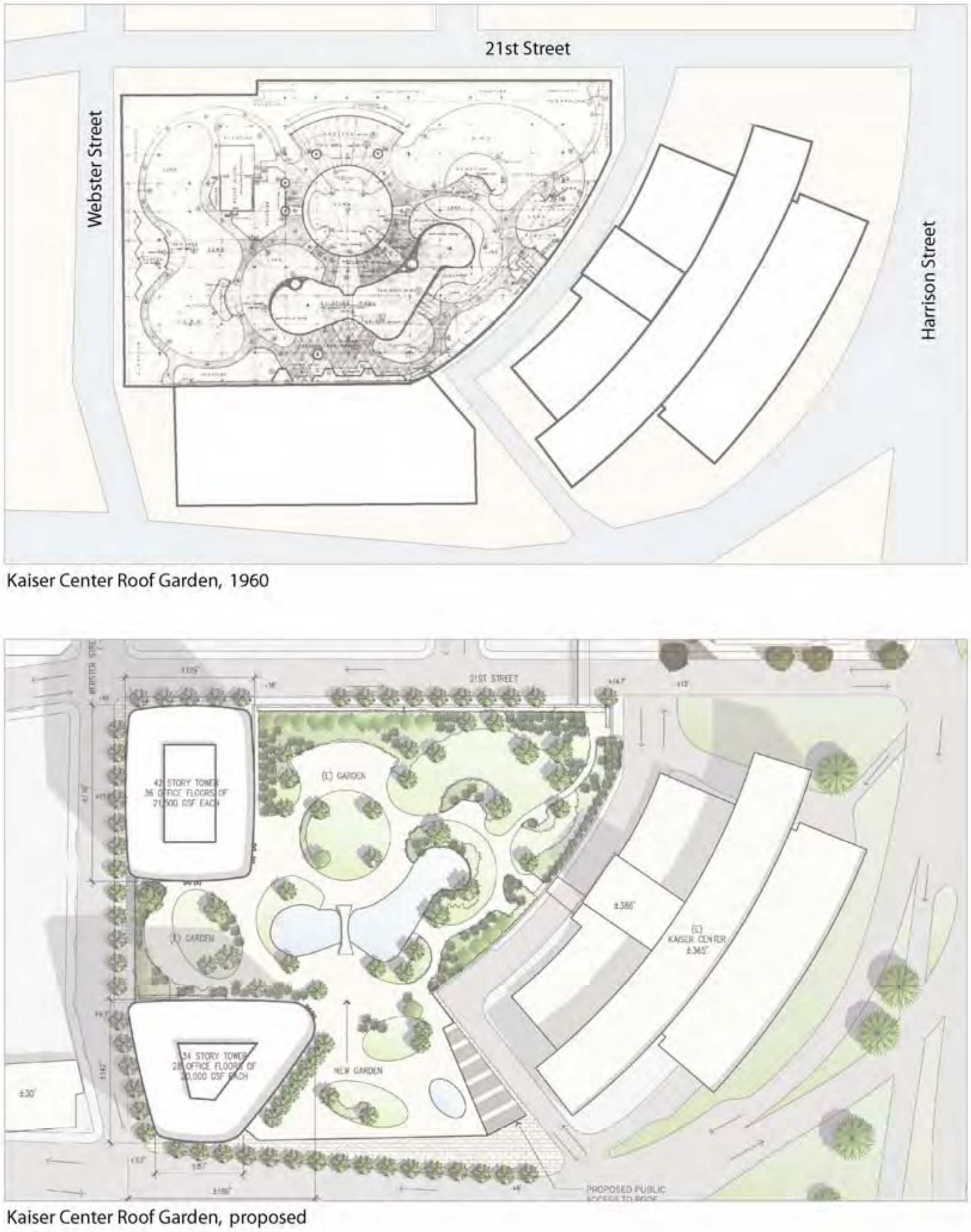

Figure 17. Comparison of original and proposed Roof Garden site plan

Figure 18. Site plan showing the proposed alterations and additions to the Roof Garden. SOM, altered by the author

E. Compliance with the Secretary of the Interior's Standards for Rehabilitation

This section evaluates each element of the proposed project (Office Tower, Mall Buildings, Garage, and Roof Garden) for compliance with each of the 10 rehabilitation standards in the *Secretary of the Interior's Standards for Rehabilitation*.. Architectural drawings of the proposed project by Skidmore, Owings & Merrill dated March 14, 2008 were used in this analysis (**see Appendix F: Proposed Project Drawings**).

> **Rehabilitation Standard 1**: *A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.*

The Kaiser Center office tower would retain its historic use as office space, and this portion of the complex would not undergo any changes to its materials, features, spaces, or spatial relationships.

The Mall Buildings would be demolished and two new office towers would be constructed on the site. While the new towers would feature retail on the ground floor as is currently present in the Mall Buildings, the Mall Buildings themselves would be demolished, destroying their materials, features, spaces and spatial relationships including the height, massing, rectangular plans, dolomite wall panels, terrazzo floors, and the appearance of the main massing of the buildings "floating" above the first floor.

The parking garage would retain its original use as a parking garage, and would remain intact.

The Kaiser Center Roof Garden would remain a publicly accessible passive recreational space that would be privately owned and managed. At the garden level, the new south office tower would occupy part of the 20th Street Mall footprint at the southwest corner of the property, while the new north tower would replace the HVAC structure and a portion of the existing garden in the northwest corner of the property. A new grand staircase at the south façade would increase public access to the roof garden. Although the overall size of the roof garden would be increased and would have a greater level of public access, construction of the north tower in particular would require demolition of a portion of the existing historic roof garden, and would introduce new garden area, requiring changes to some of the garden's distinctive materials, features, spaces, and spatial relationships. Increased shadow from the new towers would alter the climate of the roof garden. The proposed new towers would also obscure some existing views of the historic Kaiser Center office tower from certain public viewpoints, as well as views from the garden looking west toward Downtown Oakland.

The project sponsor intends to retain as many of its character-defining features of the garden as possible, including its axial plan, central lawn with surrounding curvilinear paths, low perimeter wall with concrete base and railing, irregularly shaped pool, curvilinear aggregate walkways, raised planters, irregular-shaped lawns, original furnishings, undulating topography, and perimeter plantings. Regardless, construction of two towers would substantially impact the roof garden.

The proposed project would include the demolition of the Mall Buildings and construction of two towers, which would require a substantial change to a portion of the Kaiser Center's distinctive materials, features, and spatial relationships.

Therefore, the proposed project does not comply with Rehabilitation Standard #1.

> **Rehabilitation Standard 2**: *The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize the property will be avoided.*

The Kaiser Center Office Tower would remain intact. The proposed project would retain the historic character of the office tower and would not remove or alter and features, spaces or spatial relationships that characterize the property.

The Mall Buildings would be demolished and two new office towers would be constructed on the site. The demolition of the mall buildings would remove distinctive materials, features, spaces and spatial relationships that characterize this portion of the property.

The parking garage would retain its original use as a parking garage, and this portion of the property would remain intact.

The Roof Garden would be altered, but the majority of the garden would remain intact. The 122,606 square foot roof garden would be reconfigured, removing approximately 18,369 square feet in the Webster and 21st Street corner and adding 22,933 square feet along 20th Street. Approximately 15,157 square feet of the garden, in the Webster and 20th Street corner, would be a reconstruction.

The garden would have a net gain of 4,564 square feet, for a total garden size of 127,170 square feet when completed. While the project sponsors intend to create a new roof garden design that would be differentiated from the original roof garden, yet compatible with existing historic fabric, the proposed new towers would also alter views of Downtown Oakland from the roof garden, and would add new shadow resulting in a change to the garden's climate.

The proposed project calls for the removal of the two Mall Buildings and a portion of the roof garden, which would remove distinctive materials, features, spaces and alter the spatial relationships of the Kaiser Center complex.

Therefore, as designed the proposed project does not comply with Rehabilitation Standard #2.

> **Rehabilitation Standard 3**: *Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historical properties, will not be undertaken.*

The proposed project is still in the early design phases, and would need to undergo further review as the design develops. However, the project sponsor intends that the proposed project would not feature alterations or additions that would create a false sense of historical development and that new construction would be undertaken in a manner that clearly differentiates new features from the existing.

The new roof garden area, at the southern edge, would be differentiated from the original roof garden yet compatible with existing historic fabric and design. For example, the new portion of the garden could be differentiated by plant materials, paving materials, etc. while still maintaining a connection to the original Modern landscape design. While the existing Office Tower currently shades portions of the roof garden, the proposed towers would create new shadows on the garden, which could further affect all existing and proposed plant materials. In accordance with Mitigation Measure 2.0 (discussed below), and as a condition of approval, an historic landscape expert shall be retained to ensure that character-defining features of the garden are preserved; and that the design of the new portion of the garden is compatible but differentiated from the original portion of the garden. Shade-tolerant plantings may also need to be selected for the new garden design.

If the proposed project meets these conditions, then it would comply with Rehabilitation Standard #3.

Rehabilitation Standard 4: *Changes to a property that have acquired significance in their own right will be retained and preserved.*

The Kaiser Center has undergone few alterations, including remodeling the lobby of the Office Tower, remodeling the original cafeteria in the Office Tower to serve as tenant office space, tenant improvements at the Mall Buildings, and storefront remodeling, signage, and ornamentation at the entrances of the Mall Buildings. None of these alterations have acquired significance in their own right. Therefore, as designed, the proposed project would be in compliance with Rehabilitation Standard #4.

Rehabilitation Standard 5: *Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.*

The Kaiser Center Office Tower would remain intact. The proposed project would retain the distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize this portion of the property.

The Mall Buildings would be demolished and two new office towers would be constructed on the site. The demolition of the Mall Buildings would remove the distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize this portion of the property.

The parking garage would remain intact. No changes are proposed to the parking garage.
The Roof Garden would be altered, but the majority of the garden would remain intact. A portion of lawn and walkway in the northwest corner of the roof garden would be demolished and replaced by an office tower. The portion of the roof garden to be removed is relatively small (18,369 square feet or less than 15 percent of the total garden in square feet). Approximately 15,157 square feet portion of plantings, lawn and walkway near the southwest corner of the extant garden over the Webster Street Mall would be demolished and reconstructed between the new towers. A new garden area, at the southern edge of the garden fronting on 20th Street, would be differentiated from the original roof garden yet compatible with existing historic fabric. Despite these interventions, approximately 85 percent or about 104,237 square feet of the original garden would be retained. New shadows on the garden from the proposed new towers would affect all existing and proposed plant materials.

The demolition of the two Mall Buildings would adversely impact the Kaiser Center since it would remove distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize the property. Although demolition of the Mall Buildings does not comply with the Standards, the impact on the resource may be lessened if the character and feeling of the original Mall Buildings could be interpreted in the design of the base of the new structures. In a letter dated November 20, 2008, Turner Construction Company has stated that reuse of the existing dolomite panels as part of the new structures is infeasible due to the manner in which the panels were attached to the Mall Buildings during their original construction in the 1960s (please also see Appendix B of this report). Staff reviewed the report, completed a site inspection, and agreed with the report's conclusion that the dolomite panels cannot be reused. Mitigation Measure 1.1, below, requires that the project sponsor redesign the base of the proposed new towers to retain the character and qualities of the original Mall Buildings.

As proposed, the project would not comply with Rehabilitation Standard #5.

> **Rehabilitation Standard 6**: *Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.*

The majority of the Kaiser Center complex is in excellent condition, but where repair is needed, this standard would be followed. According to Rehabilitation Standard #6, deteriorated historic features should be repaired rather than replaced. If severe deterioration makes replacement necessary, in-kind replacements would be used. There is ample documentation for the repair and/or replacement of deteriorated features and/or the replacement of missing features.

As per the Turner Construction report, the dolomite panels 'as-built' precludes their reuse; therefore, the project sponsor should incorporate into the design of the new buildings wall cladding that is of comparable character and quality as the dolomite panels, if not the actual materials (see Mitigation Measure 1.1, below).

As designed, the proposed project would be in compliance with Rehabilitation Standard #6.

> **Rehabilitation Standard 7**: *Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.*

The proposed project does not include chemical or physical treatments. Therefore, Rehabilitation Standard #7 is not applicable.

> **Rehabilitation Standard 8**: *Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measure will be undertaken.*

The proposed project would include excavation as part of the construction of the office towers. The site has already been excavated for the current buildings, but if any archeological resources are encountered during this work, construction would be halted and a proper analysis undertaken by qualified specialists to comply with Rehabilitation Standard #8.

> **Rehabilitation Standard 9**: *New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work shall be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and environment.*

The Office Tower would remain intact and the historic materials and features of this portion of the property would not be damaged by the new additions. The proposed new towers would, however, alter the existing tower's spatial relationship to the Kaiser Center, as it would no longer be the only tall building at the Kaiser Center.

The Mall Buildings would be demolished to allow for the construction of the two new office towers. Therefore, the new additions would destroy the historic materials, features and spatial relationships of this portion of the property.

The Parking Garage would remain intact. No changes are proposed to the parking garage and this portion of the property would not be damaged by the new additions.

A portion of the Roof Garden would be removed and replaced by a new office tower, another portion would be removed and reconstructed, and the garden would be expanded to the south as part of the project. A portion of the roof garden would be destroyed by the new additions. The proposed new towers would also obscure some views of Downtown Oakland from the garden. The spatial relationship between the garden and the existing office tower would be altered with the introduction of two new towers, creating a new garden 'wall' on the western side of the garden where none exists currently.

The proposed project includes two new office towers and an addition to the roof garden at the 20th Street edge. The new additions would destroy some historic features, materials and spatial relationships, including both Mall Buildings and a portion of the roof garden.

The new garden area would be differentiated from the original roof garden yet compatible with existing historic fabric. As part of the design process for the buildings, an historic landscape expert must be retained to ensure that character-defining features of the garden are preserved; and that the design of the new portion of the garden is compatible but differentiated from the original portion of the garden (see Mitigation Measure 2.0).

As design details for the new office towers are lacking, it is unknown whether the proposed new towers would be differentiated from the Kaiser Center office tower, yet compatible in terms of materials, features, size, scale and proportion, and massing.

The proposed project calls for the removal of the two Mall Buildings which would adversely impact the Kaiser Center complex since it would destroy historic materials including the Mall Buildings' character-defining features and the historic spatial relationships between the Mall Buildings and the Office Tower and the Roof Garden and the Office Tower that characterize the complex.

Therefore, the proposed project does not comply with Rehabilitation Standard #9.

> **Rehabilitation Standard 10**: *New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.*

The proposed project includes the addition of two office towers and the demolition of the two Mall Buildings and a portion of the roof garden. If the new additions were removed in the future, the essential form and integrity of the historic resource, the Kaiser Center complex, would be impaired since the Mall Buildings and a portion of the roof garden would have been removed as part of the project. The removal of the Mall Buildings and a portion of the Roof Garden would be irreversible in terms of historic materials.

Therefore, the proposed project does not comply with Rehabilitation Standard #10.

Conclusion

We conclude that the proposed project as currently designed does not conform to Standards 1, 2, 5, 9, 10 of the *Secretary of the Interior's Standards for Rehabilitation.*

F. Analysis of Project Specific Impacts under CEQA

As the above analysis demonstrates, the project as it is currently designed would not comply with the *Secretary of the Interior's Standards for Rehabilitation*. Provided below is an analysis of the proposed project's potential impacts to historic architectural resources in terms of CEQA criteria (determination of significant adverse impact).

Impact 1.0 – The proposed project would demolish the Mall Buildings, which are components of a qualified historical resource on the project site (Conservatively deemed Significant and Unavoidable because the project lacks design details)

The proposed project would demolish the two Mall Buildings, which are components of a qualified historic resource. Demolition is considered to be a significant adverse impact, since it would materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the federal, state, and local registers. The physical characteristics of the Mall Buildings that would be materially altered by the project would include the Mall Buildings' height, massing, rectangular plans, dolomite wall panels, the appearance of main massing of the buildings "floating" above the first floor, the strong, solid horizontally-oriented band at the base of the tower, the relationship between the tower building's exterior finishes with the base of the complex, and the terrazzo floors. Mitigation Measures 1.1 to 1.3 described below would help reduce the significance of the impact to historic architectural resources. However, because design details are not yet available, this impact is conservatively identified (i.e., worst case scenario) as significant and unavoidable. Specifically, this is a Preliminary Development Plan application and the project sponsor has not prepared or submitted detailed architectural designs of the proposal for consideration by the City. Without those details, the impact must conservatively be determined to be significant and unavoidable at this point. The final, approved design may mitigate the impacts to less than significant levels, but such cannot be determined at this time.

Policy 3.8.1 of the Historic Preservation Element (HPE) of the City of Oakland General Plan states that measures appropriate to mitigate significant effects to an historic resource may include one or more of the following depending on the extent of the proposed addition or alteration:

1) Modification of the project design to avoid adversely affecting the character-defining elements of the property.
2) Relocation of the affected Historical Resource to a location consistent with its historic or architectural character.

If the above measures are not feasible, then other measures may be considered including, but not limited to the following:

3) Modification of the project design to include restoration of the remaining historic character of the property.
4) Modification of the project design to incorporate or replicate elements of the building's original architectural design.
5) Salvage and preservation of significant features and materials of the structure in a local museum or within the new project.
6) Measures to protect the Historical Resource from effects of on-site or other construction activities.
7) Documentation in a Historic American Buildings Survey report or other appropriate format: photographs, oral history, video, etc.
8) Placement of a plaque, commemorative marker, or artistic or interpretive display on the site providing information on the historical significance of the resource.
9) Contribution to a Facade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource.

The following provides a list of measures appropriate to mitigate significant impacts to the historic resource:

***Mitigation Measure 1.1. The sponsor shall modify the design of the base of the new structures to retain the existing street level design and character, and shall prepare a salvage program*:** The sponsor shall modify the design of the base of the new tower structures to retain the existing street level design and character of the Mall Buildings, which include its height, massing, flat roofs, dolomite panels, the strong, solid horizontally-oriented band at the base of the tower "floating" above the first floor, the relationship between the Office Tower's side exterior dolomite panels with the Mall Building's side exterior dolomite panels, and the terrazzo floors. Other than the terrazzo floors, the majority of the remaining historic fabric is expressed on the exterior of these buildings. This mitigation would satisfy Policy 3.8.1 (1) of the Historic Preservation Element of the City of Oakland General Plan (Modification of the project design to avoid adversely affecting the character defining elements of the property).

Historic features such as dolomite panels and terrazzo flooring are easily replicated. All replicated elements should retain the character and quality of the original design, but not necessarily the individual physical elements of the dolomite panels themselves. In addition, the modified design would not be required to retain the precise dimensions of the existing Mall Buildings, but rather, should allow reasonable flexibility in their interpretation, consistent with this report and the purpose of the mitigation measure. Retention of the quality and character of the Mall Buildings could reduce the impact on the environment to a less than significant level. However, because design details are not yet available, and it is therefore unknown whether the proposed project would meet *Secretary of the Interior's Standard*s described above, this impact is conservatively deemed to be significant and unavoidable at this time.

The project sponsors shall also undertake a salvage program to save and reuse historically significant materials and features from the Mall Buildings at the site, such as terrazzo flooring, or possibly other materials or features not yet identified herein. As such the project sponsors shall conduct a full survey of *all* historic architectural elements and elements suitable for re-use at the site, develop a reuse/salvage plan, whose goal is to maximize reuse of materials at the site, and submit such for Landmarks Preservation Advisory Board (LPAB) consideration. The LPAB would make advisory recommendations either to the Planning Commission or Development Director. The applicant shall implement the approved plan. Implementation of a salvage program would satisfy Policy 3.8.1 (5) of the Historic Preservation Element of the City of Oakland General Plan (Salvage and preservation of significant features and materials of the structure in a local museum or within the new project). While salvage and reuse of historic materials would help to reduce the impact of the loss of the Mall

Buildings, the impact to historic resources is conservatively considered to be significant an unavoidable at this time since design and salvage details are not yet available.

Impacts to historic resources could be mitigated to a less-than-significant level if the project sponsor modifies the design of the base of the new structures to retain the existing street level design and character in accordance with the *Secretary of the Interior's Standards*, and completes the salvage program. However, because these activities have not yet been completed, the impact is conservatively deemed to be significant and unavoidable.

Mitigation Measure 1.2. HABS /HALS Level Recordation: The project sponsor shall complete a recordation of the Kaiser Center which meets the requirements of the National Park Service's Historic American Buildings Survey (HABS) and the Historic American Landscape Survey (HALS). A complete set of HABS/HALS documentation typically consists of a set of measured drawings (or a copy of original drawings if available), large-format black and white photographs, and a written history. A complete set of the HABS/HALS recordation photos, drawings, and report should be presented to following repositories:

- Library of Congress
- Oakland History Room at the Oakland Public Library.
- Oakland Heritage Alliance, and
- Oakland Cultural Heritage Survey.

This mitigation would satisfy Policy 3.8.1 (7) of the Historic Preservation Element of the City of Oakland General Plan (Documentation in a Historic American Building Survey report or other appropriate format: photographs, oral history, video, etc.)

While applications of HABS/ HALS efforts are common mitigation strategies used to reduce the significance of an adverse impact to historic resources, they do not alter the loss to community character and collective history. Section 15126.4(b)(2) of the Public Resources Code is clear in this regard: "In some circumstances, documentation of an historical resource, by way of historic narrative, photographs or architectural drawings, as mitigation for the effects of demolition of the resource will not mitigate the effects to a point where clearly no significant effect on the environment would occur."

Mitigation Measure 1.3. Financial Contributions to the Oakland Façade Improvement Program: If Mitigation Measure 1.1 is not satisfied, the project sponsors shall make a financial contribution to the City of Oakland, which can be used to fund other historic preservation projects at the project site or in the immediate vicinity. This mitigation would satisfy Policy 3.8.1.(9) of the Historic Preservation Element of the City of Oakland General Plan (Contribution to a Façade Improvement Fund, the Historic Preservation Revolving Loan Fund, the Oakland Cultural Heritage Survey, or other program appropriate to the character of the resource. Contributions to the fund shall be determined by staff based on the linear feet of the facades to be demolished. Potential preservation projects that may benefit from the fund could include, without limitation; 1) an update of the Lake Merritt Historic District survey and/or Lake Merritt historic context statement., or, 2) physical improvements to potential contributor(s) to the District so that they may become a formal contributor in the future, or improvements to existing contributor(s) that are currently in a state of disrepair. However, such financial contribution, even in conjunction with Mitigation Measure 1.2 (HALS/HABS Recordation), would not reduce the impacts to less than significant levels. Thus, the impact would remain significant and unavoidable if Mitigation Measure 1.1 is not satisfied.

The City of Oakland would not impose Mitigation Measure 1.3 (financial contribution) if the project sponsors can demonstrate through the subsequent submission and review and approval by the City (with review by the LPAB) of design modifications to the proposed project that they would meet the requirements of Mitigation Measure 1.1. For conservative purposes, however, and because no such designs are currently available for review, Mitigation Measure 1.3 is included in this document.

Impact 2.0 – The proposed new construction would affect remaining portion of the qualified historic resource on the project site (Conservatively deemed Significant and Unavoidable because the project lacks design details).

The proposed project would retain the Kaiser Center Office Tower, the majority of the Kaiser Center Roof Garden, and the Parking Garage, and construct two new commercial towers on the site of the existing Mall Buildings. The new construction would affect the resource's integrity of setting, since the Mall Buildings would be removed and the view corridor from the west on 21st Street to the rear of the Office Tower would be altered by the construction of the new commercial towers. The new construction would remove a portion of the historic roof garden and introduce new garden area. The impacts to the resource's setting and roof garden design are considered to be significant adverse impacts, since new construction would impact the character-defining features of the historic resource. Mitigation Measure 2.0, described below, would help reduce the significance of the impact to historic architectural resources by modifying the project design to ensure that new additions to the Kaiser Center would be designed to relate to the architectural and landscape character, spatial relationships, and organizing principles of the existing design. (See Mitigation Measure 2.0, below). However, because design details are not yet available, this impact is conservatively identified as significant and unavoidable.

Mitigation Measure 2.0. Historically-Sensitive Roof Garden Design: The project sponsor shall ensure that a qualified Landscape Architect familiar with landscape history and historic resources designs a roof garden addition that is differentiated from the old and compatible with the historic design to protect the integrity of the historic roof garden, specifically with respect to the following character-defining features of the garden; the viability of the plant palette under new shadows and altered micro-climate created by the proposed new towers; the north-south axial plan, curvilinear shaped lawns, and curvilinear aggregate pathways, original furnishings, undulating topography, irregularly shaped pools, and raised planters. Since the Kaiser Center Roof Garden was included in articles in many landscape architecture journals at the time of its construction, historic images of the roof garden are easily located. The landscape plan shall be submitted the LPAB for review and approval. The LPAB would make advisory recommendations either to the Planning Commission or Development Director, and the Applicant shall implement the approved plan.

The proposed alterations to the lawns and walkways can be mitigated by clearly demarcating the original garden material and new configuration with signage and design features. As part of the design process for the buildings, garden entrances, and new garden area, the architects and landscape architect should consult with a historic landscape expert who would prepare a landscape plan to ensure that new designs are compatible yet differentiated from the historic garden material and plans. The restored portion of the garden must adhere to the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. In this way, the design of the new roof garden addition could reduce the impact to historic resources.

Mitigation Measure 2.1. Historically Sensitive Tower Design. The project sponsors shall ensure that the design of the new towers is compatible with, yet clearly differentiated from, the existing Kaiser Center Office Tower. Existing views of Downtown Oakland to the southwest and northwest should be maintained to the greatest extent possible, through the use of highly-transparent glass for the design of the towers at the roof garden level. Plans should be reviewed and approved by the LPAB, which would make advisory recommendations either to the Planning Commission or Development Director.

To further reduce Impact 2.0, the project sponsor shall also implement Mitigation Measure 1.2 (*HALS Level Recordation*). For conservative purposes, however, because no designs are currently available for review, this impact is conservatively deemed to be significant and unavoidable at this point in time.

Impact 3.0. The Proposed Project Would Have a Less-Than-Significant Impact on the Eligibility of the Lake Merritt Historic District as an API or NRHP historic district.

According to the inventory form completed in 1986, the Lake Merritt Historic District consists of "Lake Merritt itself, the parklands on its shores, the buildings within those parks, and all buildings fronting on the lake which were constructed over 50 years ago and are now reasonably intact. Some newer structures, compatible with the older ones, are also within district boundaries."[94] As of 1986, the Lake Merritt Historic District included approximately 92 total resources, of which 64 were contributors, five were contingency contributors and 23 were non-contributors. It should be noted that contributors included six parks and two objects. As with most historic districts, changes have been made over time within the boundaries of the district. According to the inventory form, "the Lakeside area has gradually changed from a neighborhood of 19th century single family dwellings to one of 20th century apartment, civic, and office buildings."[95]

Since the district was identified, a number of additions have been made including the Lake Merritt Plaza a 27-story office tower constructed in 1986, at 1999 Harrison Street, the 20-story The Essex on Lake Merritt, a residential building constructed in 2001, at the corner of Lakeside Drive and 17th Street, and the Cathedral of Christ the Light, constructed in 2008, on Harrison Street between 21st Street and Grand Avenue. One contributor, located at 1330 Lakeshore Drive was demolished and replaced by a non-contributor. Other smaller-scale development along the shores of Lake Merritt has also taken place during this time. However, these projects have retained the basic nature of the district, which includes a combination of residential, institutional, and commercial uses and a variety of building heights all focused on and respecting the lake. The northwest shore is predominantly high-rise, the southwest shore is predominantly mid- and high-rise, the southeast shore is predominantly mid-rise, and the northeast shore is predominantly mid-rise.

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[94] OCHS, Lake Merritt District Inventory Form, 1986.
[95] OCHS, Lake Merritt District Inventory Form, 1986. 8.

The proposed projects, located along the northwest shore, appear to be an adaptation of the district to meet the needs of the current day. As stated previously, the Kaiser Center Office tower was the first Modern high-rise office complex on Lake Merritt and led to an expansion of high-rise office tower development from downtown Oakland to the shores of Lake Merritt. While the proposed project includes towers that are substantially taller than extant towers in the district, they would not adversely affect the district's integrity. The proposed towers would be non-contributors to the district. The proposed towers would not directly front on the lake; they would be placed behind other existing historic buildings that contribute to the district, lessening the visual impact on the district. They would also perpetuate a pattern of building heights stepping down toward the lake.

The Lake Merritt Historic District currently includes approximately 107 total resources, of which 90 are contributors, and 17 are non-contributors. The proposed project would demolish a portion of one contributor to the district (the Mall Buildings at the Kaiser Center) and add two non-contributing buildings (two new office towers at the Kaiser Center) to the district. However, the district would retain over two-thirds contributing properties, therefore retaining its integrity and its API and NRHP status. Since the proposed deletions and additions to the district would not adversely affect the district's potential eligibility as an API or NRHP historic district, the proposed project would not cause a significant impact on the Lake Merritt Historic District. No mitigation would be required.

F. Analysis of Cumulative Impacts under CEQA

CEQA defines cumulative impacts as follows:

> "Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.[96]

In addition to the proposed Kaiser Center project, there are thirteen reasonably foreseeable projects within the project area (generally defined to be a five block radius from the project site), some of which could combine with the loss of a portion of the Kaiser Center complex to form a significant cumulative impact to historic resources. The following list includes the project names, project

[96] CEQA Guidelines, Article 20, subsection 15355.

description including effect to historic resources if any, and Major Projects List number from CEDA's website [accessed October 30, 2008] in parentheses. These projects were identified at the time of the release of the Kaiser Center Notice of Preparation (NOP) on May 19, 2008.

Proposed Projects with No Effects on Historic Resources:

- 1309 Madison Street (17); 72 condominium units.
- 1538 Broadway (31); 69 residential units, ground floor food sales.
- Valdez & 23rd Street Project (48); 281 residential units, 500 car parking structure including 250 public spaces, 12,000 square feet retail.
- 1755 Broadway (53); Conversion of floors 2-5 of office to 24 live/work condominiums.
- Jackson Center Two (58); 110 condominium units, 5,000 square feet retail.
- 1331 Harrison Street (59); 98 condominium units, 9,000 square feet commercial, structured parking.
- 100 Grand (61) 241 residential units.
- 1640 Broadway Mixed Use Project (85) 177,600 square feet of office, 4,710 square feet ground floor retail, structured parking, alternative approved for 254 residential units with ground floor retail.

Proposed Projects including Rehabilitation of Historic Resources

- 1930 Broadway (75); approximately 85,200 square foot retail/fitness club, approximately 829,500 square feet of office space, 220 residential units, 444 parking stalls, Rehabilitation of the Tapscott Building, a historic resource.
- 1100 Broadway (92); 310,285 square feet of office, 9,810 square feet of retail; Rehabilitation of the Key System Building, a historic resource.

Proposed Projects with Possible Effects on Historic Resources:

- 1443 Alice Street/1434 Harrison Street (15); 245 residential units; alterations to a historic resource.
- Emerald Views, 222 19th Street (21); 42-story residential high-rise (457'-9" to the top of the pyramidal roof form), containing 370 residential units, 357 parking spaces in five levels of underground parking, 933 square foot café; and demolition of a historic resource (the garden associated with the historic August Schilling estate). Located within Lake Merritt Historic District.
- Broadway West Grand (86); 367 residential units, 8, 500 square feet retail; demolition of seven historic resources (mostly former brick auto showrooms).

Impact 4.0. The Proposed Project Would Have a Less-Than-Significant Cumulative Impact to Historic Architectural Resources.

Cumulative Impacts to the Lake Merritt Historic District

Aside from the proposed project, the only other reasonably foreseeable project within the Lake Merritt Historic District boundaries is the proposed 42-story Emerald Views Development project. The proposed 34- and 42-story office towers associated with the Kaiser Center project, in combination with the proposed 42-story Emerald Views development, may form a cumulative impact to historic resources within the Lake Merritt Historic District, as both would demolish contributors to the district (an historic garden and the Mall Buildings at the project site), and would introduce a total of three new non-contributing towers to the District.

As described above under Impact 3.0, the proposed towers of the Kaiser Center and Emerald Views can be understood as a continuation of the development of modern towers on the northwestern shores of Lake Merritt, a characteristic of the district that has already been established. Collectively, these projects would continue the trend of redevelopment along this portion of Lake Merritt. With approximately 90 contributory resources to the District, the combination of these projects would retain over two-thirds of its contributing properties, thereby retaining its integrity and its API and NRHP status. Since these proposed changes to the district would not adversely affect the district's potential eligibility to the NRHP or as an APE, no significant cumulative impacts to the Lake Merritt Historic District are anticipated. No mitigation would be required.

Cumulative Impacts to Historic Resources in the Immediate Project Vicinity and to the City of Oakland

Taken collectively, the reasonably foreseeable projects listed above, such as those along Broadway and Harrison Streets, contribute to the on-going demolition or alteration of historic resources within the project vicinity. The proposed Kaiser Center project would demolish a portion of a historic resource, therefore contributing to this trend. However, the proposed project is consistent with the typical development found in this area and would not directly or indirectly affect the eligibility of any other historic resources within the vicinity

While these projects may affect individual historic resources, the affected resources include a broad range of building typologies, and would not have a clear, measurable impact on an individual type of historic resource. For example, the proposed Kaiser Center project would demolish a portion of a Modern historic resource in the Lake Merritt Historic District. None of the other proposed projects would affect Modern historic resources, and only one other proposed project, the Emerald Views project, would affect the Lake Merritt area or a resource in the Lake Merritt Historic District. Since these projects do not have a clear, measurable impact to an individual type of historic resource, or a type that is particularly rare or threatened, the cumulative impact would be less than significant.

Other reasonably foreseeable projects throughout the City of Oakland which may affect citywide historic resources and have been considered in the cumulative analysis include alterations to the Ninth Avenue Terminal Building along the Oakland waterfront, and alterations to buildings at the former Oakland Army Base. Other projects that have been approved/constructed include those in the Waterfront Warehouse District along the Oakland Waterfront, and the Courthouse Condominiums project at 29th and Telegraph Avenue. However, such citywide projects are too far away from the project site (and would affect such different types of historical buildings compared with the Modern Kaiser Center, that such projects would not be cumulatively considerable. As such, the proposed project would have no significant cumulative impacts to historic resources on a citywide basis. No mitigation would be required.

VIII. Conclusion

Designed in 1958 as the headquarters building for Kaiser Industries, the Kaiser Center complex is an excellent example of an intact 1950s Modern style office campus with a high-rise office tower, low-rise shopping mall and parking garage, and modern, podium roof-top designed landscape. The twenty-eight-story glass and aluminum curtain wall building is currently used as office space and anchors the commercial high-rise area at the northwest corner of Oakland's Lake Merritt. The three-story Mall Buildings remain in retail use and create a strong horizontal base that is juxtaposed by the tower's verticality. The Kaiser Center Roof Garden remains an important publicly accessible private open space and is an iconic example of Bay Area Modern Landscape Architecture. The Kaiser Center is an excellent example of an intact Modern style office campus.

The Kaiser Center is rated A by the Oakland Cultural Heritage Survey and appears to be individually eligible for listing in both the California and National Register under Criteria A/1 (Events), B/2 (Persons), and C/3 (Design). The Kaiser Center also appears to be eligible to the National Register as a contributor to the potential Lake Merritt Historic District. Because the Mall Buildings are an integral part of the Kaiser Center Complex, their proposed demolition would not comply with the

Secretary of the Interior's Standards for Rehabilitation and would materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the federal, state, and local registers. As such, the proposed project would have a significant adverse impact on the historic resource under CEQA. Mitigation measures are available to reduce the impact of the proposed project, such as a modified design which retains the street level design and character and quality of materials of the Mall Buildings. However, because design details are not yet available, this impact would conservatively be deemed to be significant and unavoidable at this time.

The project-specific impacts of the proposed new construction has been conservatively deemed to be significant and unavoidable at this time because design proposals have not been submitted to the city, and design details are not yet available for review, as described above. No significant cumulative impacts were identified to the Lake Merritt Historic District, or from other proposed developments in the project vicinity or in the City of Oakland as a whole. Therefore, no mitigation measures were identified.

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APPENDIX A

Additional Figures

Figure A1. Office Tower, rear façade.
Page & Turnbull, 2008

Figure A2. Office Tower, detail of *porte cochere*.
Page & Turnbull, 2008

Figure A3. Kaiser Complex from 21st Street
Page & Turnbull, 2008

Figure A4. Office Tower, porte cochere. Page & Turnbull, 2008

Figure A5. Office Tower, second floor lobby.
Page & Turnbull, 2008

Figure A6. Garage, south façade. Page & Turnbull, 2008

Figure A7. 20th Street Mall, south façade. Detail of entrance.
Page & Turnbull, 2008

Figure A8. 20th Street Mall, First Floor Lobby.
Page & Turnbull, 2008

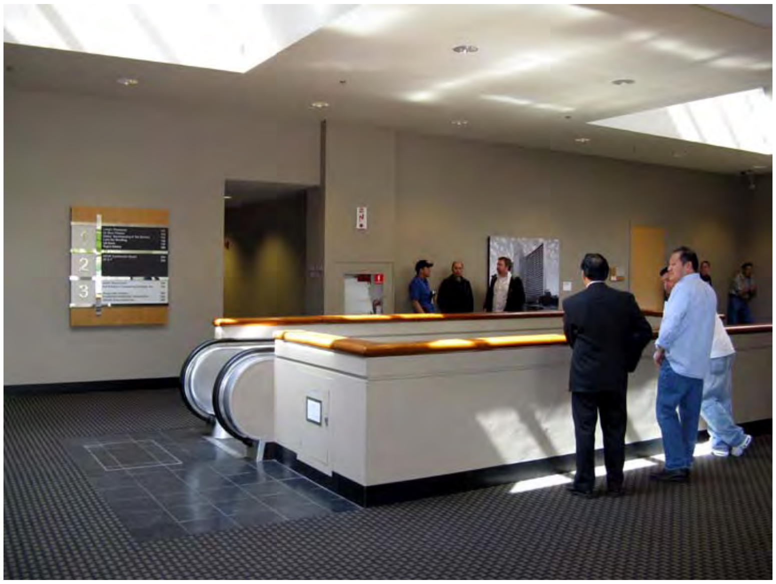

Figure A9. 20th Street Mall, Third floor
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Figure A10. Webster Street Mall, view from northwest.
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Figure A11. Webster Street Mall, Hall. View from north.
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Figure A12. Webster Street Mall, Hall. View from south.
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Figure A13. HVAC, Kaiser Center Roof Garden. View from southwest.
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Figure A14. Roof Garden, water fountain.
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Figure A15. Lake Merritt Historic District
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Figure A16. Lake Merritt Historic District, northwest shore.
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Figure A20. Lake Merritt Historic District, showing Kaiser Center.
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Figure A21. Lake Merritt Historic District, showing Kaiser Center (center), The Essex (left), Cathedral of Christ the Light (Right)
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Figure A22. Lake Merritt Historic District,
244 Lakeside Drive
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Figure A23. Lake Merritt Historic District, Snow Park
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Figure A24. Lake Merritt Historic District,
The Essex at Lake Merritt
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Historic Images

Figure H1. Model of Kaiser Center Tower. Kaiser Center Archives.

Figure H2. Office Tower, Lobby, ca. 1960.
***Architectural Record*, December 1960**

Maps

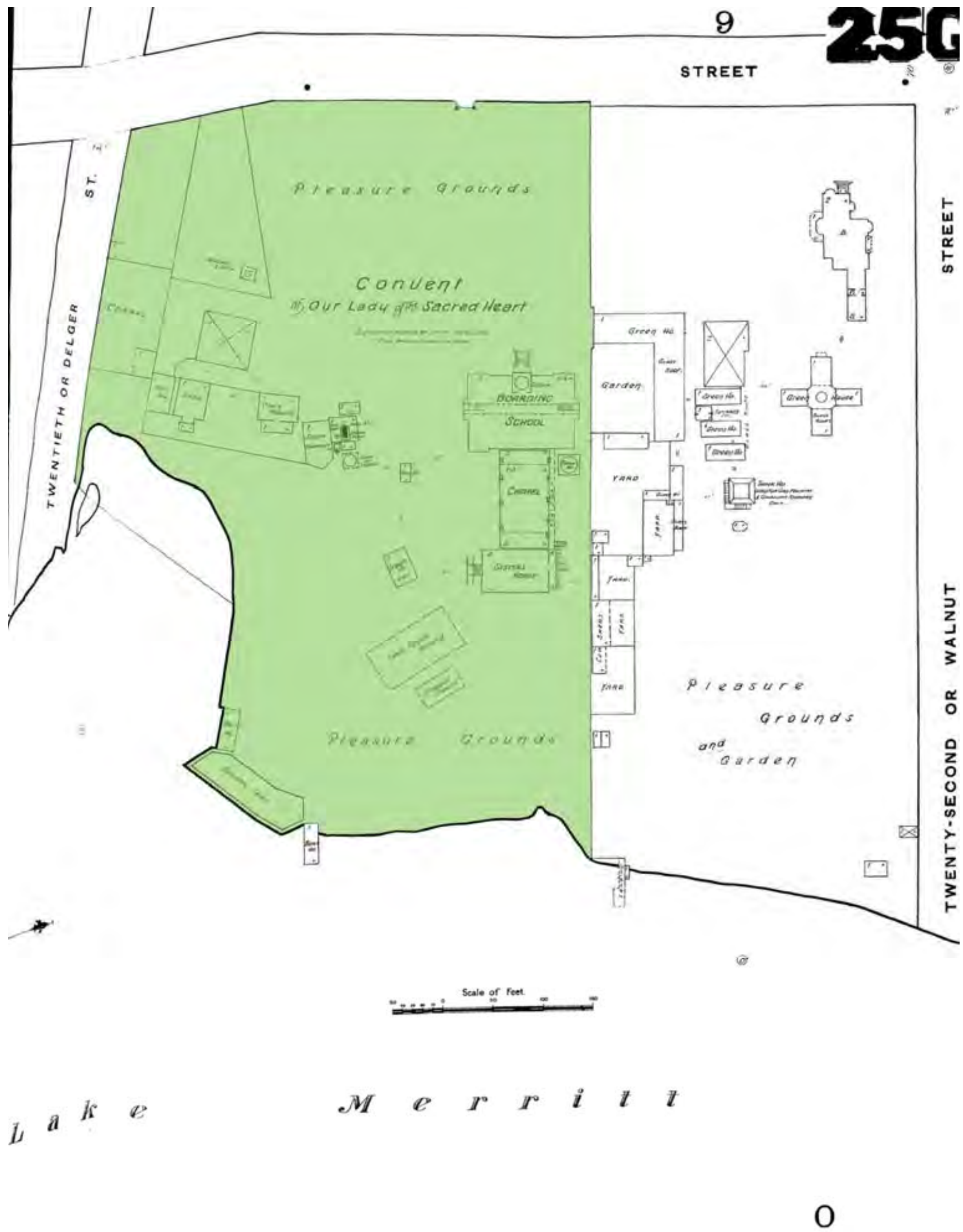

Figure M1. Sanborn Fire Insurance Map, 1899. Showing approximate location of subject property

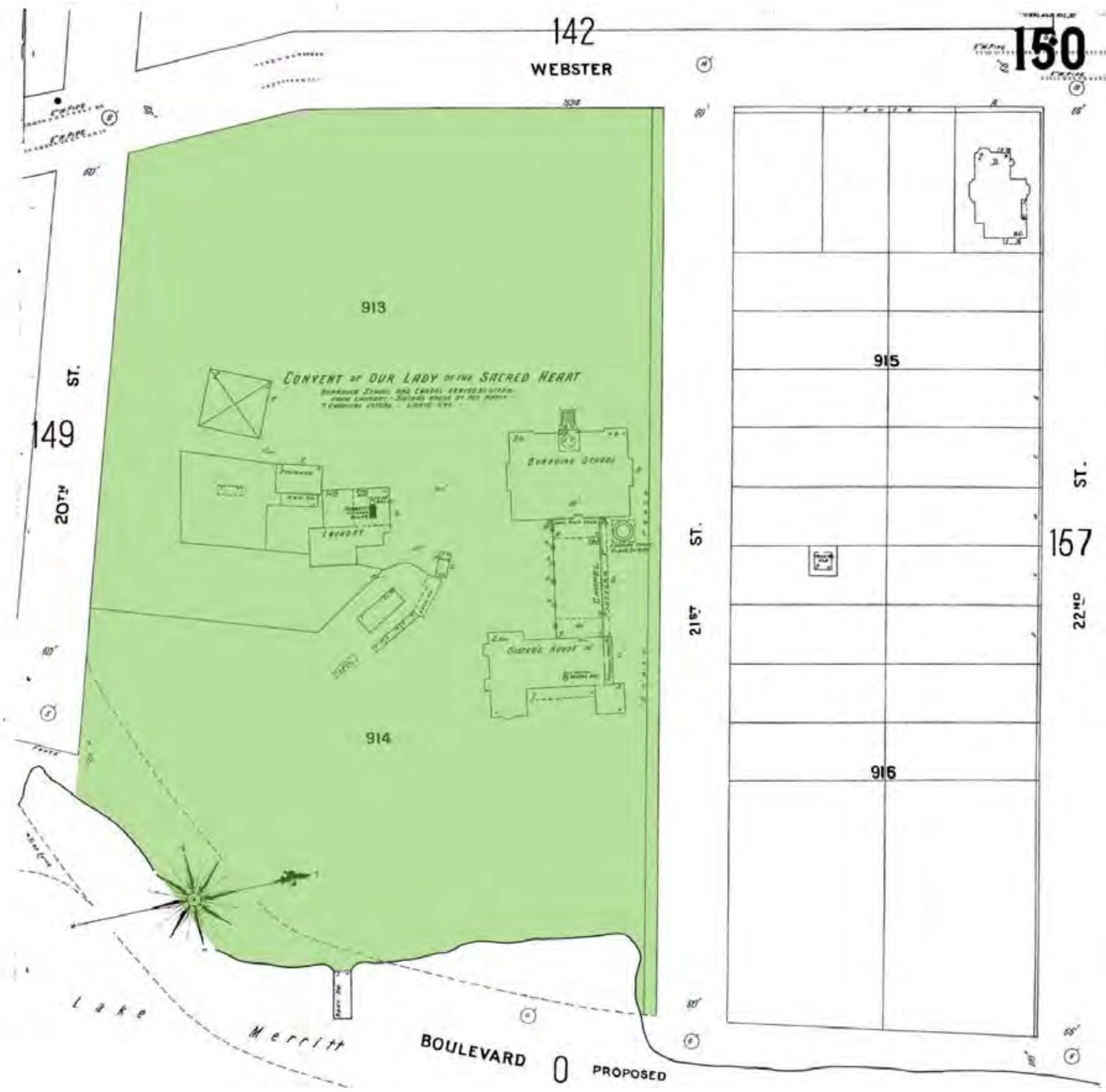

Figure M2. Sanborn Fire Insurance Map, 1903. Showing approximate location of subject property

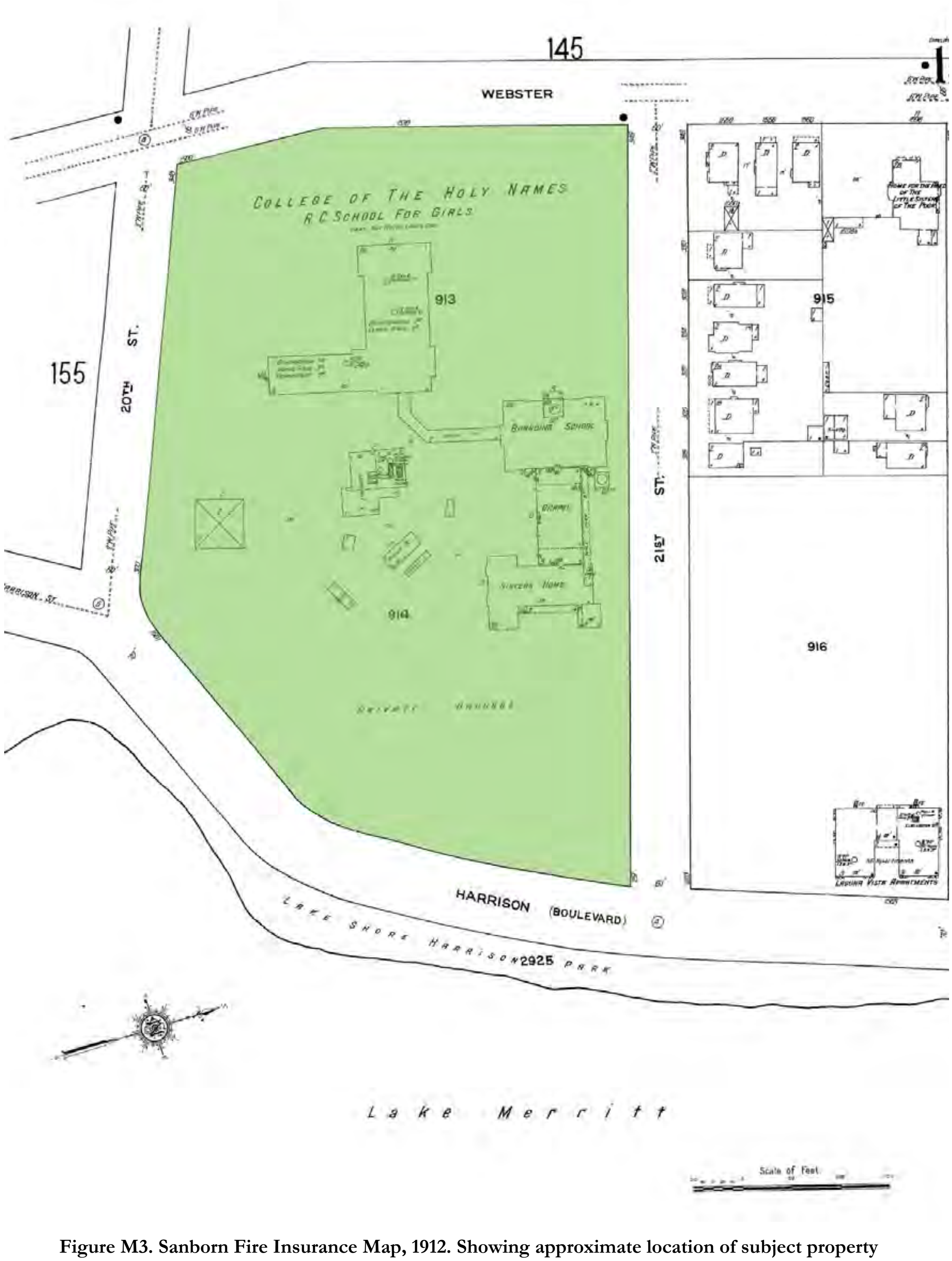

Figure M3. Sanborn Fire Insurance Map, 1912. Showing approximate location of subject property

Figure M4. Sanborn Fire Insurance Map, 1950. Showing approximate location of subject property

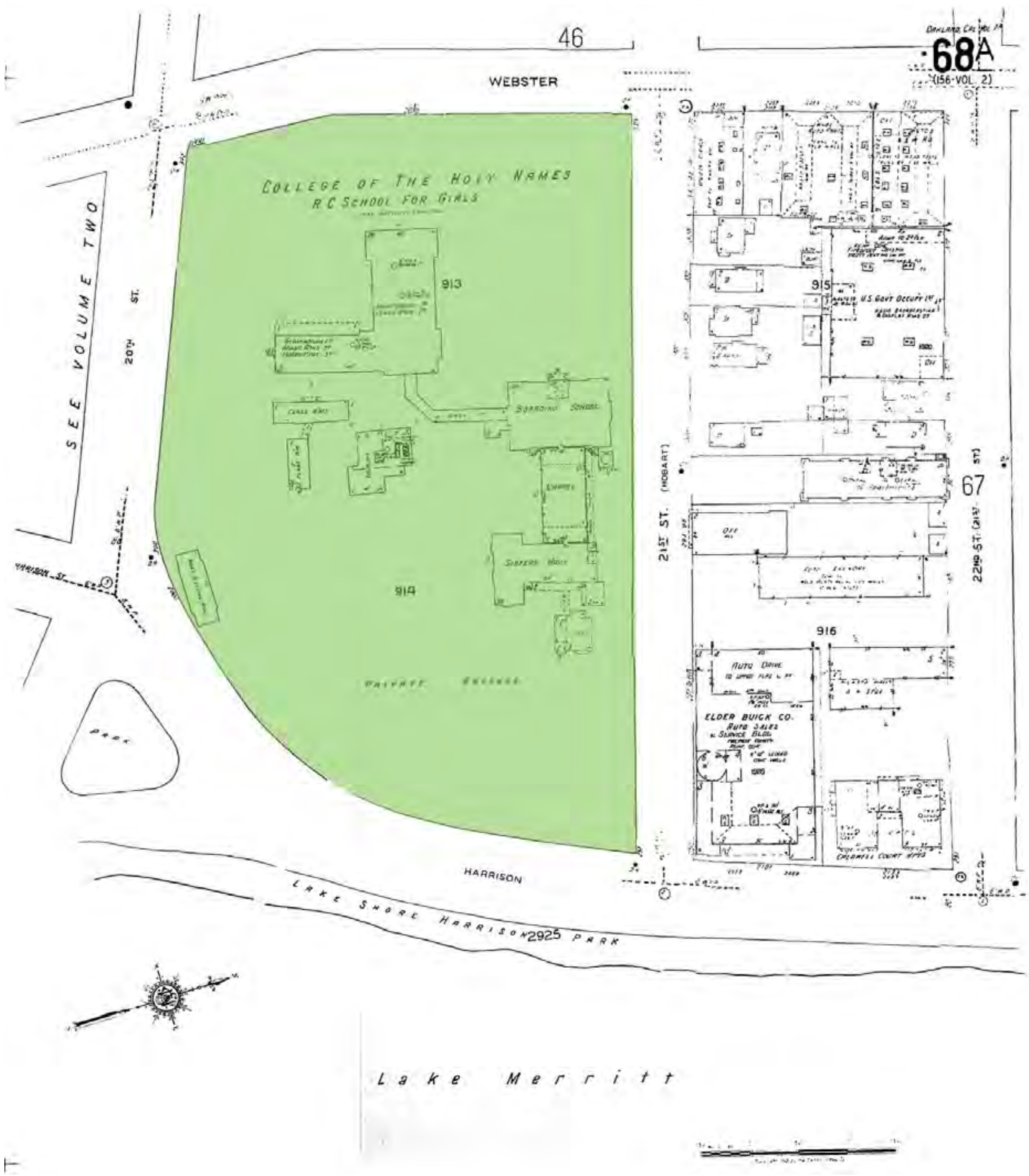

Figure M5. Sanborn Fire Insurance Map, 1952. Showing approximate location of subject property

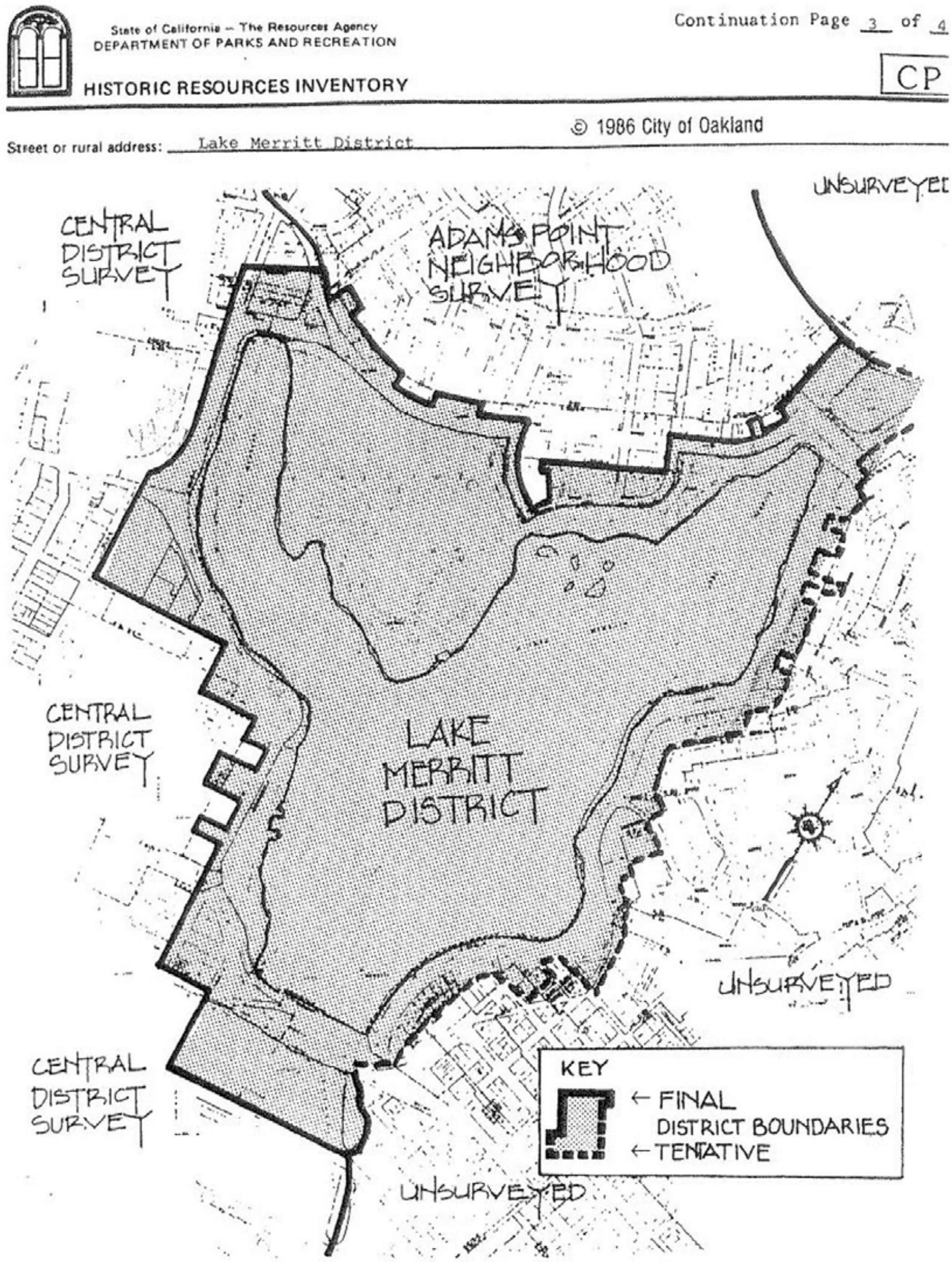

Figure M6. OCHS, Lake Merritt Historic District Boundary Map, 1986.

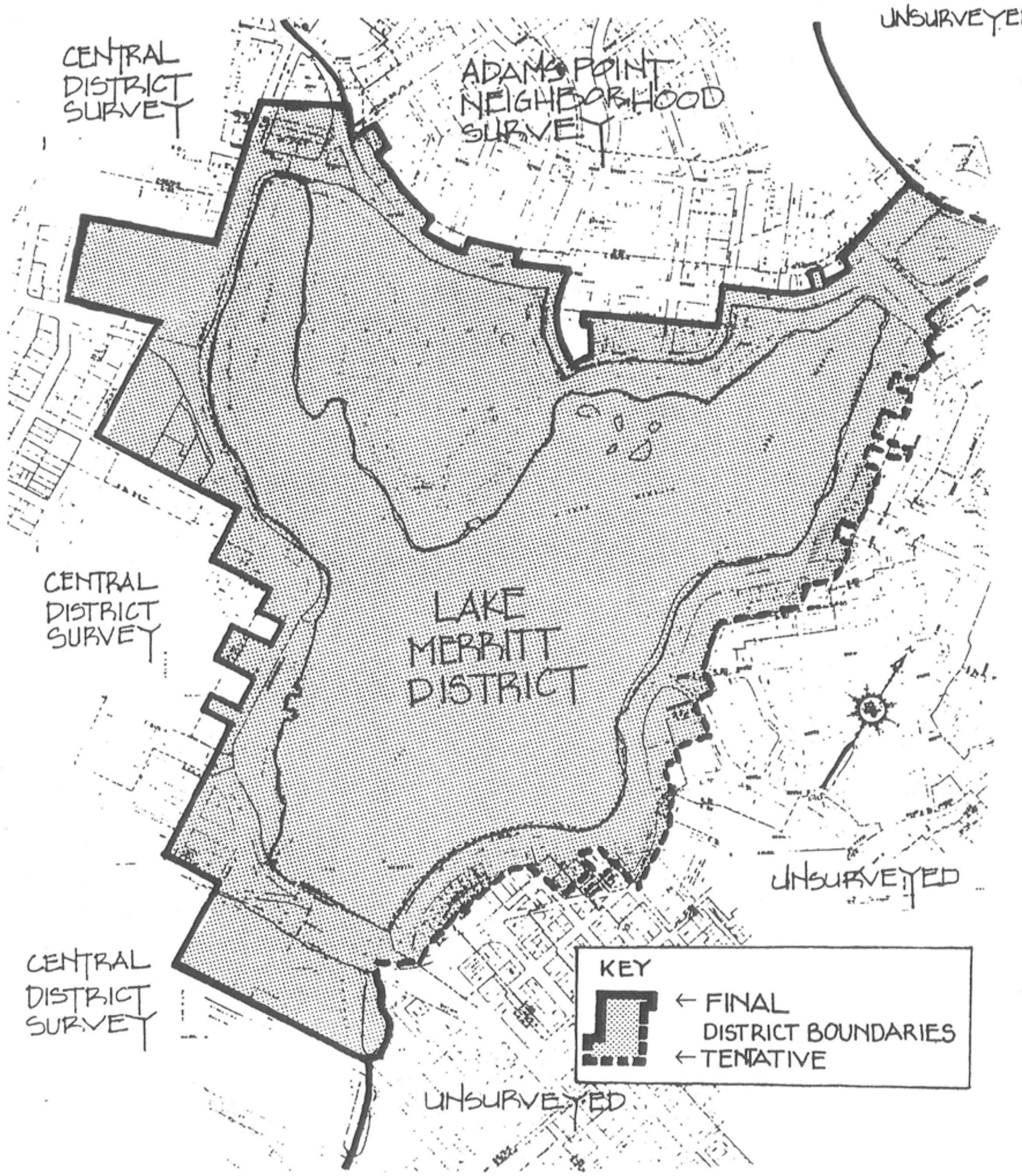

Figure M7. OCHS, Lake Merritt Historic District Boundary Map, 1986, Altered by author per the request of OCHS staff. Note that the map boundary has been altered to include the Kaiser Center.

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APPENDIX B

Dolomite Panel Cleaning Study and Reuse Feasibility Analysis

Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

BY FAX AND U.S. MAIL

10 March 2000

Ms. Deborah A. Boyer
Director of Operations & Construction
Kaiser Center, Inc.
300 Lakeside Dr., Suite 130
Oakland, California 94612-3534

Comm. 98843.01 — Construction Administration, Concrete Wall Repairs, Kaiser Center, Oakland, CA

Dear Ms. Boyer:

This letter is in response to your request for maintenance guidelines of the rehabilitation work performed by Western Waterproofing at the above referenced project. Western Waterproofing's rehabilitation scope included sealant replacement, concrete spall repair, sealing concrete panels, and aluminum coping installation. The maintenance guidelines for each of these items are listed below.

Sealant

In accordance with the manufacturers recommendations, the Sikaflex 2c replacement sealant should be visually inspected every five years to check the performance of the sealant. The Sikaflex 2c normally will not require repair or replacement for at least ten years dependent on exposure. If a failure is observed, that portion of the sealant joint should be removed and the surface of the panels should be cleaned and free of foreign materials that would inhibit bonding. The sealant should then be replaced with Sikaflex 2c using a joint width-to-depth ratio of 2 to 1 using new backing material to set the joint depth. We recommend that a qualified waterproofing contractor perform any sealant repairs to assure that the joints are prepared properly.

Concrete Spall Repairs

The exposed aggregate panels should be monitored for further spalling. If additional spalls should occur, the spalls should be removed, and the area prepared and repaired according to the specifications. The spalls should be repaired by a company with experience in restoration and concrete patching.

Note that the final mix design included one part lime, one part grey Portland Type II cement and two parts sand. This mix was developed as part of the submittal process and is not in the specifications.

Concrete Sealer

The Dynasylan BH-N clear penetrating sealer is a surfaced-applied sealer which affects the top 1/2 inch of the wall surface. The sealer is colorless and therefore it is impossible to determine the condition of the sealer over time by visual observation. The condition of the sealer can only be assessed by coring the wall and doing a chemical analysis of the surface. For maintenance, the manufacturer suggests recoating the wall in 10 to 15 years. This product is affected by environmental exposure so the condition of the sealer on the three facades may vary by the time of resealing. Prior to resealing, it is prudent to conduct an inconspicuous mock-up on each facade to determine any negative aesthetic results, such as darkening. Concrete coating and sealing technology changes constantly. We would recommend consulting product representatives of Dynasylan or other consultants for an evaluation of then current products and compatibility with the Dynasylan BH-N.

Aluminum Coping

The aluminum coping extension should be checked biyearly from the roof to verify the condition of the sealants used at the metal joints. Because of its exposure to weather, the coping seals experience a lot of movement. If a failure is observed, that portion of the sealant joint should be removed and the surface of the panels should be cleaned and free of foreign materials that would inhibit bonding. The sealant should then be replaced with Sikaflex 2c using a bond breaker at the fillet-type joints. We recommend that a qualified waterproofing contractor perform any sealant repairs to assure that the joints are prepared properly.

Conclusion

The above guidelines are meant to assist you in maintaining your property. A periodic inspection of every five years should help Kaiser Center monitor the performance of exterior concrete walls. There are many factors which affect the performance of the exterior cladding materials, especially environmental factors, such as sun, wind, rain and airborne contaminants. Therefore, the various products will require repair or replacement at different times. Any failures within the warranty periods, however, should be brought to Western Waterproofing and Simpson Gumpertz & Heger's attention.

We hope this letter assists you in the long-term maintenance of your building. If you have any questions or concerns, please do not hesitate to call.

Sincerely yours,

Jonathan T. Stafford, Engineer

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Encl.

cc: Mr. Robert P. Browne, Western Waterproofing (w/o encl.)

Sikaflex®-2c Maintenance Procedure

1) Preconditions:

a) As a premium-grade two component polyurethane elastomeric joint sealant Sikaflex-2c is suitable for sealing properly designed working joints. The self-leveling grade for horizontal joints and the non-sag consistency for vertical and overhead joints.

b) Sikaflex-2c is normally applied at a minimum thickness of 1/4 inch by use of a bulk gun or by manually pouring the self-leveling grade.

c) Sikaflex-2c is normally used to seal joints between concrete, masonry, aluminum or coated metal panels and EIFS systems that have been suitably prepared, repaired or conditioned in accordance with Sika's current technical data sheets.

2) Maintenance Procedure:

These maintenance recommendations given below relate to the product correctly applied in accordance with the preconditions above.

In accordance with standard good practices all sealant systems, including Sikaflex-2c, should at least be visually inspected every 5 years. Sikaflex-2c will normally not require maintenance (i.e. resealing) for at least 10 years dependent on exposure. When eventual maintenance is required, the following procedure should be closely observed:

a) Cut out all damaged sealant with a manual or mechanical device. By mechanical means remove all other foreign or deleterious materials that might prevent bond.

b) When the substrate is clean, sound and dry, reapply the sealant in accordance with the original Sikaflex-2c specification.

c) The sealant shall be applied with a minimal thickness of 1/4 inch and in the industry acceptable ratio, width to depth, of 2:1. Note that a 1:1 ratio is also tolerable in various situations.

d) Allow the sealant to cure normally and plan the next visual inspection in 5 years and possible routine maintenance in 10-15 years dependent on exposure and requirements.

3) Warranties:

Subject to satisfactory compliance with all of the above, Sika Corporation will issue a further warranty for this system in accordance with our standard policies.

file

Simpson Gumpertz & Heger Inc.

Consulting Engineers

San Francisco
Arlington

222 Sutter Street
Suite 300
San Francisco, CA
94108

Telephone:
415 495 3700
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415 495 3550

TRANSMITTAL

Date:	10 March 2000	**Comm. No.**	98843.01
Project:	Kaiser Center		
To:	Kaiser Center, Inc.	**From:**	Chris Decareau
Attention:	Ms. Deborah A. Boyer Director of Operations & Construction	**Tel No:**	(510) 271-6113
Address:	300 Lakeside Dr., Suite 130	**Fax No:**	(510) 271-6103
City, State, Zip:	Oakland, California 94612-3534	**No. Pages:**	3

Delivered Via:	✔ U.S. Mail ☐ Federal Express	✔ Fax ☐ Messenger	☐ UPS ☐ Pick up
Action Required:	☐ Sign and return to this office ☐ Indicated on item transmitted	☐ Comment / return ☐ See remarks below	☐ No action required ☐
For your:	☐ Approval ☐ Review / Comments	☐ Records ☐ Distribution	☐ Use ☐ Information

Quantity:	**Description / Remarks:**	**Dated:**
1	Letter	10 March 2000

cc:	Enclosures:	Delivered Via:	
		☐ U.S. Mail ☐ Federal Express	☐ Fax ☐ Messenger
		☐ U.S. Mail ☐ Federal Express	☐ Fax ☐ Messenger
		☐ U.S. Mail ☐ Federal Express	☐ Fax ☐ Messenger

Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

LETTER REPORT

EXTERIOR WALL CLEANING AND COATING STUDY

KAISER CENTER
OAKLAND, CALIFORNIA

Prepared for:

Kaiser Center Inc.
300 Lakeside Dr., Suite 130
Oakland, California 94612-3534

Comm. 98843.00

25 February 1999

Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

25 February 1999

Ms. Deborah A. Boyer
Director of Operations and Construction
Kaiser Center Inc.
300 Lakeside Drive, Suite 130
Oakland, California 94612-3534

Comm. 98843.00 — Exterior Wall Cleaning and Coating Study, Kaiser Center, Oakland, CA

Dear Deborah:

Introduction

At your request, Simpson Gumpertz & Heger Inc. (SGH) has conducted an investigation of methods to clean and repair the exterior walls at the Kaiser Center. The Kaiser Center is a 28-story office building (Photo 1), built in the early 1960's, located in Oakland, California. Most of the exterior wall is an aluminum and glass curtain wall. Solid stair tower walls are clad in precast concrete with exposed dolomite aggregate finish.

You identified two problems for us to investigate:

1. The aluminum curtain wall panels are dirty and unsightly.

2. The concrete walls are streaked and dirty.

Our work to date has consisted of a review of original construction documents, visual surveys of the exterior walls, close-up inspections from swing stages, laboratory analysis of samples, cleaning test mock-ups, recommendations for cleaning and repair, and an estimate of probable construction cost.

Information Obtained From Others

We reviewed the original drawings and specifications, by architect Welton Becket & Associates and found the following pertinent information:

- Four types of finishes were used on the aluminum (Sheet 1008, dated 1-29-58):
  - Column covers are a dark grey color identified as "material: .125#7BP with finish C1-A2."
  - Beam fascias are a light grey color identified as "material: 6063-T5 with finish C1-A2."
  - Mullions are a light grey color identified as "material: 6063-T5 with finish C1-A2."
  - Spandrel panels are a gold color identified as "material: 125 gold alloy, ribs embossed vertically, with finish C1-A2."
- Precast concrete panels are lightweight concrete with a decorative dolomite aggregate finish. (Specification Section XIII)

We interviewed personnel familiar with the building:

- According to the building engineer, George, pieces of concrete have spalled from the panels since shortly after construction. A small, tan colored aggregate particle is at the apex of the spalls, and appears to be the point of origin of the spalls. The concrete was coated with an epoxy sealer to prevent water from reaching the aggregate particle and causing expansion of the particle and spalling. There have been fewer spalls since the sealer was applied.
- According to Dick Schroter of SGH, who worked for Kaiser at the time of construction, the aggregate causing the spalls was reported to be burnt dolomite, which was transported in the same trucks as the exposed aggregate dolomite. The burnt dolomite became mixed into the aggregate for the precast panels, and caused the spalls.

We reviewed two letter reports by Western Restoration, dated 23 September 1991 and 24 October 1991, regarding exterior cleaning.

- Western Restoration conducted cleaning tests on the north concrete wall at ground level, using various chemical cleaners manufactured by ProSoCo. They recommended a cleaning program consisting of:

  a. Water blast

  b. Apply poultice and allow to dwell for 24 hours

  c. Remove poultice

  d. Pressure wash

  e. Apply ProSoCo limestone restorer

  f. Apply ProSoCo Weather Seal Siloxane

Steps a, d and e would have to be done after hours, and the poultice removed in step c would have to be disposed of as hazardous waste.

- Western Restoration recommended cleaning the aluminum with Sure Klean Aluminum Cleaner.

Field Observations

Carolyn Searls made a visual survey of the entire building from street level and a close up survey of the lower portion of the north concrete wall on 18 July 1998:

<u>Concrete Walls</u>

All concrete walls are streaked and dirty. The epoxy sealer is cracked and brittle. It has worn off in some areas but is intact in other areas. There are incipient spalls and previously patched spalls visible on all concrete walls. The concrete panels are dirtier on the tower than at the lower podium.

North Wall

We accessed the north wall up to the fourth floor using a lift. We removed two incipient spalls from the concrete panels. A tan-colored aggregate particle was found at the base of each spall. The particles were cracked and disintegrating. In the area up to the sixth floor we could see five other incipient spalls and 17 previously patched spalls (Photo 2).

Aluminum and Glass Curtain Wall

The aluminum is dirtier at the north and east sides of the building (Photo 3). The louvers near the top of the building appear especially dirty. The aluminum on the south side of the podium has been scuffed and scratched (Photo 4).

We made further inspections on 27 August 1998.

East Concrete Wall

Carolyn Searls and George (the building engineer) made a close up inspection of the east concrete wall on 27 August 1998. The swing stage covered the south half of the wall only. We made the following observations:

- We identified and removed 31 incipient spalls. Photo 5 shows a typical spall. Most of the spalls were easy to remove by hand or with a little prying with a screwdriver.
- We saw many incipient spalls at the half of the wall we could not reach from our swing stage. (Photo 6)
- We saw one area where concrete had recently spalled. (The concrete where the spall had been was still clean.) (Photo 7)
- The spalls range in size from 2 in. to 9 in. in diameter, and ½ in. to 1-3/4 in. deep.
- Most spalls have one tan, disintegrating aggregate particle at the apex of the spall. One spall has two particles.
- While on the wall, we noticed that the sealant is in fairly good condition with some small areas of adhesive failure. The sealant is still fairly elastic. It is placed over a fibrous backer rod.
- The epoxy sealer is worn off the dolomite aggregate, but remains on some of the cement paste between the aggregate. It is brittle and flaky.
- The metal roof coping does not cover the top of the precast panels, leaving the top horizontal concrete surface exposed. (Photo 8)
- The ends of steel rods are sticking out at the 26th and 27th floors. These rods may have originally been installed to support the "Kaiser Center" sign shown on the drawings. The sign is no longer in place on this elevation.

Aluminum and Glass Curtain Wall

Carolyn Searls observed the aluminum curtain wall close up at the fourth floor roof and from a swing stage on the east elevation, and made the following observations:

- All aluminum elements are dirty. The ribbed gold panels are more dirty than the smooth grey column covers and mullions.
- Some gold panels have patches of oxidation product, as shown in Photo 9. If the oxidation product is scraped off, a pit in the aluminum remains.
- The pitting on the drop we surveyed was worse at about the mid height of the building.

Field Tests

Aluminum Cleaning

On 15 September 1998, AMS Architectural Technologies Inc. performed mock-ups of the cleaning of the aluminum. The first mock-up is located at the 17th floor, south elevation, between Column Lines 7 and 8. We selected this panel for the mock up because it was representative of the most severe corrosion and pitting we saw. The gold, ribbed panel was cleaned. Before cleaning the aluminum was dirty and had irregular shaped spots of oxidation products from corrosion of the aluminum, as shown in Photo 9.

AMS cleaned the panel by hand scrubbing with nylon abrasive pads and detergent. After rinsing and drying, they applied a surface protectant.

After cleaning, some dirt remained in the grooves, but the panel was fairly and uniformly clean. We could see the pits in the aluminum from the swing stage (Photo 10), but not from the street. The cleaned panel is much cleaner than the adjacent panels and is readily visible from the street (Photo 11).

AMS cleaned a second mock up at the fourth floor roof level, north elevation, at the east end of the building, as shown in Photo 12:

- Gold ribbed panels: AMS cleaned two gold panels — one especially pitted and one heavily soiled panel. After cleaning and applying the surface protectant, the pitting is still visible. Both panels are uniformly clean except at a strip at the lower 2 in. of the panels. It was difficult to clean this area because of interference from the horizontal mullion below the panel.
- Light grey spandrels and mullions: AMS found that these elements have a lacquer coating. They removed the lacquer, cleaned the panels and applied the surface protectant. The panels are visibly cleaner than the adjacent uncleaned areas.
- Dark grey column covers: These elements also have a lacquer coating. AMS removed the lacquer and cleaned the panels. The cleaned panels are visibly cleaner than the adjacent uncleaned areas.

On 12 December 1998, Stuart Dean Co, Inc. performed a mock up of the cleaning of the aluminum on the fourth floor roof level on the north elevation of the building. The cleaning included two gold ribbed panels, two light grey horizontal mullions and a six foot section of the dark grey column covers.

The panels were cleaned using 3M nylon pads and a liquid detergent. The gold ribbed panels had to be cleaned using an additional lacquer stripper in order to remove the shipping coating. After the cleaning, the panels were allowed to dry and were then sealed with a surface protectant.

Before cleaning the panels were very dirty, showed signs of pitting and oxidization, and were scratched in places, assumed to be caused by the window washing equipment.

After cleaning the panels were fairly clean with minimal dirt remaining on the surface. The pitting on the surface and scratches from the window washers equipment were still visible. The cleaned panels stood out against the dirty panels around them.

Concrete Cleaning

On 13 October 1998, Western Waterproofing and JOS/Quintek performed cleaning mock ups of the concrete panels. The mock-ups are located at ground level on the north side of the building. Four cleaning methods were tried:

- JOS System. This system uses a microabrasive fine dolomite powder mixed with water applied at low pressures. The process was not successful in removing the epoxy coating, and was extremely messy, requiring large amounts of the microabrasive. This system is not recommended.
- Black Beauty: This is a dry blast method. It damaged the dolomite aggregate and is not recommended.
- Rotec steam cleaning. The Rotec system uses steam projected in a flat fan spray (Photo 13). A variety of pressures from 1000 psi to 3000 psi, with a small and large nozzle were tested. The 3000 psi pressure using the small nozzle was most effective (Photo 14).
- Rotec steam cleaning with polymer cracker. A chemical "polymer cracker" was brushed on the concrete and allowed to dwell for 6 ½ hours. It was then removed with the steam cleaning at 2500 psi. The improvement over the steam cleaning alone was marginal.

We observed further cleaning tests conducted by Western Waterproofing on 14 January 1999. They tested:

- Peel Away 7 paint stripper, dwell time 1-1/2 hours, removed with a power wash.
- High pressure cold water power wash.

Neither of the techniques was as effective as the Rotec steam cleaning.

Laboratory Tests

We performed a microscopic examination of two spalls removed from the concrete and x-ray diffraction analysis of the tan aggregate particles found at the apex of the spalls. The complete report is attached, and our findings are summarized herein. The spalls are caused by fragments of burnt dolomite within the concrete which experience up to a 200% increase in volume when exposed to moisture over long periods. When the burnt dolomite expands, it fractures the surrounding concrete, creating the spalls. The previously applied coating has trapped moisture behind the outer surface of the concrete and probably exacerbated the spalling.

Unreacted aggregate particles are still present in the concrete; therefore, the spalling can be expected to continue as long as a source of moisture is provided. However, the concrete provides some restraint of expanding particles, and spalls only occur to a certain depth. At some time, all shallow particles will have expanded and spalled, and the spalling will stop. Determining the number of spalls on the building over several years is the best method of determining if the spalls have slowed or stopped.

We had Sivento, Inc., a manufacturer of water repellents, perform tests of the efficacy of water repellent coating for the concrete. The complete report is attached, and our findings are summarized herein.

We submitted two steam-cleaned concrete spalls (which we had removed from the east wall) to Sivento for testing. Sivento coated one sample with their Dynasylan BH-N water repellent and measured the 24-hour water absorption of the treated sample and one untreated sample. The untreated sample absorption was 0.90%, and the treated sample absorption was 0.24%.

Both treated and untreated samples have low water absorption. The moisture causing the spalls may be caused more by the water trapped by the epoxy coating than by absorption through the surface of the concrete. Further testing would be required to determine the primary source of the moisture and how effective a water repellent will be. However, a breathable water repellent (such as Dynasylan BH-N) will not cause any harm and could reduce the spalling.

Recommendations

We recommend the following repairs:

Aluminum Curtain Wall

1. Clean the aluminum surfaces using mild cleaners, hand scrubbing and water rinse.

2. Seal aluminum surfaces with either AMS #350 or Stuart Dean's Sodric sealers.

The following table compares the proposals submitted thus far by AMS and Stuart Dean. We have worked with both contractors, and we believe either one is capable of performing this work.

Comparison of Aluminum Cleaning Proposals		
Category	**AMS**	**Stuart Dean**
Price	$698,323.84, including staging	$750,000 ± 10%, including staging*
Cleaning	Hand scrub, water rinse	Hand scrub, water rinse
Sealing	AMS #350 0.1 mil thickness siloxane	Sodric 1.0 mil thickness acrylic-silicone blend
Maintenance: Washing	once/year with water	once/year with water
Maintenance: Resealing	3 years or more, depending on exposure, likely 5 years	3 years or more, depending on exposure, likely 5 years

Comparison of Aluminum Cleaning Proposals		
Category	**AMS**	**Stuart Dean**
Duration	Within 1 year, flexible to meet needs of owner	Within 1 year, flexible to meet needs of owner
Guarantee	3 years	3 years

*Stuart Dean has requested to be allowed to perform do another test panel (time and motion study) similar to that done by AMS, in order to finalize their price

Concrete Walls

1. Clean the concrete using the Rotec steam cleaning method.
2. Remove incipient spalls.
3. Patch spalls with mortar. Embed dolomite aggregate in the patch to match the existing surface.
4. Apply Dynasylan BH-N water repellant.
5. Install sheet metal coping at the top of the concrete walls to reduce water infiltration into the concrete panels.

Our specifications require the contractor to install a sample panel showing all of the repairs, to verify acceptable appearance of, and to set a standard for the rest of the work.

Cost Estimate

We have prepared the following cost estimate for your budgeting purposes:

Item	Cost	Estimate by
Aluminum Curtain Wall		
Cleaning and Sealing (incl. staging)	$698,324	AMS
Concrete Walls		
Cleaning (incl. staging)	$245,000	Western Waterproofing
Water repellant	85,000	Western Waterproofing
Coping	4,450	Western Waterproofing
Spall patching	25,000	Western Waterproofing
Total Concrete Walls	$359,450	

Item	Cost	Estimate by
Engineering Fees		
Construction documents	$15,000	SGH
Construction administration	40,000	SGH
Total Engineering Fees	$55,000	
GRAND TOTAL	$1,112,774	

Once you have received approval to proceed, we will prepare construction documents for the work. We will need input from you concerning your requirements for the owner/contractor agreement, as well as special requirements for working hours, noise, etc. We will submit the construction documents to AMS, Stuart Dean, and Western Waterproofing for bidding. We are available to provide construction observation during the work.

Sincerely yours,

Carolyn L. Searls

Carolyn L. Searls, Senior Associate, VP
I:\98843\00KAIS\R01CLS99.WPD

Photo 1

Kaiser Building, Oakland, California.

Photo 2

Previously patched concrete spall.

Photo 3

Dirty aluminum panels.

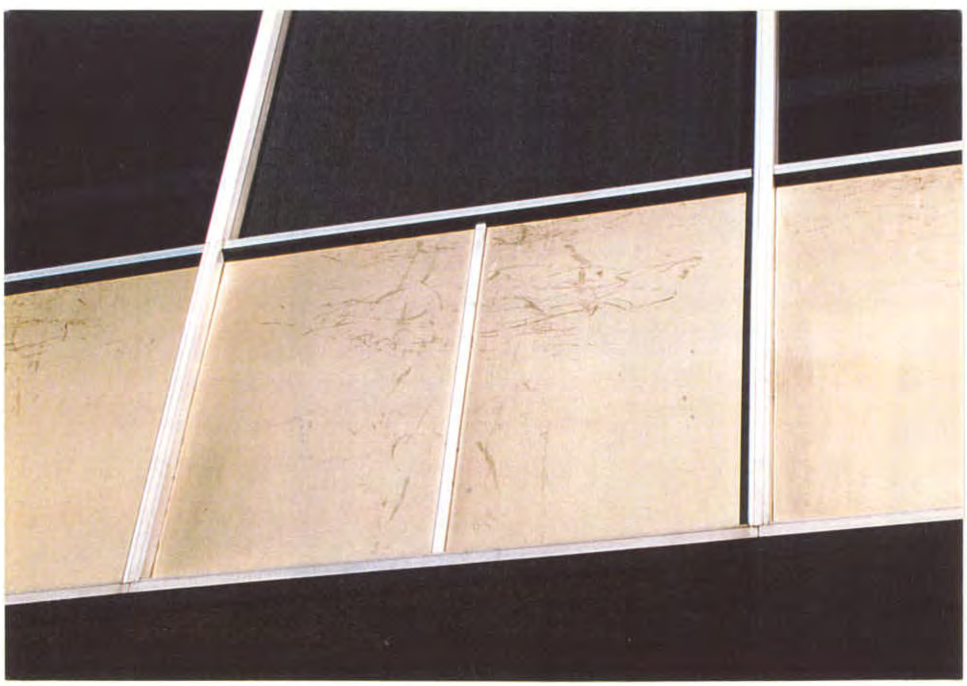


Photo 4

Scratched aluminum on the south side of the podium near ground level.

Photo 5

Typical concrete spall. Note tan-colored aggregate at apex of spall.

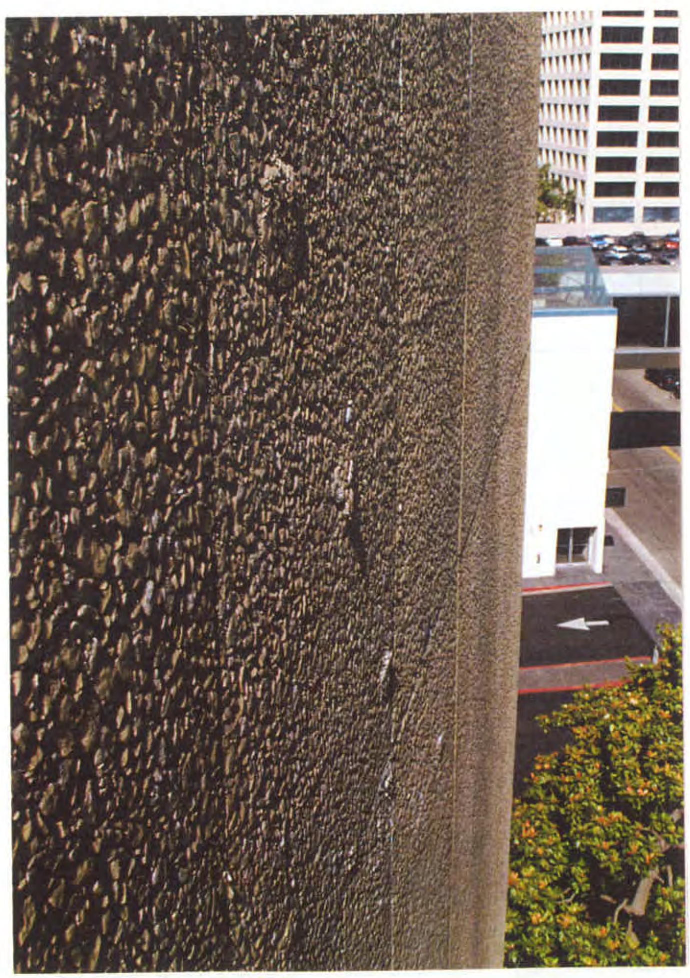


Photo 6

We saw many incipient spalls (popouts that had not yet fallen) on the portion of the south wall adjacent to our drop.

Photo 7

Recent concrete spall. Note how dirty the surface of the concrete is compared to the clean spalled area.

Photo 8

The parapet coping does not cover top of precast concrete panels.

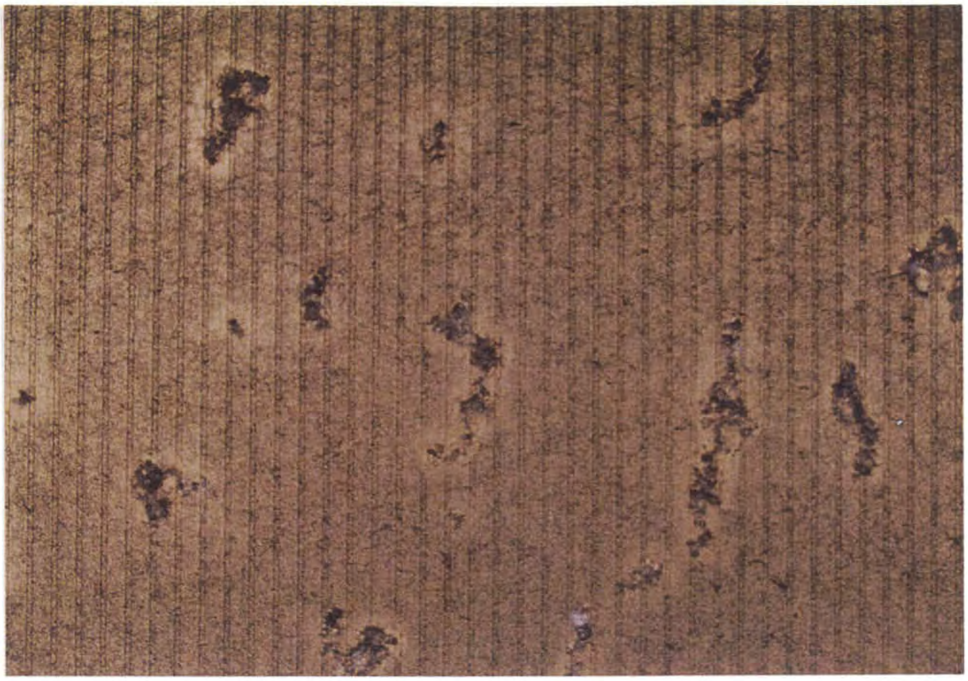


Photo 9

Gold-ribbed panel before cleaning is dirty and pitted. The irregular splotches on the photo are areas of corrosion.

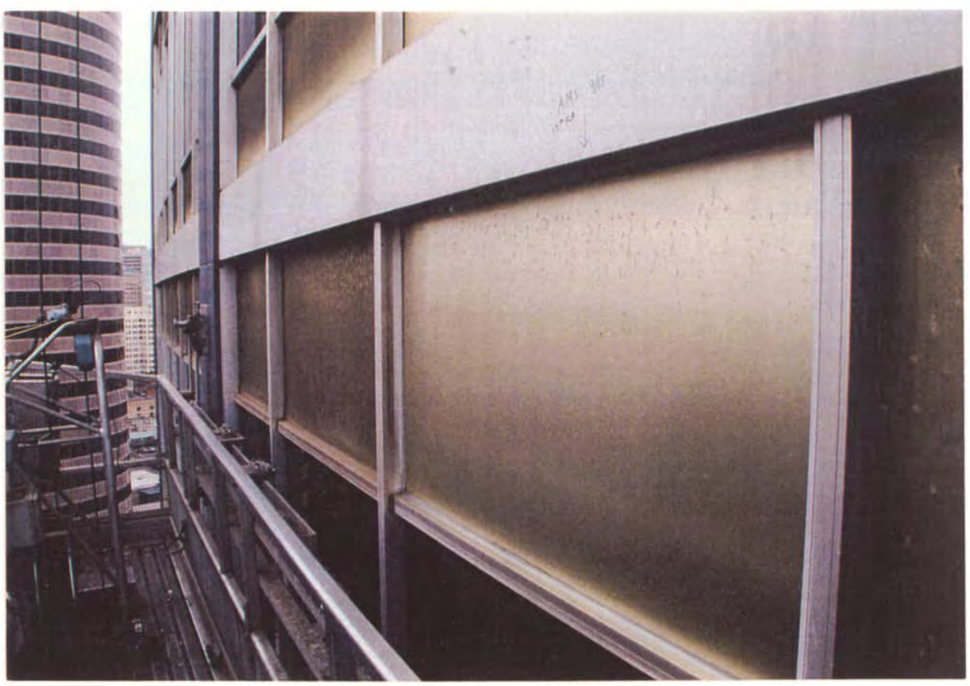


Photo 10

Cleaned gold aluminum panel at 17th Floor.

Photo 11

Cleaned gold aluminum panel at 17th Floor.

Photo 12

Aluminum cleaning mock-ups at the 4th Floor.

Photo 13

Steam cleaning of concrete.

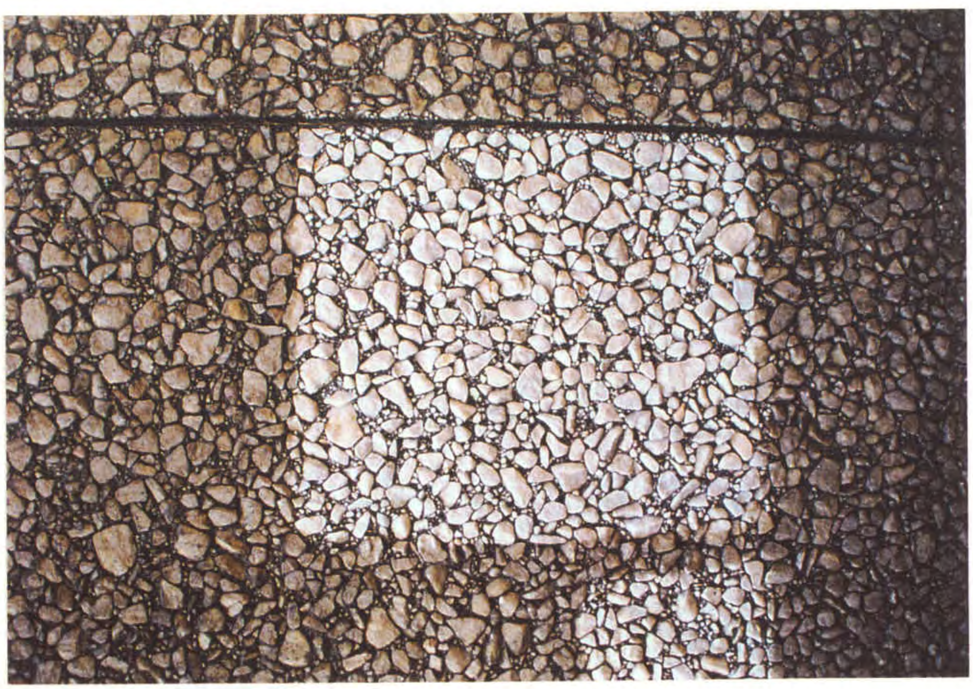


Photo 14

Concrete cleaning test area.

APPENDIX A

MICROSCOPIC EXAMINATION AND ANALYSIS OF HARDENED CONCRETE

Simpson Gumpertz & Heger Inc.
Consulting Engineers

Arlington, MA / San Francisco, CA

M E M O R A N D U M

Date: 2 October 1998

To: Carolyn Searls and File

From: Mauro J. Scali, Staff Consultant/Petrography

Comm. 98843 – Investigation of Precast Concrete Panel Failures – Kaiser Building, San Francisco, CA

Subject: Microscopic Examination and Analysis of Hardened Concrete

Per your request, we have completed a microscopic examination and analysis of hardened concrete samples from the Kaiser Building, located in San Francisco, California. The purpose of the laboratory testing is to determine the underlying cause of popouts in the exposed surfaces of the precast concrete panels on the exterior of the building.

This memorandum provides a summary of the results of the visual and microscopic examination and x-ray diffraction analysis of the submitted test samples.

Sample Description

The test samples consist of two small, irregular, conically-shaped fractured spalled sections of hardened concrete. The test samples were removed from two different precast panels on the exterior of the building. The test samples were identified as ES -1 and ES -2, with nominal dimensions 6X8 in. and 6-1/2 X 9-1/2 in., respectively.

Sample Preparation

Each sample was cut transversely to expose a cross-section of the hardened concrete. The cut sections were then lapped and ground smooth to create planar, polished surfaces for conducting a microscopic examination of the precast concrete. In addition, a portion of each sample was submitted for preparation of ultra-thin (23 μm -27 μm, about 0.0009 in. to 0.001 in. thick) sections that were used to conduct a more detailed examination and analysis of the aggregate and surrounding paste structure.

A portion of Sample ES -1 containing a fragment of a tan color aggregate was submitted to an independent testing laboratory for x-ray diffraction (XRD) analysis. The sample was selected on the basis of the location of the aggregate near the center of the fractured concrete surface.

Microscopic Examination

Using both visual and microscopic techniques, portions of prepared and unprepared surfaces of each sample, including ultra-thin sections, were examined in accordance with selected portions of ASTM C856 "Petrographic Examination of Hardened Concrete."

Polished and fractured sections from each sample were examined with the aid of a stereo microscope at magnifications of 10X to 100X. In addition, a more detailed examination of the prepared thin sections was conducted with the aid of a transmitted-light polarizing microscope, at magnifications of 50X to 800X.

Test Results

Visual and Microscopic Examinaiton

The results of our visual and microscopic examination are summarized below:

- Both samples exhibit a conical cross-section having a maximum thickness of 1-1/4 in. In both instances, there are multiple pieces of small (1/8 to 1/4 in.), tan to brown color aggregate located at the apex or along the crest of the conical spall fracture (Figures 1 and 2).
- The small tan color particles are soft and easily disrupted when probed with a steel pick.
- The exterior surface of the concrete is dark with light color splotches (Figure 3). The dark color is due to a yellowed, translucent polymer coating on the exterior surface of the concrete. The surface coating exhibits extensive cracking and has pulled away from the surfaces of exposed aggregate particles creating the contrasting light color splotches (Figure 4).
- In general, the surface coating is well bonded to the concrete, except where it has curled and pulled away from the coarse aggregate particles (Figure 5).
- The coarse aggregate consists of 3/4 to 1 in. maximum sized particles of white marble, which are present throughout the full depth of the spalled concrete.
- There is microcracking and evidence of expansion fractures in the tan color aggregate particles (Figure 6).

X-Ray Diffraction (XRD) Analysis

The results of the XRD analysis are summarized below and a copy of the x-ray spectra is included as an attachment to this report. The x-ray diffraction analysis identified the following phases in the tan color particles.

- MgO
- $Ca(OH)_2$
- Calcite ($CaCO_3$)
- Brucite [$Mg(OH)_2$]
- Hematite (Fe_2O_3)
- Aragonite ($CaCO_3$), small amounts
- Dolomite [$CaMg(CO_3)_2$], small amounts

Based on the presence of the above compounds and mineral species, the following chemical reactions are believed to have occurred when the tan color particles were exposed to moisture:

$CaO + H_2O = Ca(OH)_2$, calcium hydroxide
$MgO + H_2O = Mg(OH)_2$, brucite

Both of these reactions can result in as much as a 200% increase in the volume of the aggregate.

Subsequently, the calcium hydroxide combines with air and water-borne carbon dioxide (CO_2) to form the calcium carbonate that was detected in the tan color particles. The CaO reaction is much more rapid and more likely to have gone to completion as compared to the MgO reaction. Therefore, it is not surprising that CaO (lime) was not detected by XRD analysis of the already expanded tan color aggregate.

Summary and Conclusions

Based on all of the test results, it is concluded that the surface popouts are due to the presence of a contaminant within the concrete, which is expansive in the presence moisture.

The XRD analysis detected calcium carbonate and brucite that were formed from lime (CaO) and magnesium oxide (MgO) in the original aggregate. The tan color aggregate also contains small amounts of dolomite and Aragonite.

The presence of dolomite and Aragonite indicate that the tan color fragments were originally formed from a dolomitic rock. Furthermore, the small quantities of dolomite, the presence of magnesium oxide and the tan color of aggregate fragments indicate that the aggregate particles represent fragments of burnt dolomite.

The XRD analysis reveals the presence of substantial amounts of MgO that remain unreacted in the tan color aggregate. Therefore, there is a real possibility of continued expansion and spalling of the precast concrete, unless the ingress of moisture is halted.

Despite the evidence of extensive cracking, discoloration and partial debonding, the coating on the exterior surface of the concrete has contributed to moisture being trapped behind the surface of the concrete.

The constant availability of moisture ensures that the expansion can and will continue as long as there are sites of unreacted lime (CaO) and magnesium oxide (MgO) in the tan color aggregate. Therefore, the existing surface coating should be removed by mechanical abrasion and replaced with a breathable coating such as a silane or siloxane sealer.

MJS02-98.mmb

Figure 1.

A view of the underside of Sample ES -1 showing the presence of two tan color aggregate fragments along the apex of the surface spall.

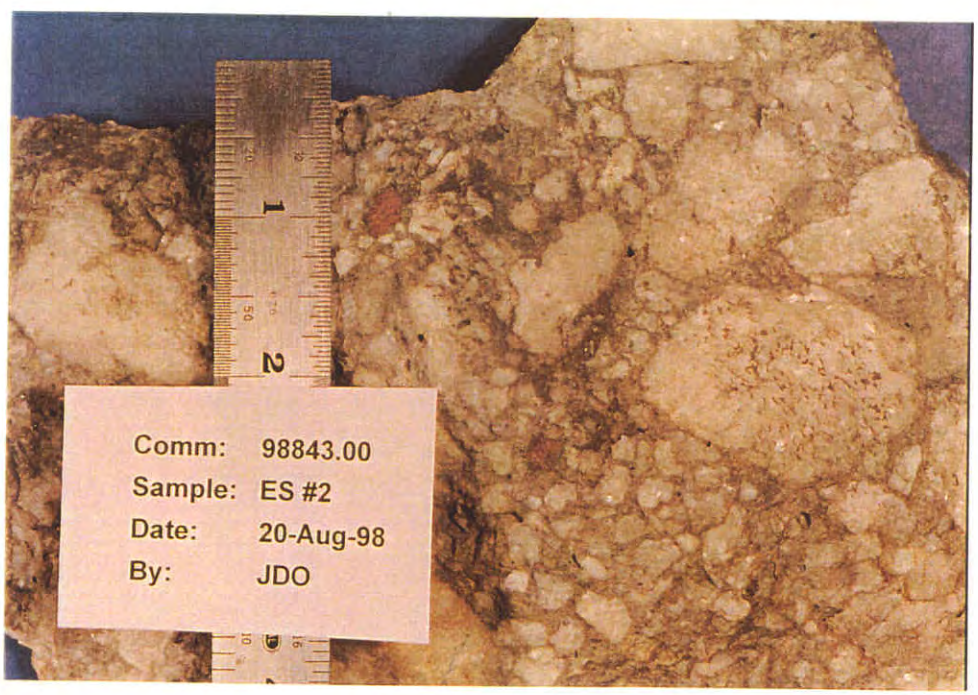


Figure 2.

A view of the underside of Sample ES -2 showing the presence of two tan color aggregate fragments along the apex of the surface spall.

Figure 3.

A view of the exterior surface of the precast concrete at the location for Sample ES - 2. Note the generally dark color of the concrete and the contrasting light color splotches.

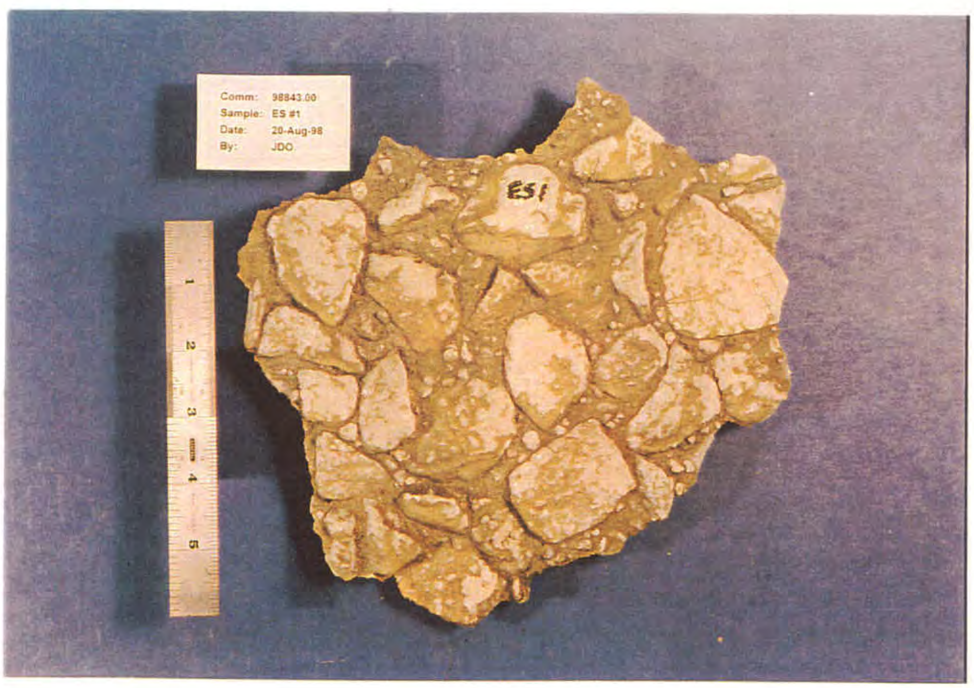


Figure 4.

A close-up view of the surface coating on Sample ES - 1 showing exposed coarse aggregate particles that are only partially covered with the surface coating material.

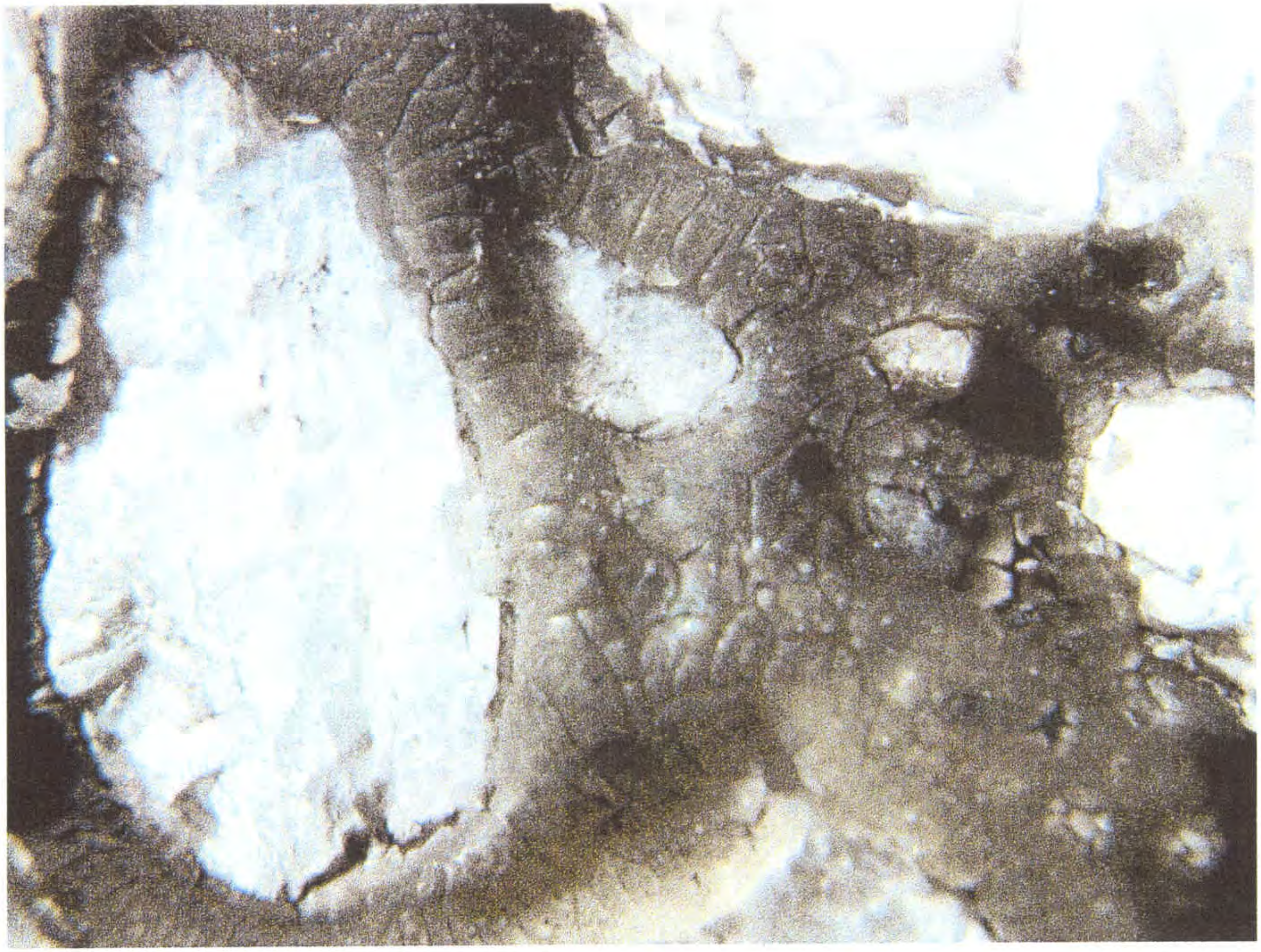


Figure 5 - A magnified (10X) view of the surface of Sample ES - 2 showing discoloration and extensive cracking of the surface coating material. Also note the contrasting color of the exposed white marble aggregate.

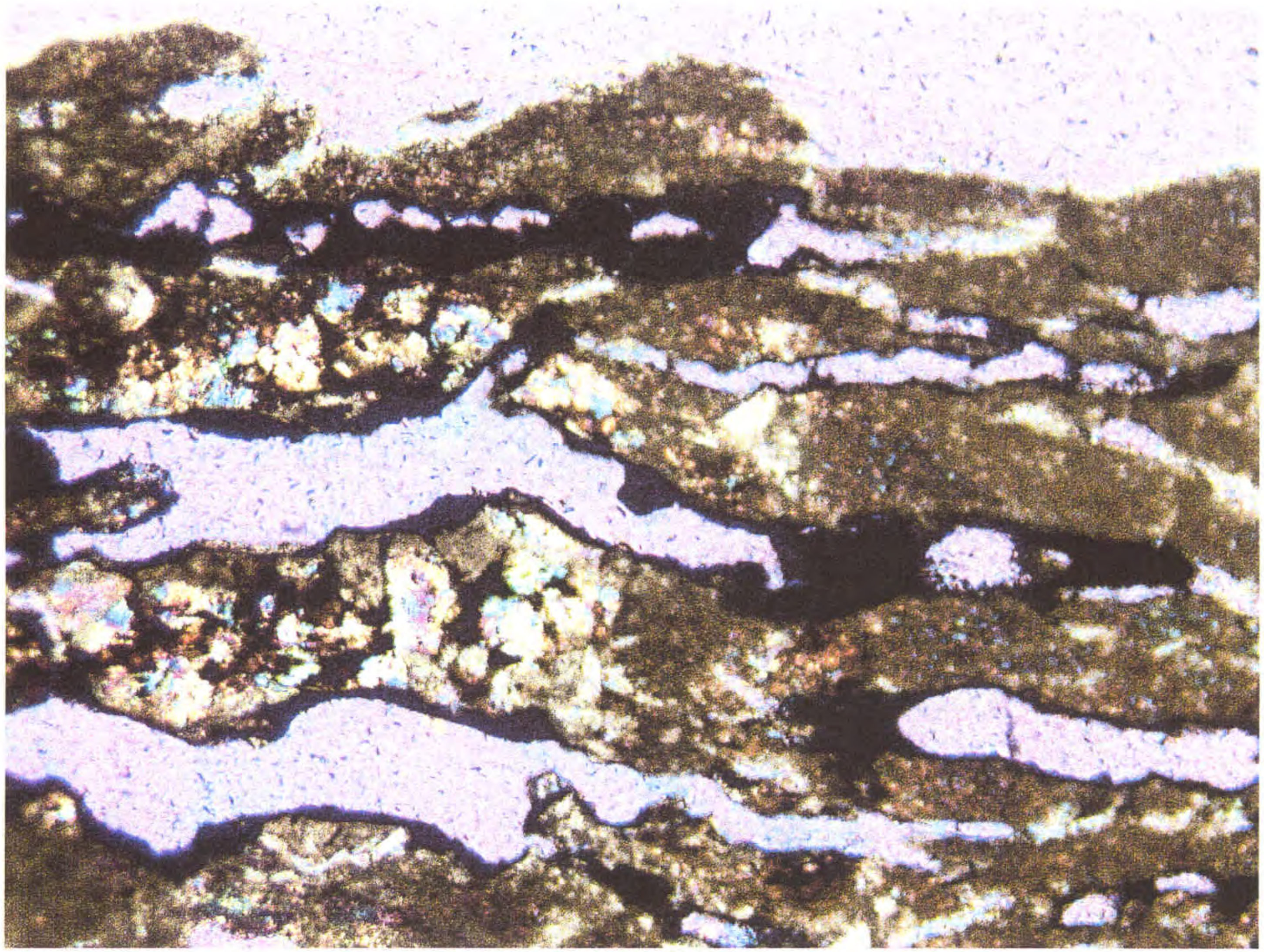


Figure 6 - A magnified (100X) view of a thin section from near the center of the concrete spall in Sample ES - 1. Note the large expansion fractures through the dolomite aggregate (colorful particle located left of center). Also note the extension of the fractures into the surrounding paste structure.

APPENDIX B

WATER REPELLENT EVALUATION

Laboratory Report

CONSTRUCTION PRODUCTS GROUP

CHEM-TRETE® Weatherproofing

Water Repellent Evaluation

TS-369-088

DATE:

November 16, 1998

PROJECT:

Kaiser Center
300 Lakeside Drive, Suite 130
Oakland, CA 94612

SAMPLES RECEIVED:

(3) pieces of Precast Concrete (spalled from structure)

RECEIVED FROM:

Mr. Joe Link
Specialty Construction Products
P.O. Box 1674
Sebastopol, CA 95473

Regional Sales Manager: Bob Dooley

PURPOSE:

To determine the effectiveness of Dynasylan BH-N at reducing water ingress in the supplied specimens for the purpose of warranty qualification.

SAMPLE PREPARATION:

Specimens received were oven dried at 110°C for 24 hours to remove atmospheric moisture. The entire circumference of each sample was waxed to prevent water absorption along sides during testing.

TREATMENT OF SAMPLE:

Specimen number 1 was laboratory treated with flood coat of Dynasylan BH-N. Specimen number 2 remained untreated as a control.

The third specimen was retained.

SIVENTO INC. STANDARD TEST PROCEDURES:

Water Absorption Test: (Modified ASTM C- 642)

The cooled specimen(s) was weighed to the nearest 0.01 grams, then placed treated or exposed surface only, in a tank containing several inches of tap water for a period of 24 hours. The specimen(s) was then removed from the water, towel dried and reweighed. The initial and final weights were used to calculate the 24 Hour Treated Water Absorption values.

Depth of Penetration:

Each sample was split longitudinally using a hammer and chisel. Sample half was placed fractured surface down in a water soluble dye solution. Only the untreated portion of each sample absorbs the solution and becomes stained. The depth of penetration is measured from the surface down to stained region, highest and lowest penetration is recorded.

TEST RESULTS:

Water Absorption and Depth of Penetration:

Sample No.	Sample Treatment	24 Hour Water Absorption (%)	Depth of Penetration (inches)
1	Dynasylan BH-N	0.27	Full
2	Control	0.9	–

CONCLUSION:

Test results indicate that Dynasylan BH-N is very effective at reducing water ingress in the supplied specimens. Data shows a very low 0.27 % uptake of water for the treated specimen compared to the relatively low 0.9 % for the control. Dynasylan BH-N penetrated the full depth of specimen to a measurement of approximately one inch.

Observations indicate that a significant amount of epoxy coating remains on the surface of the received samples.

Turner

Turner Construction Company
1625 Clay Street
Oakland, California 94612
phone: (510) 267-8100
fax: (510) 267-8118

November 20, 2008

Tomas Schoenberg
The Swig Company, LLC
220 Montgomery Street
San Francisco, CA 94104

Re: Kaiser Center- Mall Buildings Exterior Façade (Dolomite Panels) Feasibility Analysis

Dear Tomas,

Thank you for requesting Turner Construction Company to provide an analysis of the exterior façade of the two existing Mall Buildings at the Kaiser Center complex. Per your request, we have evaluated the feasibility of the intact salvaging (removal) of the Dolomite Precast Panels from the structure of the Mall Buildings, and then the potential preservation and reinstallation of these panels on a new structure at that location.

Scope
The scope of the study included a detailed review of the original 1958 Architectural and Structural Drawings and Specifications for both the Kaiser Center office tower and Mall Buildings prepared by Welton Becket & Associates, as well as a visual inspection of these buildings. Both the tower and Mall Buildings were reviewed due to the variation in panel thickness and attachment details given their different structural frames.

Findings
A review of the original construction documents for the Mall Buildings yielded two Architectural details and one Structural detail as the primary elements influencing our findings (please reference Architectural Detail “A” and Detail “B”, and Structural Detail “C” attached to this document). The key element is the 1 inch thick grout layer shown between the 3 inch thick precast panels and the buildings’ concrete frame, as referenced on the attached Details “A” and “B”. The grout bonds the panel to the concrete as if the panel were cast in place, thus effectively creating a unified section. While the Structural details do not show how the panels are to be attached, Detail “C” does show the same unified section for the panel and grout of 4 inches thick. From our visual inspection we did not see anything to suggest that the panels were installed other than the manner is shown in the drawings. It should be noted that none of these details reference any mechanical attachment for the precast panels that is common in current construction methods (the fastener shown in Detail “A” is for a vertical aluminum mullion interfacing between the panels and is not for the panels’ attachment to the building); please reference attached Details SK1A and SK1B as examples of typical precast attachment details.

It is important to note that in our experience renovating another high-rise building in Oakland of similar vintage with a similar precast system, the precast panels were actually used as the form surface for the shearwall concrete, thus casting the panels into the unified concrete frame. Separating the panels from the building’s concrete frame required extensive hand demolition of the panels utilizing chipping guns. It is possible that this method of attachment may have been used in certain areas of the Mall Building as well, and thus removal would have the same result as the grouted bonding of the panels stipulated in the original design.

Turner

Conclusion
Based upon our review of the design documents and our visual inspection, the attachment of these precast Dolomite panels to the Mall Buildings' concrete frame precludes their mechanical removal other than by destructive methods. Further, even attempting to remove the panels by careful hand demolition would most likely cause them to disintegrate due to the nature of their material composition and age. Therefore, it is our opinion that, irrespective of cost, it would be infeasible for the Dolomite precast exterior façade at the Mall Buildings to be salvaged in a manner that would allow their reuse on any new structure. In addition, while it may be possible to salvage some limited amounts of the Dolomite material from the panels, a reasonable approach to demolition of the structure would not yield any "clean" or consistent material for incorporation into the proposed new building façade.

We also consulted two other construction firms that specialize in precast panel manufacturing and installation, Walters & Wolf and Clark Pacific, who reviewed and commented on the pertinent design documents with respect to the Dolomite panels and their opinions and conclusions align with ours.

We welcome the opportunity to discuss this analysis with you or whomever else you feel is appropriate, and would be glad to answer any further questions you may have.

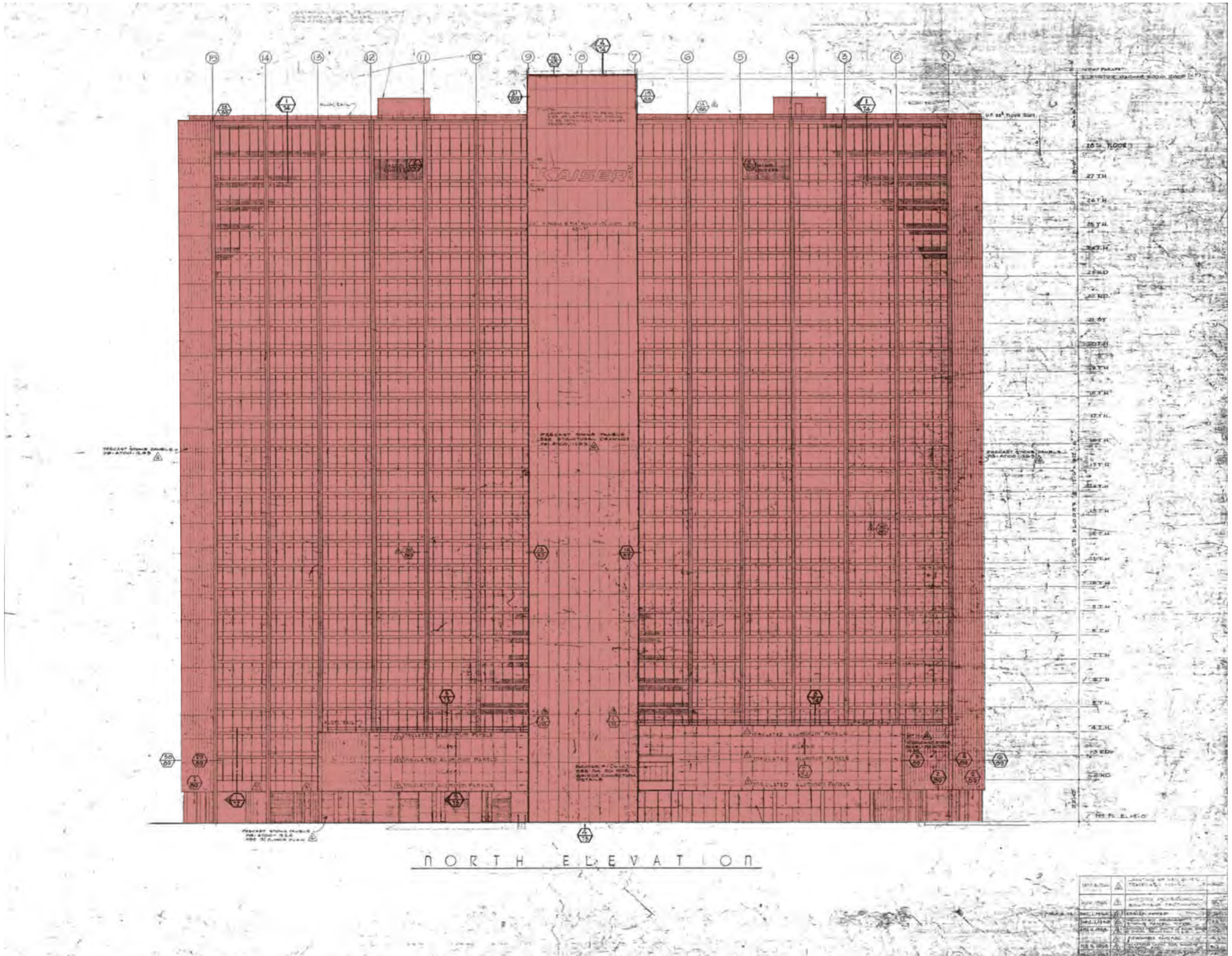
Sincerely,

Willy Mautner, AIA
Chief Estimator

Cc: Deborah Boyer, The Swig Company, LLC
Scott Eastman, Turner Construction Company

APPENDIX C

Significance Diagrams



Significant

Contributing

Non-Contributing

Kaiser Center Office Tower

North Elevation

11 September 2008

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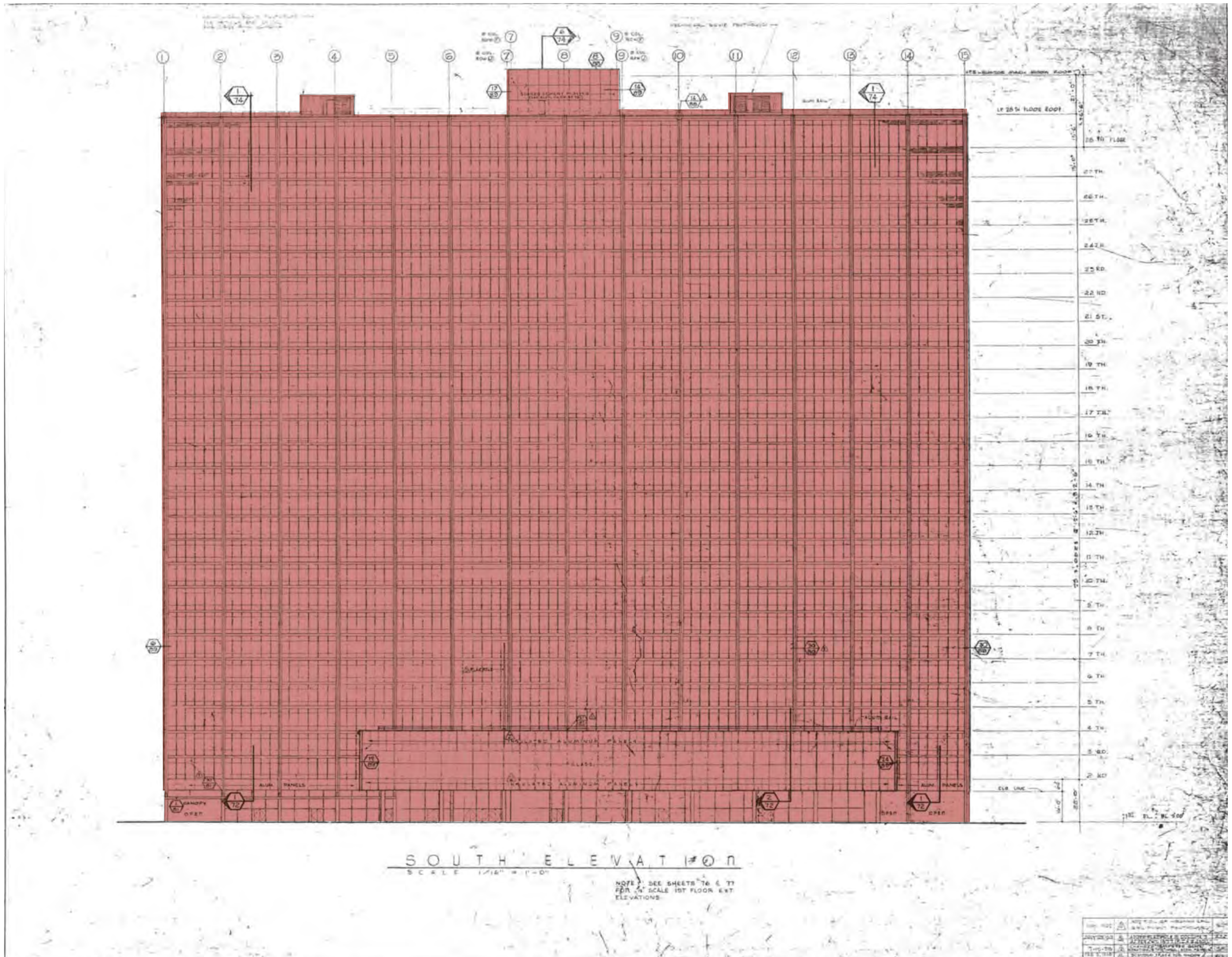

Significant

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Kaiser Center Office Tower

South Elevation

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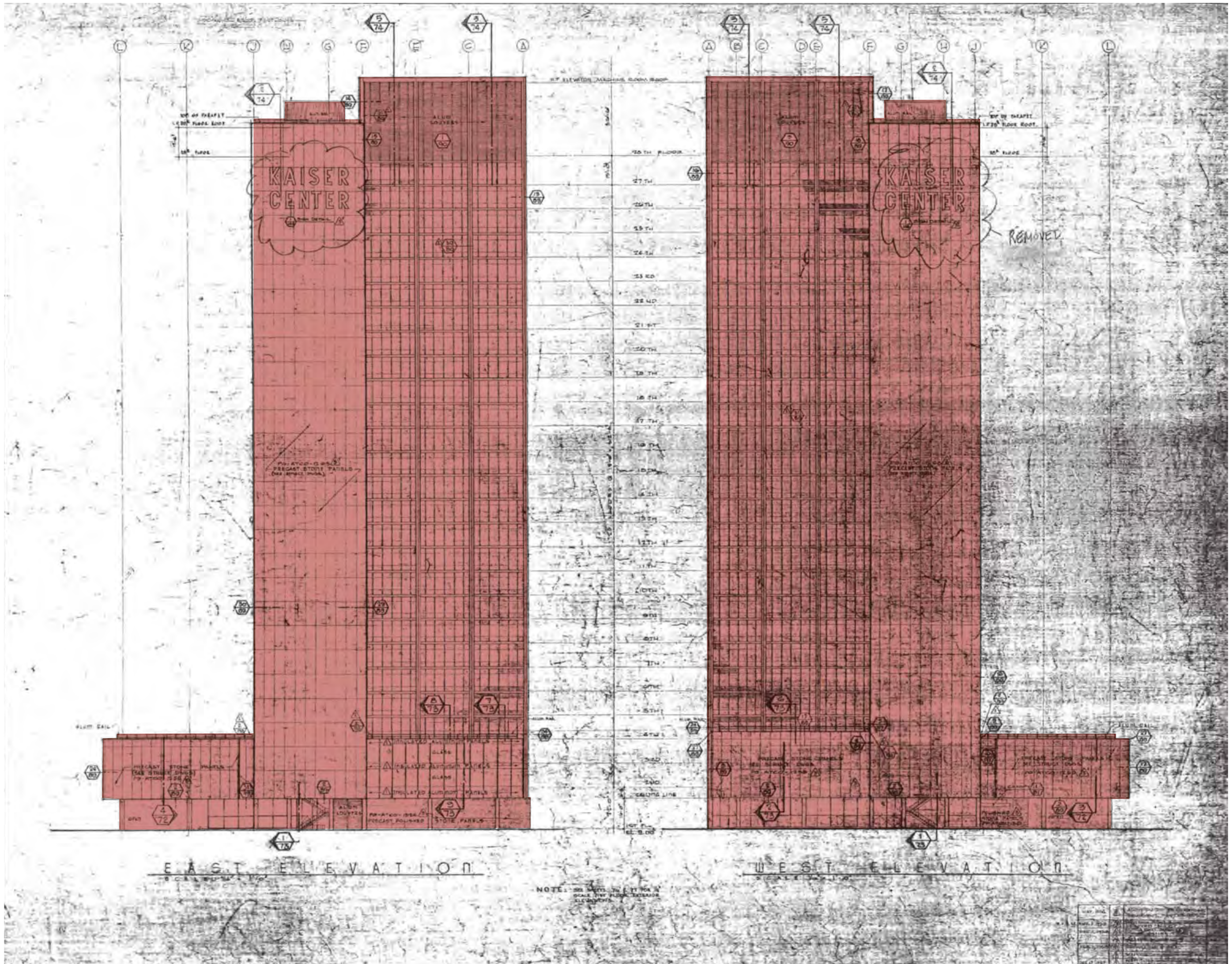

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Non-Contributing

Kaiser Center Office Tower

East & West Elevations

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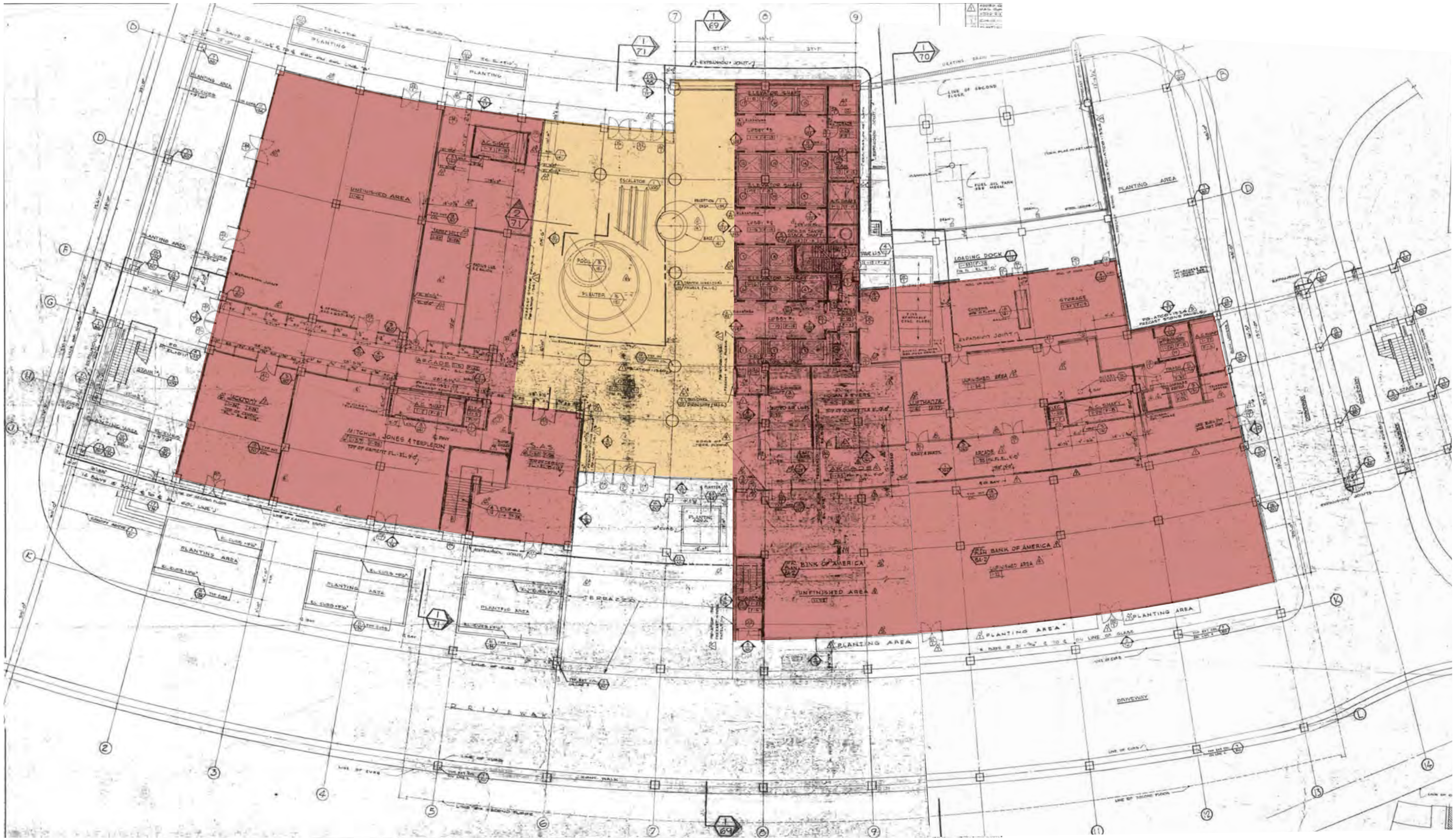

Significant

Contributing

Non-Contributing

Kaiser Center Office Tower

First Floor

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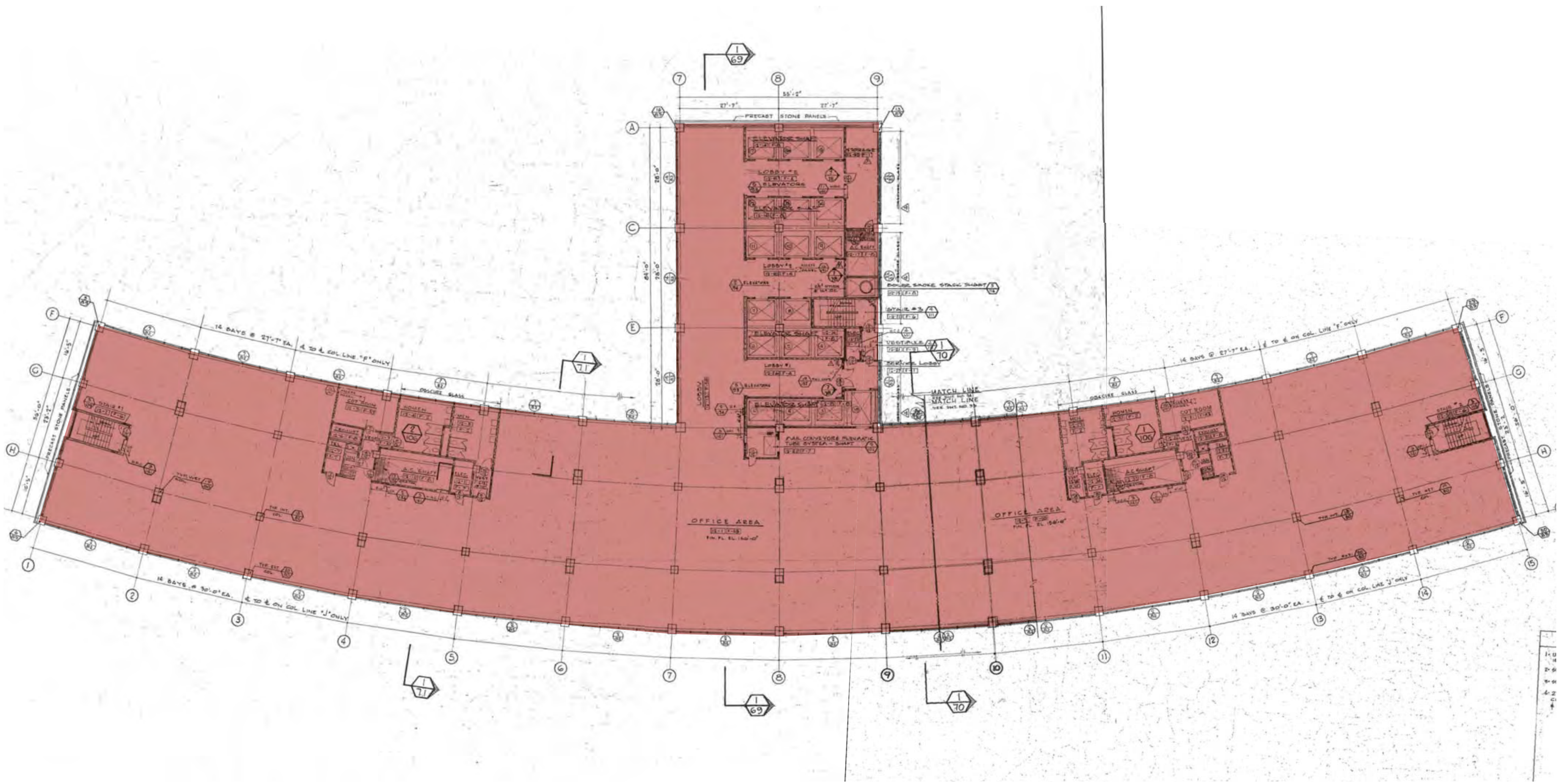

Significant

Contributing

Non-Contributing

Kaiser Center Office Tower

Upper Floors

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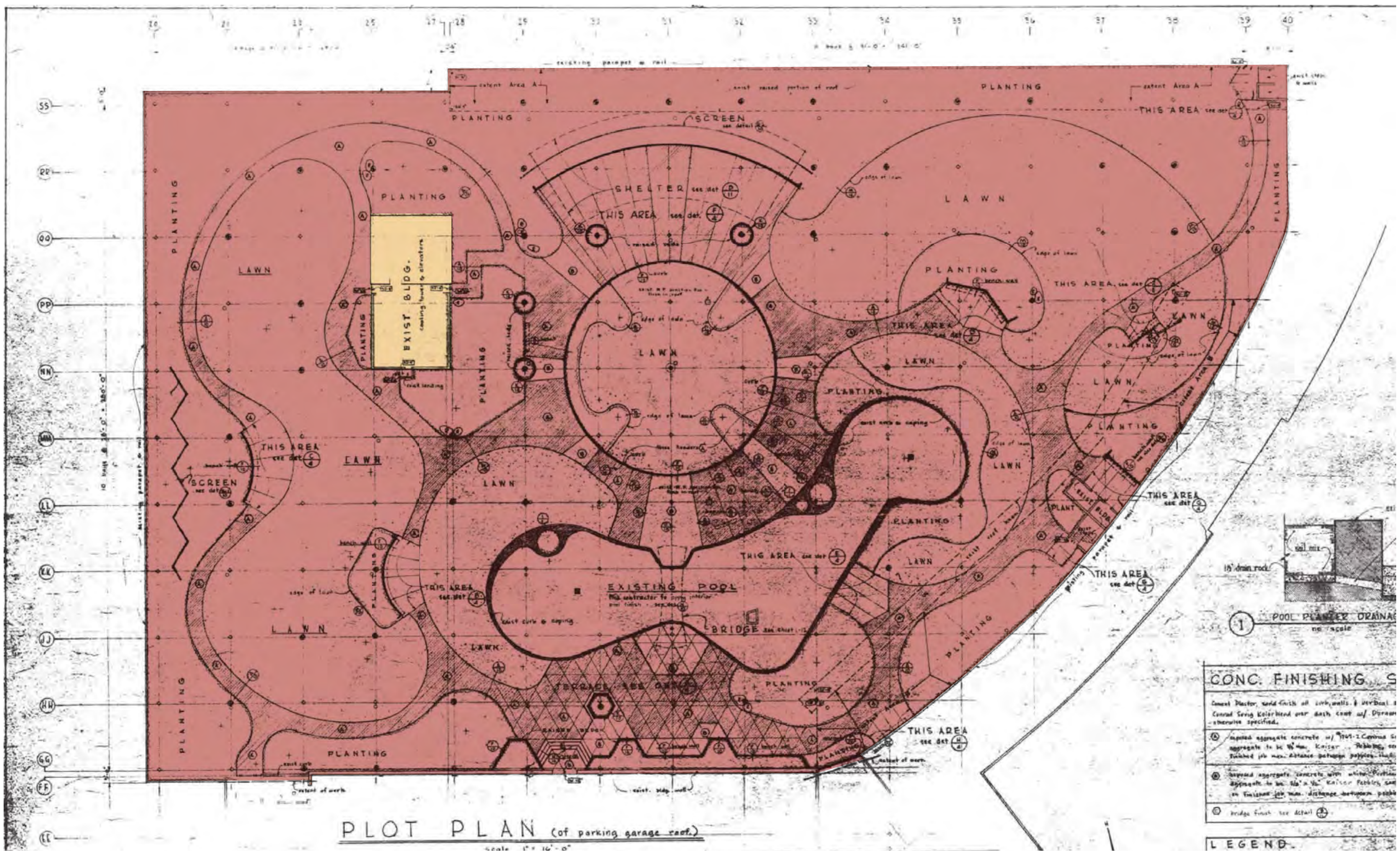

Significant

Contributing

Non-Contributing

Kaiser Center Roof Garden

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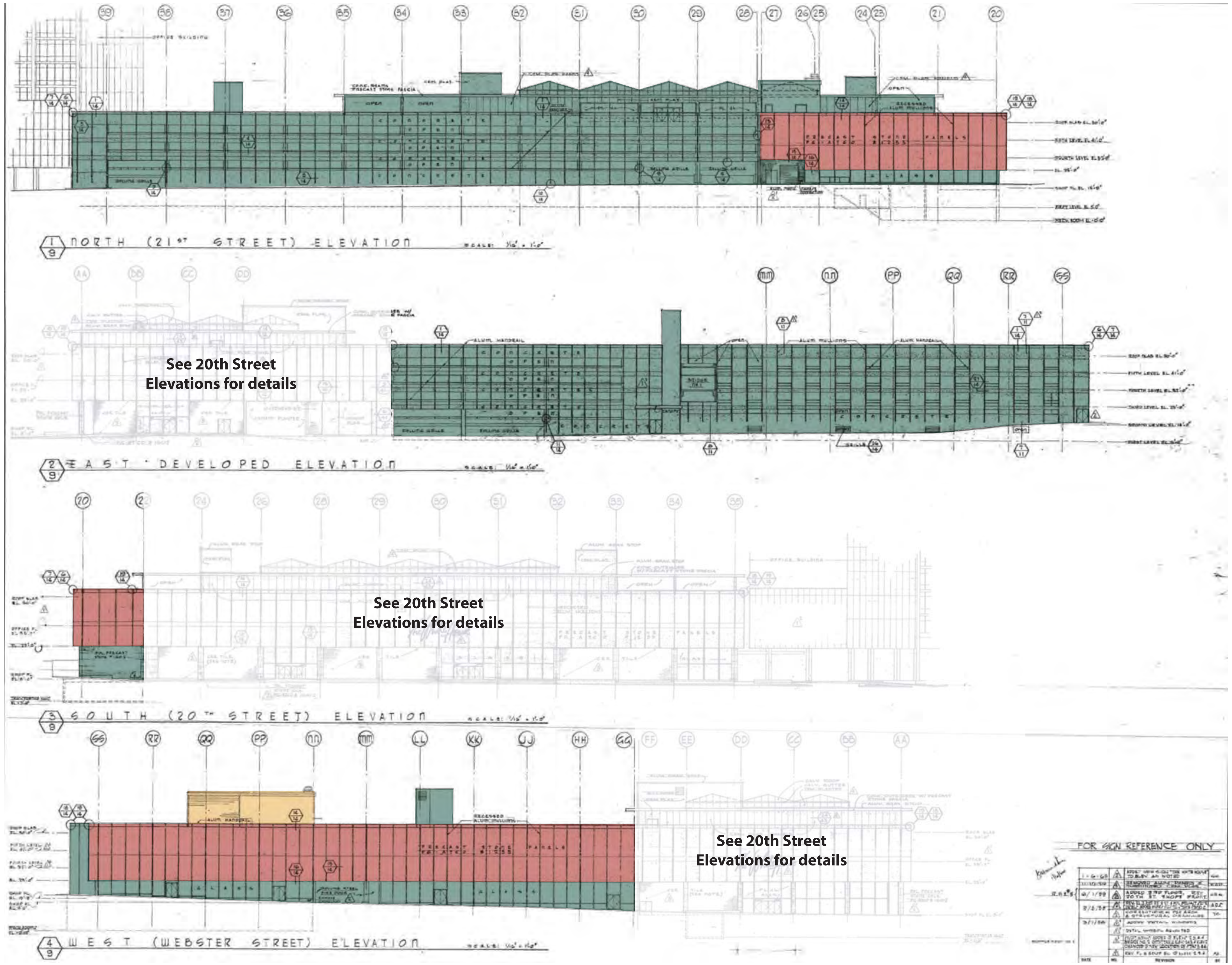

Significant

Contributing

Non-Contributing

Kaiser Center Mall Building

Elevations

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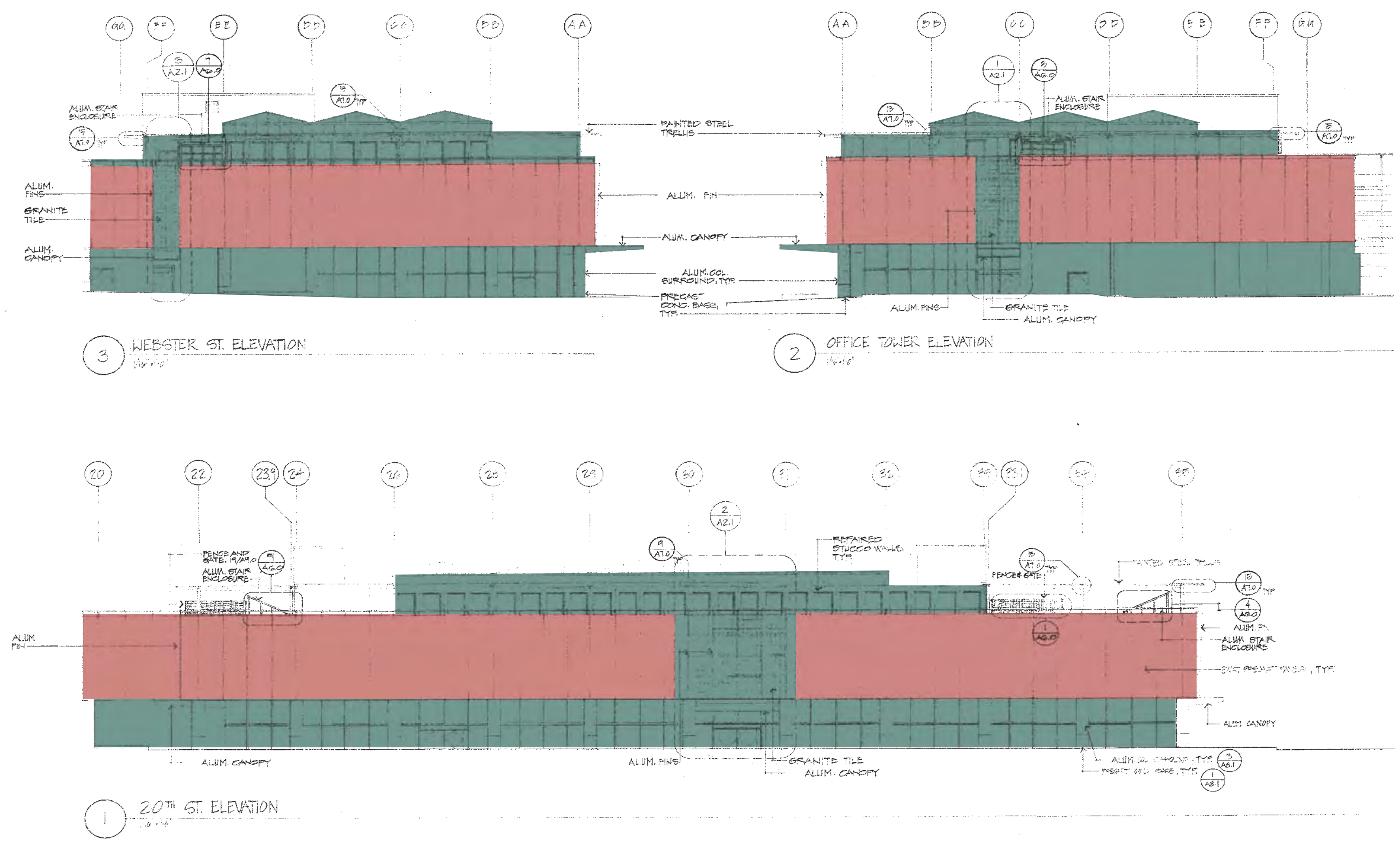

Significant

Contributing

Non-Contributing

Kaiser Center Mall Building

20th Street Building Elevations

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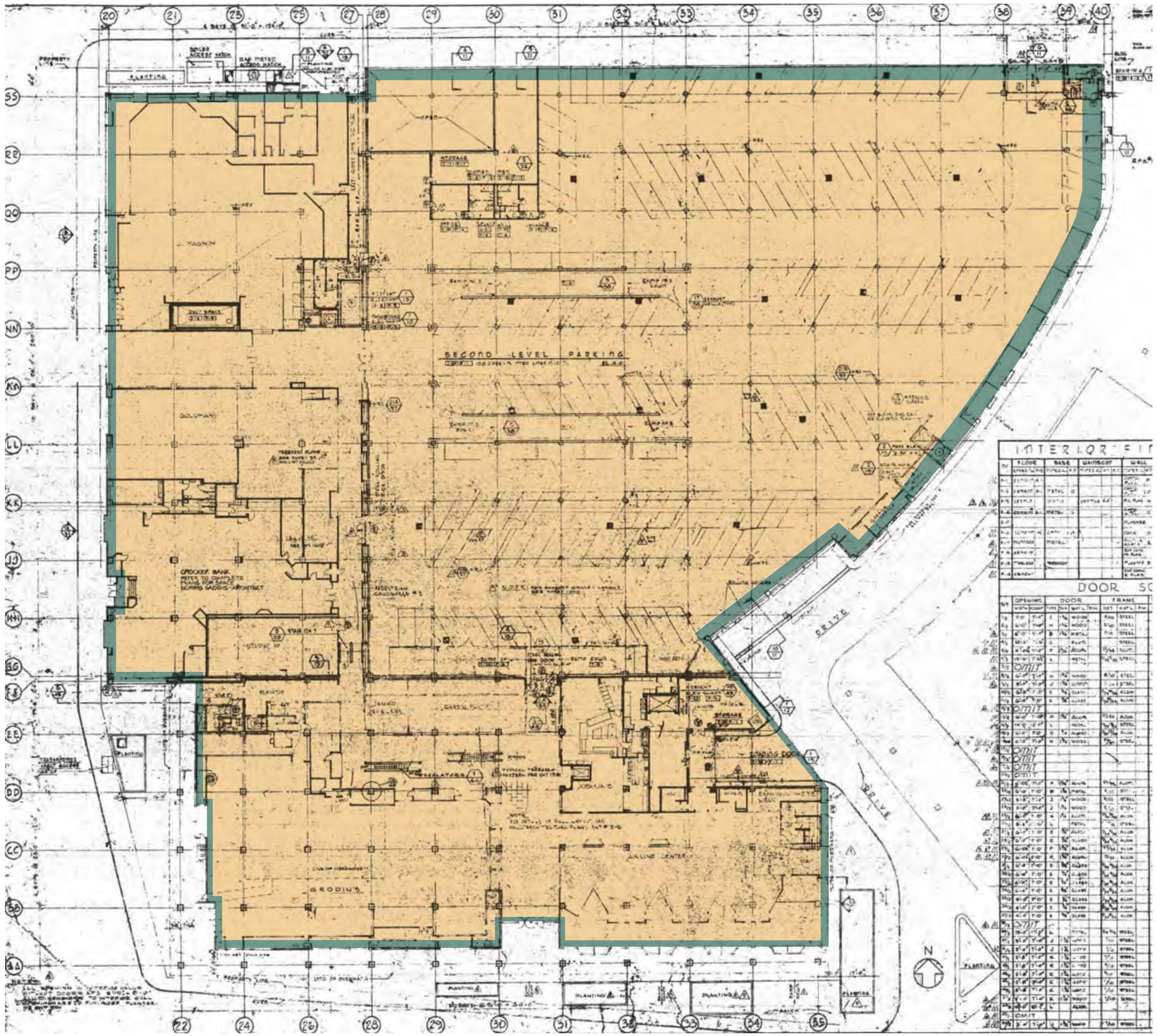

Significant

Contributing

Non-Contributing

Kaiser Center
Mall Building

First Floor Shops/
Second Level Parking

11 September 2008

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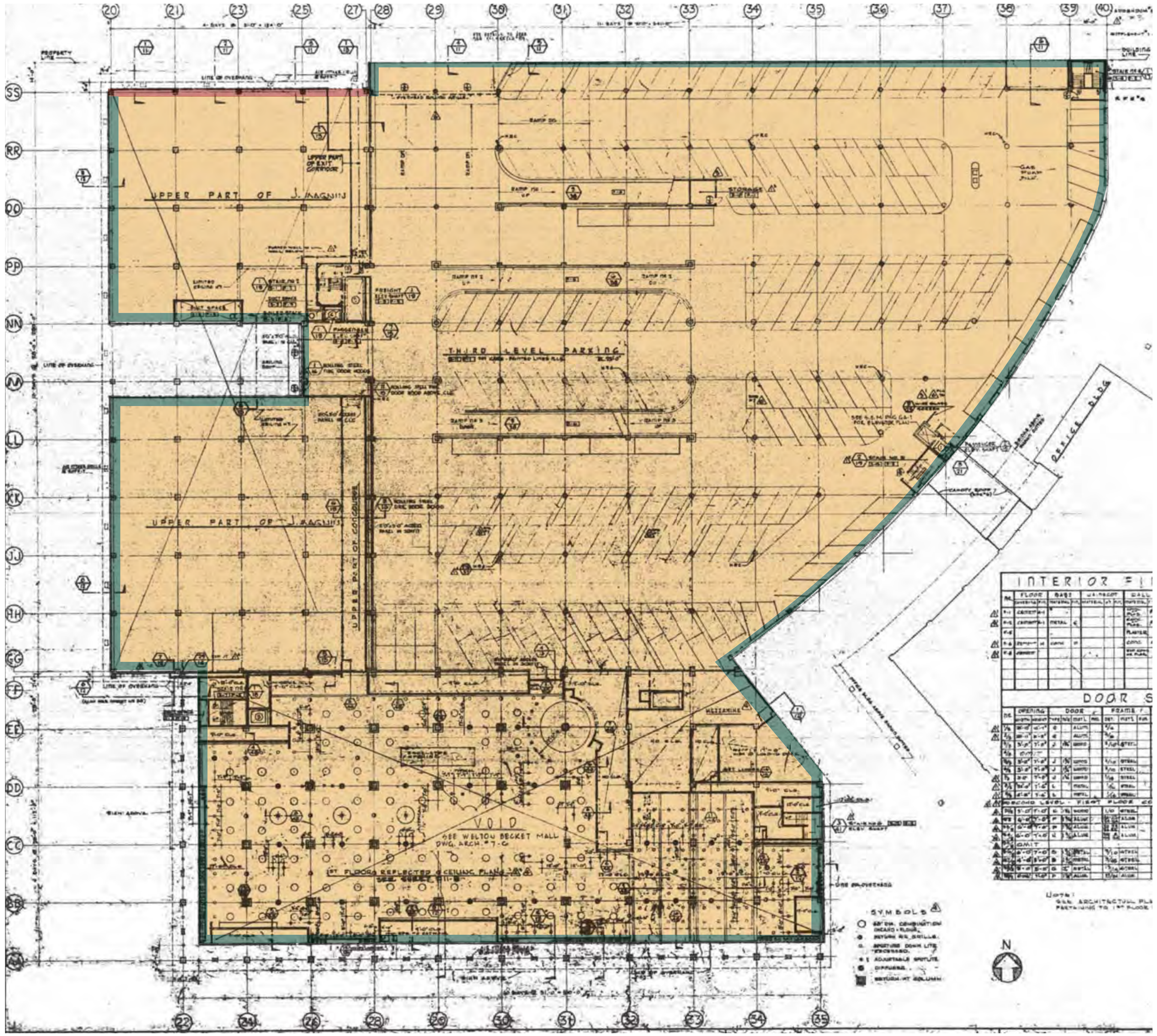

Significant

Contributing

Non-Contributing

Kaiser Center
Mall Building

First Floor Shops/
Third Level Parking

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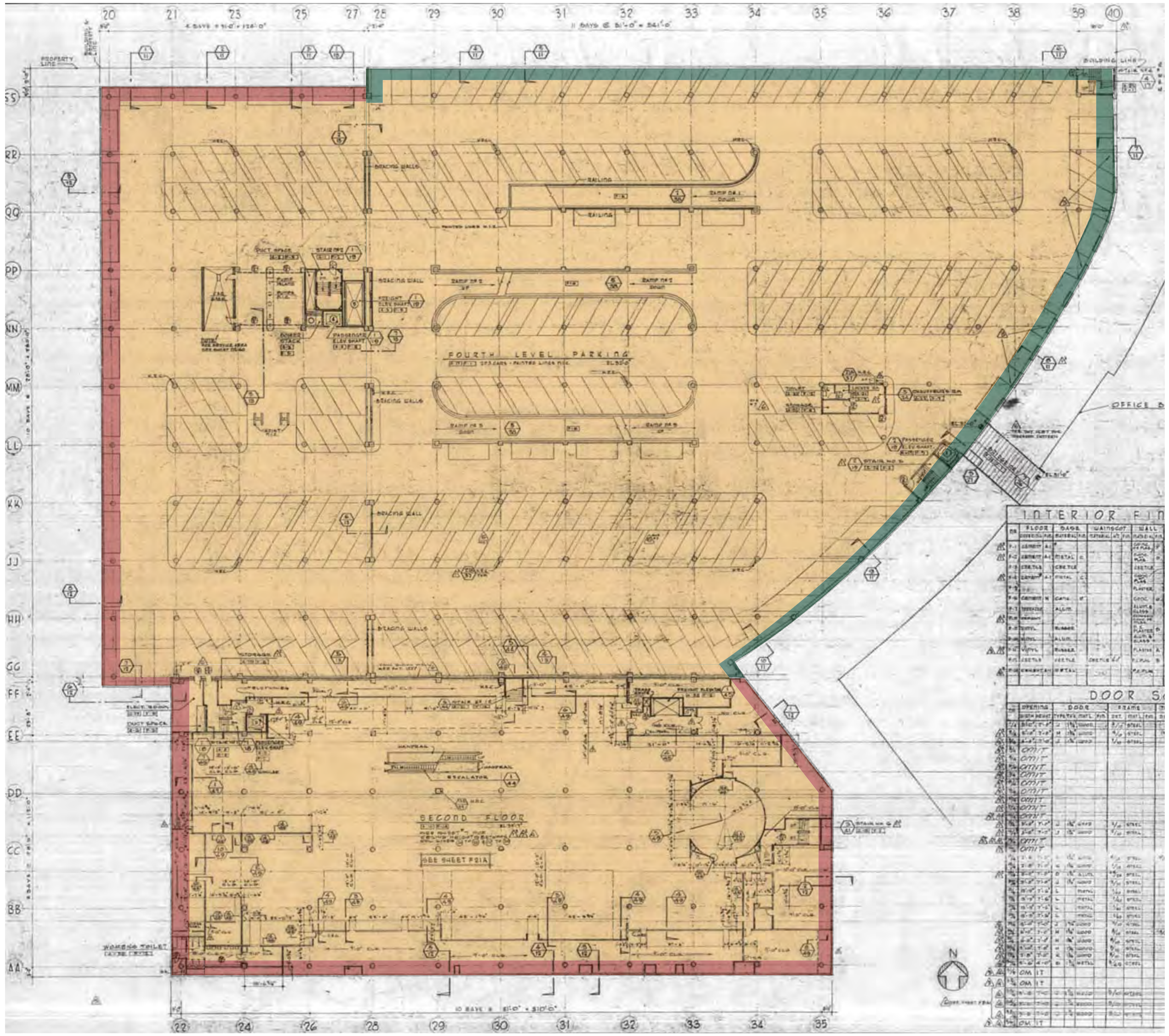

Significant

Contributing

Non-Contributing

Kaiser Center
Mall Building

Second Floor Offices /
Fourth Floor Parking

11 September 2008

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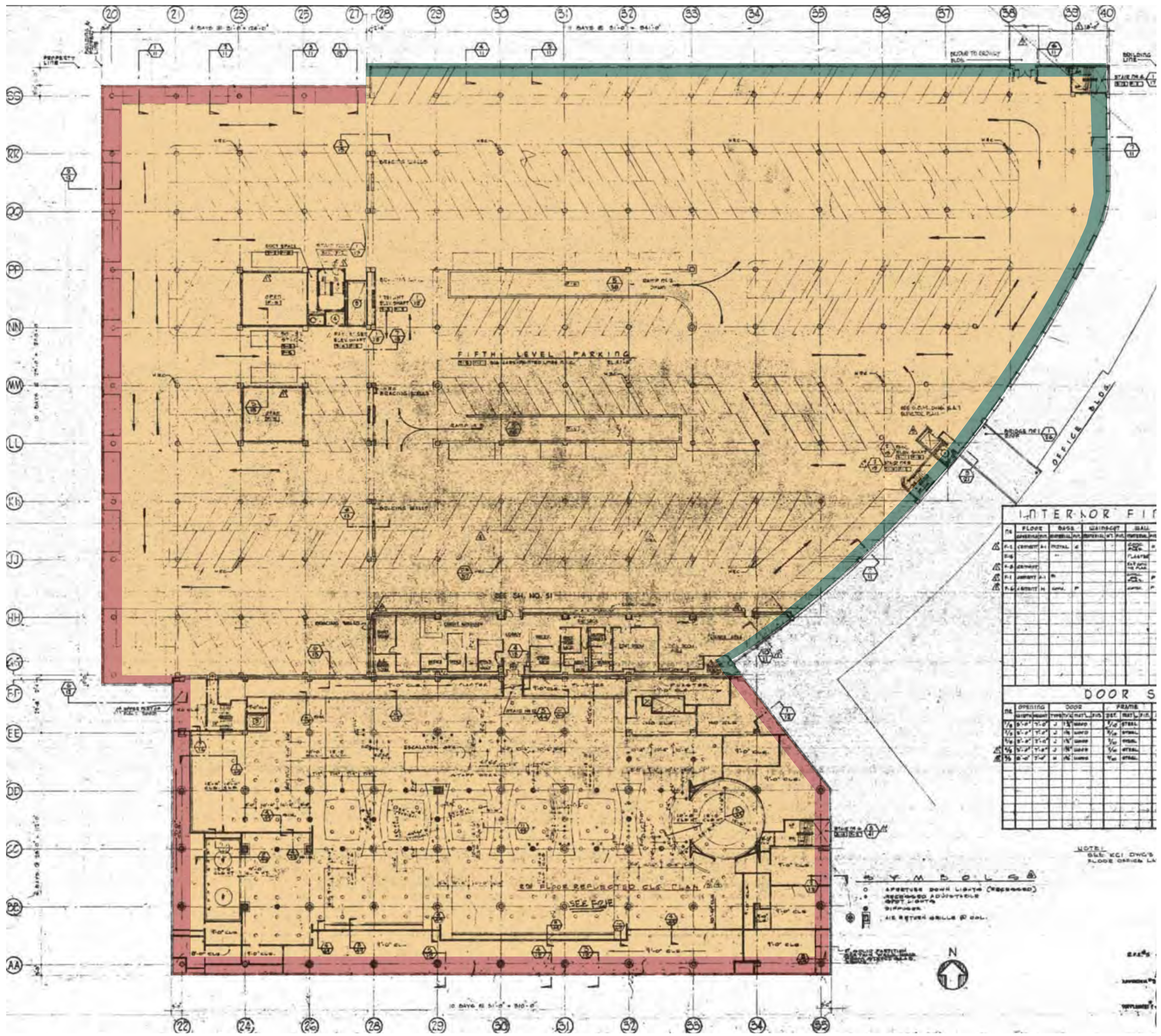

Significant

Contributing

Non-Contributing

Kaiser Center
Mall Building

Second Floor Offices /
Fifth Floor Parking

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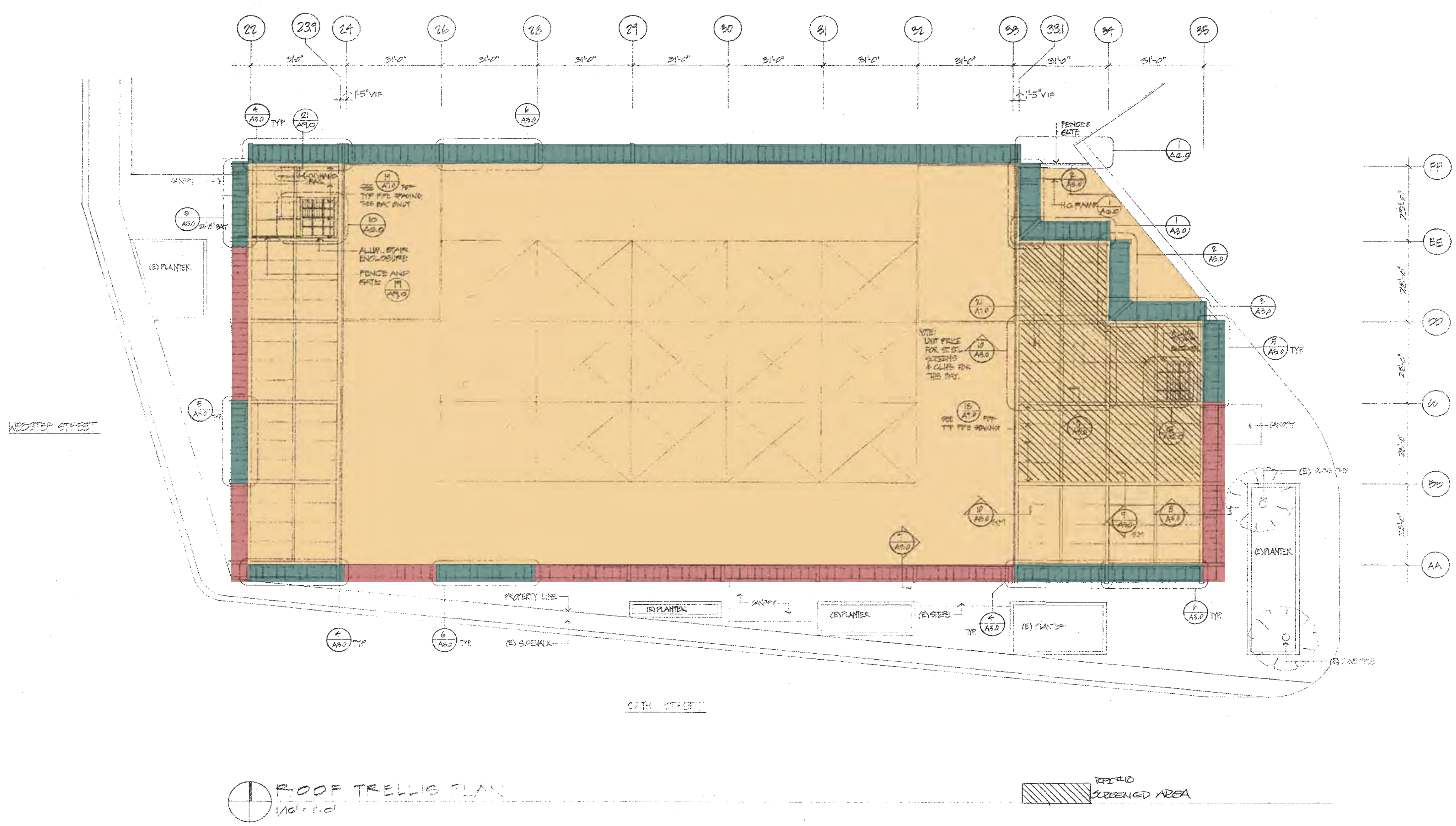

Significant

Contributing

Non-Contributing

Kaiser Center Mall Building

20th Street Building Roof Terrace

11 September 2008

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APPENDIX D

DPR 523 A & B Form

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #________
HRI #________
Trinomial________
NRHP Status Code________
Other Listings________
Review Code________ Reviewer________ Date________

 Resource name(s) or number(assigned by recorder) Kaiser Center and Roof Garden

P1. Other Identifier:
***P2. Location:** ☐Not for Publication ☒Unrestricted ***a. County** Alameda
***b. USGS 7.5' Quad** Oakland, CA. **Date:** 1995
***c. Address** 300 Lakeside Drive **City** Oakland **Zip** 94612
***e. Other Locational Data:** Assessor's Parcel Number Block: 652 Lot: 1-5

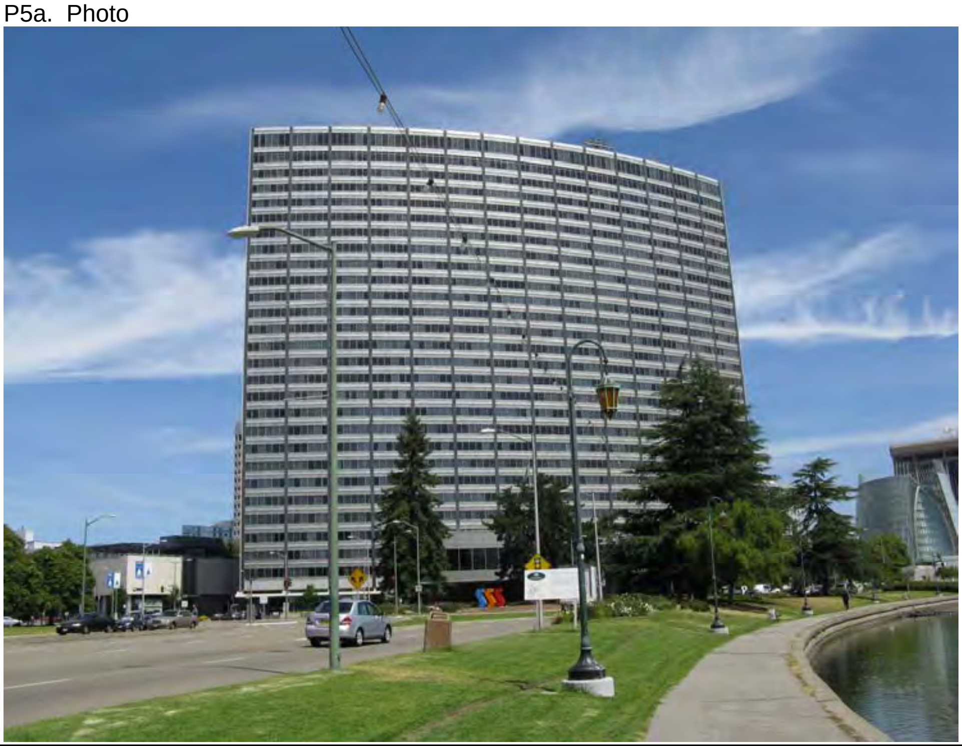
***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.)
The Kaiser Center complex is on a large, irregularly shaped block bounded by 20th, Harrison, 21st, and Webster streets. The Kaiser Center complex consists of a twenty-eight-story Office Tower, the three-story and basement 20th Street Mall Building, the two-and-three-story Webster Street Mall Building, a three-and-four-story parking garade, and the Roof Garden on the top level parking garage. The Mall Buildings appear as a strong horizontal base that contrasts the verticality of the tower. The complex was designed by Welton Becket & Associates and completed in 1959. The roof garden was designed by the landscape architecture firm Osmundson & Staley and completed in 1960.

The office tower is made up of two basic components: a T-shaped tower with a straight stem and curved wings; and an asymmetrically located two-story podium supported by square piers at the first floor that extends beyond the plane of the T-shaped tower and follows the curve of the main façade. The main façade of the tower features fourteen bays separated by burnished aluminum piers. Each bay includes six windows surrounded by gold toned and natural aluminum frames. The side facades of the curved plane feature concrete panels with dolomite, a rock-like mineral product, aggregate. Other than the penthouse floor which features a higher ceiling height, all floors and bays on the main façade are identical. The straight vertical portion or stem of the tower features the same fenestration pattern as the main façade at the east and west façade and the same concrete panels with dolomite aggregate at the north and south façades. The north façade features signage reading, "Kaiser." The office tower has undergone few exterior alterations. The only interior alterations include an early-1990s renovation of the lobby and the conversion of the original cafeteria space into tenant space.
(continued)

***P3b. Resource Attributes:** (list attributes and codes) HP6 1-3 story commercial building, HP7 3+ story commercial building, HP29 Landscape Architecture

***P4. Resources Present:** ☒Building ☐Structure ☐Object ☒Site ☐District ☐Element of District ☐Other

P5a. Photo



P5b. Photo: (view and date)
Office Tower, View from south; June 16, 2008

***P6. Date Constructed/Age and Sources:** ☒historic
1959 (buildings); 1960 (roof garden)

***P7. Owner and Address:**
Swig Company
220 Montgomery, Floor 20
San Francisco, CA 94104

***P8. Recorded by:**
Page & Turnbull, Inc.
724 Pine Street
San Francisco, CA 94108

***P9. Date Recorded:** July 2008

***P10. Survey Type:**
Reconnaissance

***P11. Report Citation:** (Cite survey report and other sources, or enter "none")
Page & Turnbull, Historic Resource Evaluation, "Kaiser Center," Sept. 2008.

***Attachments:** ☐None ☐Location Map ☐Sketch Map ☒Continuation Sheet ☒Building, Structure, and Object Record ☐Archaeological Record ☐District Record ☐Linear Feature Record ☐Milling Station Record ☐Rock Art Record ☐Artifact Record ☐Photograph Record ☐ Other (list)

The parking garage is a three-and-four-story reinforced concrete rectangular plan building with a curved east façade that parallels the tower. The building is utilitarian and the only ornamentation present on the parking lot is a grid of narrow aluminum ribs and aluminum signage reading, "Kaiser Center Garage." The top level of the building is occupied by the Kaiser Center Roof Garden.

The 20th Street Mall building is a three-story and building located at the corner of 20th and Webster streets with a rectangular plan and flat roof. The building features oversize circular piers and glazed aluminum storefronts at the first floor giving the main mass of the building the appearance of floating. The first floor features stucco and white brick veneer cladding. The second floor has no fenestration but feature dolomite concrete panels with aluminum cantilevered canopies and vertical granite panels and aluminum fins above the entrances. The penthouse level occupies approximately three-quarters of the floor plate and is set back from the plane of the lower floors. The penthouse level features stucco cladding and closely arranged aluminum sash windows. The remainder of the penthouse level features an aluminum pergola. As of the date of this evaluation, a portion of this floor is vacant, but has traditionally been occupied by a restaurant that accesses the roof garden.

The Webster Street Mall building is a two-and-three-story building located at the corner of 21st and Webster streets with a rectangular plan and a flat roof covered by the roof garden. The first floor features stucco cladding and fixed full-height aluminum windows. The upper two floors feature slightly protruding dolomite concrete panels with no fenestration. Similar to the 20th Street Mall Building, the main mass of the building appears to float above the first floor.

The Kaiser Center Roof Garden is located on the top level of the parking garage at the northwest corner of the complex. The roof garden is rectangular in plan, except at the eastern edge, where the garden parallels the arc of the tower's main façade. The garden features curvilinear aggregate pathways, a series of irregularly-shaped undulating lawns, a circular lawn located in the center of the garden, low concrete curbing, specimen trees, shrub plantings, concrete benches and related site furnishings, and an 8,800 square foot reflecting pool. The pool features a wood bridge which was added between 1973 and 1975. A visual axis begins at the main entrance to the garden at the 20th Street Mall Building and runs through the reflecting pool and central circular lawn. A concrete HVAC building is located in the northwest corner of the garden. The building is approximately eighteen feet in height, clad in stucco and capped by a flat roof. The HVAC building is screened by specimen trees to alleviate the visual intrusion of this building within the garden.

The buildings and roof garden appear to be in excellent condition.

BUILDING, STRUCTURE, AND OBJECT RECORD

***NRHP Status Code** 3B

***Resource Name or #** Kaiser Center

B1. Historic name: Kaiser Center
B2. Common name: Kaiser Center
B3. Original Use: Commercial, Garden   B4. Present use: Commercial, Garden
***B5. Architectural Style:** Modern
***B6. Construction History:** (Construction date, alterations, and date of alterations) The Kaiser Center buildings were constructed in 1959. The Roof Garden was completed in 1960. No major exterior alterations have been made. The Mall Buildings have undergone the most alterations, including changes to the storefronts, and cosmetic changes at the entrances (1960s and 1990s). The interior of the Mall buildings have been substantially altered due to tenant improvements. The cafeteria of the office tower was converted to office space (date unknown), and the lobby of the office tower was renovated in the early-1990s. The wood bridge, a later addition, was installed in the roof garden between 1973 and 1975.

***B7. Moved?** ☒**No** ☐**Yes** ☐**Unknown** **Date:**__________ **Original Location:**____________________________
***B8. Related Features:**

B9a. Architect: Welton Becket & Associates (buildings); Osmundson & Staley (roof garden)   b. Builder: Robert E. McKee
***B10. Significance: Theme** Commercial Development, Modern Architecture and Landscape Architecture **Area** Oakland
Period of Significance 1959 **Property Type** Commercial; Landscape Architecture **Applicable Criteria** 1, 2, 3
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity)
The Kaiser Center Office Tower and Roof Garden is recognized as one of the symbols of Oakland. The 1960 Modern office complex with curved tower anchors the northwest corner of Lake Merritt in the heart of Oakland. Henry J. Kaiser, the magnate of the Kaiser Industries empire commissioned the iconic office complex to serve as the company's headquarters. Kaiser commissioned Welton Becket & Associates, an acclaimed commercial architecture firm, to design the new complex with office tower, retail buildings, parking garage, and roof garden. The complex is also significant for containing the first modern office tower constructed on the shores of Lake Merritt. The Roof Garden, at the top level of the parking garage, was designed by Osmundson & Staley, important landscape architects who created the largest contiguous roof garden in North America at the time of its completion. The roof garden is an important example of Bay Area Modern landscape architecture. Today the Kaiser Center complex stands as a tangible reminder of the importance of Oakland as an industrial and commercial center in the 1950s and 1960s, as an excellent example of the elegance of the Modern style, and the versatility of a master architect, Welton Becket & Associates.
(continued)

B11. Additional Resource Attributes: (List attributes and codes)__________________
***B12. References:**
See "References Cited" in Page & Turnbull, Historic Resource Evaluation, Kaiser Center, July 2008.

B13. Remarks: None

***B14. Evaluator:** Cora Palmer

***Date of Evaluation:** September 2008

Sketch Map

(This space reserved for official comments.)

***B10. Significance (cont.):**

Criterion 1 (Events)

The Kaiser Center appears to be eligible under Criterion 1 (Events) as a complex that reflects "events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States." In this case, the event is the influence of the Kaiser Industries on the history of California and the West Coast. As the only remaining headquarters building of Kaiser Industries, the multinational corporation that influenced the World War II war effort, infrastructure in California, and throughout the West Coast, and changed the health care industry, the Kaiser Center is a significant landmark testifying to an important industrial institution that helped Oakland remain a significant site of commercial and industrial activities in the post-War era.

The complex is also significant as a reminder of the movement of Oakland's Downtown commercial core toward Grand Avenue and Lake Merritt. The Kaiser Center led the shift of the commercial core from 14th and Broadway in downtown Oakland to Lake Merritt. While earlier residential towers such as the Lake Merritt Hotel (1927) and the Bellevue-Staten Building (1929) had been present on the lake, the Kaiser Center was the first true modern commercial skyscraper complex to be located on Lake Merritt. Other modern office towers followed the shift away from downtown including the Ordway Building (1970), the twenty-seven-story Lake Merritt Plaza (1985) at 1999 Harrison Street, and a number of skyscraper office buildings dating from the 1970s to the 1990s are located on prominent intersections in the immediate area.

Criterion 2 (Persons)

The Kaiser Center appears eligible for the California Register under Criterion 2 (Persons) for its association with Henry J. Kaiser. Kaiser is significant as an innovative industrialist with a larger than life personality who built more ships than any other builder during World War II, completed massive construction projects like the Hoover Dam, headed the first company to manufacture steel on the West Coast, and developed a health care organization for workers that became a model for Health Maintenance Organizations (HMOs) across the country. Kaiser was influential in the design of the Kaiser Center; purportedly telling the management team and the architects to "double it" when asked his opinion of the proposed size of the building. Kaiser is also frequently credited for the creation of the roof garden. Additionally, Kaiser held his offices, where he oversaw his multitude of companies and had an apartment at the 27th floor of the building. While many of Kaiser's industrial buildings still exist, the Kaiser Center in Oakland is the only remaining corporate headquarters connected to Kaiser Industries. Kaiser's earlier Oakland headquarters building, at 1924 Broadway, was demolished in the 1990s and therefore the Kaiser Center is an important building that expresses the importance of Oakland as the world headquarters of Kaiser Industries.

Criterion 3 (Architecture)

The Kaiser Center appears eligible for the California Register under Criterion 3 for embodying the distinctive characteristics of the Modern style. The Kaiser Center is a well-preserved example of the style as applied to a corporate headquarters complex. Characteristic features of the complex include its variety of building types: office tower, retail wings, and parking garage all designed in a compatible style; its site in a landscaped plaza with views to Lake Merritt. The complex appears as a strong horizontal base that is contrasted by a vertical office tower. The office tower features structural piers elevating the building's mass above the plaza, a mezzanine podium at the base, a T-shaped plan, a sweeping curved façade, flat roof, polychrome aluminum and glazed wall surfaces, aggregate concrete panels at secondary facades, and standardized bays with little variation. The Mall Buildings are completed in the same style and feature rectangular plans, flat roofs, structural piers elevating the building's mass above the first floor, and dolomite panel cladding. The materials used throughout the complex were selected to showcase the variety of Kaiser manufactured materials including aluminum and dolomite.

The Kaiser Center is also important as a designed office and retail complex, with an office tower, retail, landscaped open space, and parking incorporated on one site. Kaiser's headquarters was not envisioned as solely an office building, but as a group of associated buildings and landscapes that were intended to be used by both Kaiser Industries employees and Oakland community members.

In addition to being an example of a type, the Kaiser Center is also significant as the work of a master, Welton Becket & Associates. Welton Becket & Associates was an important modernist architecture firm working throughout the United States. The firm specialized in corporate headquarters, hotels, and cultural centers and was the largest architecture firm in the United States in the 1950s. The Kaiser Center is an excellent example of Welton Becket's work for corporate clients, who relied upon the firm to embody the corporation's philosophy in physical form. Welton Becket's design for the Kaiser Center showcases not only the materials produced by Kaiser Industries but also the characteristics Kaiser Industries were known for: innovation, in the use of a curved façade; and concern for employee well-being embodied in the inclusion of a roof garden.

The roof garden is significant for its design and as the largest contiguous roof garden in North America at the time of its construction. The garden features many of the hallmarks of modern landscape design including undulating topography, curvilinear pathways, geometrically shaped lawns, simple materials such as concrete pathways, planters, and benches; (continued)

***B10. Significance (cont.):**

trimmed hedges, shrubs, specimen trees, and an asymmetrical pool. The design by Osmundson & Staley is indicative of the Bay Area Modern landscape architecture popularized by designers such as Thomas Church, Robert Royston, and Lawrence Halprin. The Kaiser Center roof garden by Osmundson & Staley exemplifies the mid-century California Style first popularized by Church and his contemporaries in the 1940s. The California Style emphasized the importance of indoor/outdoor living and relied heavily on a modern landscape architectural vocabulary to achieve this effect. The decision to include a roof garden as part of the Kaiser Center complex marked an important recognition of the potential of the roof garden to create a more healthful and attractive office environment within the city.

Criterion 4 (Information Potential)

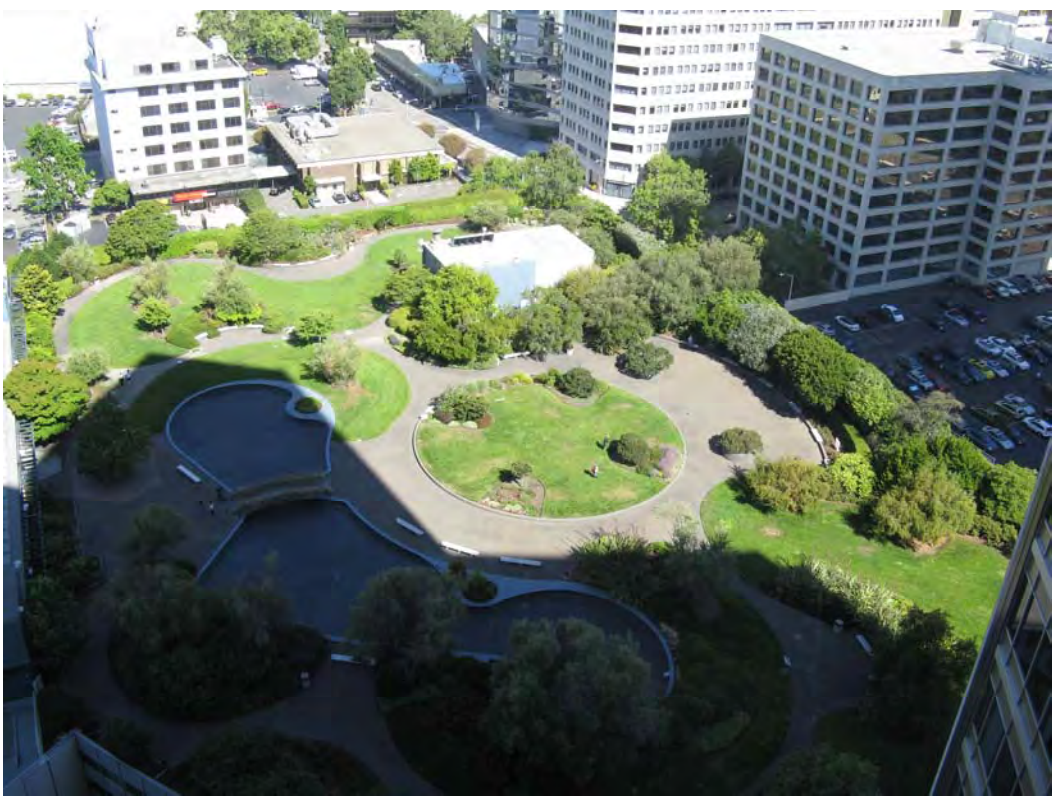
This property was not fully assessed for its potential to yield information important in prehistory or history, per California Register Criterion 4 (Information Potential).

The Kaiser Center complex retains its integrity, and the only significant alterations to public spaces include the renovation of the lobby and replacement of the cafeteria by tenant space. The exterior of the complex has seen few alterations, other than storefront alterations, signage changes, and the installation of ornament at the Mall Building entrances. The roof garden also retains integrity and though many of the plantings have been replaced over time, the new plantings are consistent with the original design. Overall, the complex retains sufficient integrity to convey its historical significance.

Parking Garage, north façade. Source: Page & Turnbull, June 2008.

20th Street Mall, southeast corner. Source: Page & Turnbull, June 2008

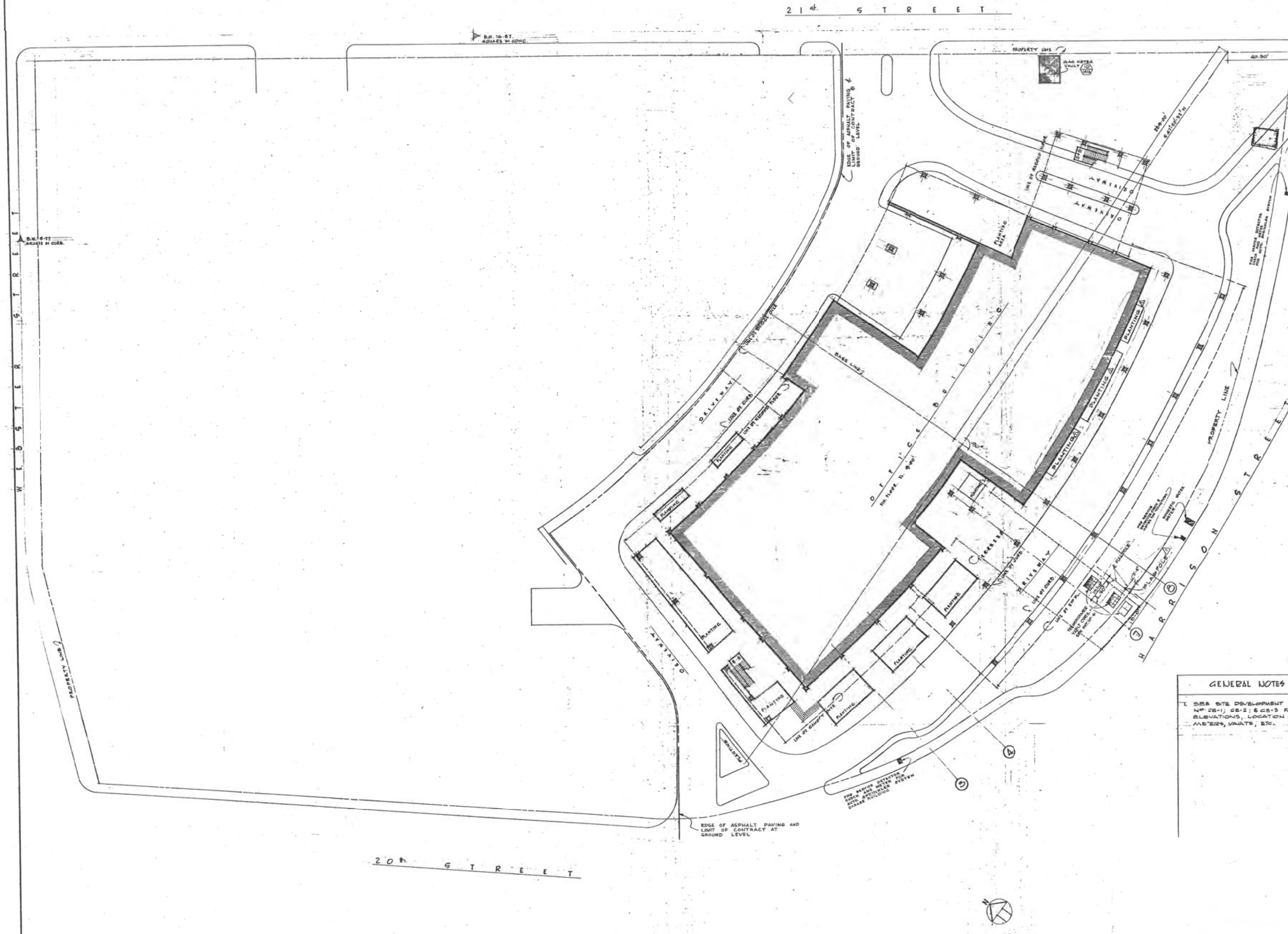
Webster Street Mall, northwest corner. Source: Page & Turnbull, June 2008.



Roof Garden, view from Office Tower. Source: Page & Turnbull, June 2008

APPENDIX E

Historic Drawings



GENERAL NOTES

1. SEE SITE DEVELOPMENT DRAWINGS Nº CE-1; CE-2; & CE-3 FOR GRADE ELEVATIONS, LOCATION OF CURBS, METERS, VAULTS, ETC.

DATE	NO.	REVISION	BY
JULY 25, 60	2	REVISED PLANTING AREA & PART OF SOUTH WALL AS PER BANK OF AMERICA DRAWINGS	G.P.
	1	[illegible]	E.L.S.

MURRAY ERICK ASSOCIATES
STRUCTURAL ENGINEERS — LOS ANGELES, CALIF.

DUDLEY DEANE & ASSOCIATES
MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.

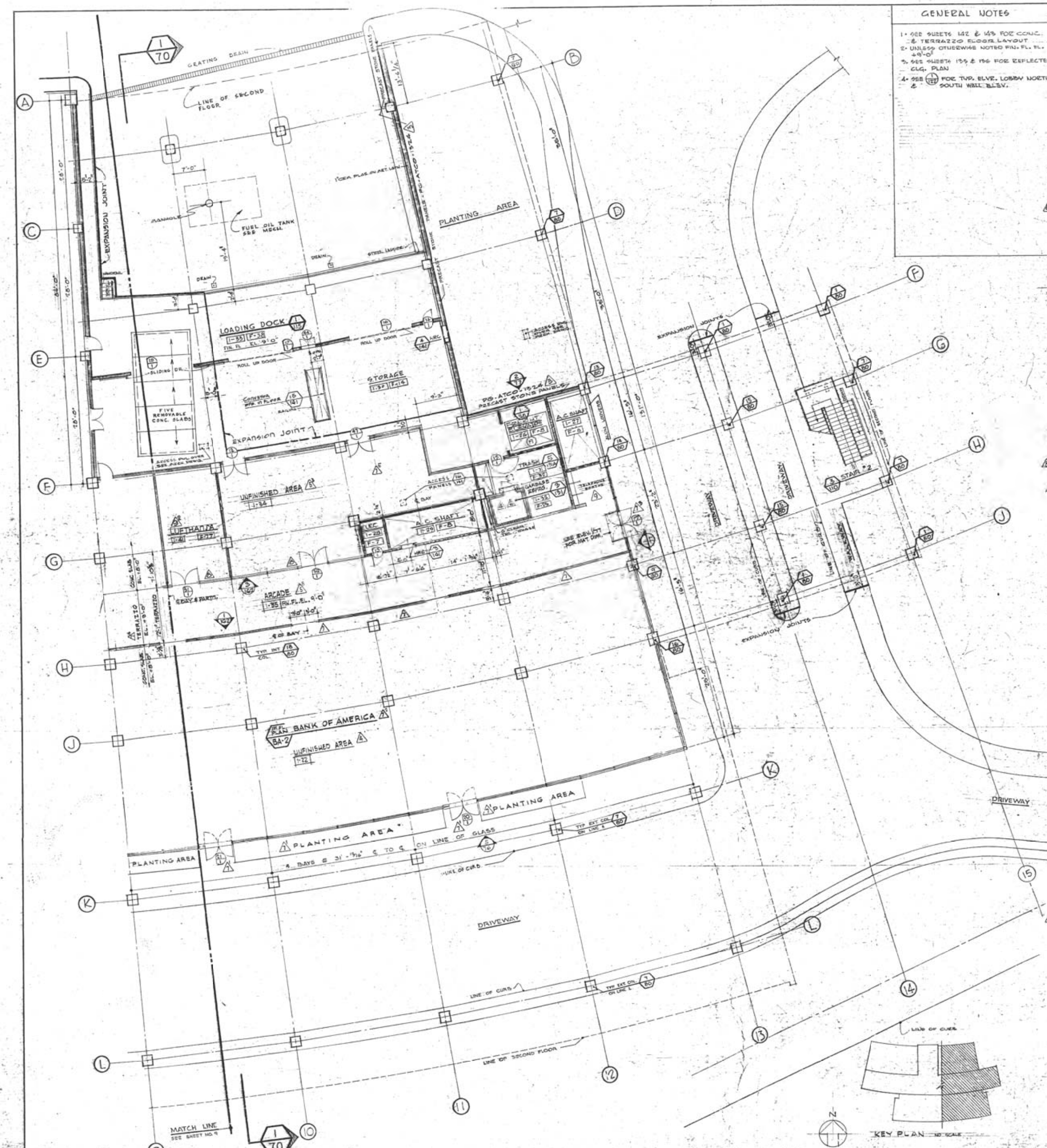
KAISER CENTER
OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
PLOT PLAN
SCALE 1" - 20'-0"

DRAWN	DATE NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO. 2-1

MURRAY ERICK ASSOCIATES STRUCTURAL ENGINEERS — LOS ANGELES, CALIF. DUDLEY DEANE & ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.	KAISER CENTER OAKLAND, CALIFORNIA	WELTON BECKET AND ASSOCIATES ARCHITECTS AND ENGINEERS LOS ANGELES, CALIFORNIA	OFFICE BUILDING 1 ST FLOOR PLAN SCALE 1/8" = 1'-0"	DATE NOVEMBER 15, 1957 JOB NO. 1437 SHEET NO. 9-7



GENERAL NOTES

1. SEE SHEETS 142 & 143 FOR CONC. & TERRAZZO FLOOR LAYOUT
2. UNLESS OTHERWISE NOTED FIN. FL. EL. +9'-0"
3. SEE SHEETS 135 & 136 FOR REFLECTED CLG. PLAN
4. SEE (1/125) FOR TYP. ELVR. LOBBY NORTH & SOUTH WALL ELEV.

INTERIOR FINISH SCHEDULE

FIN. NO.	FLOOR COVERING	FIN	BASE MATERIAL	FIN	WAINSCOT MATERIAL	HT.	FIN	WALL MATERIAL	FIN	CEILING MATERIAL	HT.	FIN	TRIM MATERIAL	FIN	REMARKS
F-1	VINYL TILE	–	RUBBER	–	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	9'-0"	B	METAL	C	
F-5	ASPHALT TILE	–	RUBBER	–	NONE			PUTTYCOAT PLASTER	A	PUTTYCOAT PLASTER	9'-0"	A	METAL	C	*SEE SHEET 135 FOR VARIATION IN CLG. HT. OF SPACE [illegible]
F-6	CEMENT	D	METAL	O	NONE			PUTTYCOAT PLASTER	O	EXPOSED STRUCTURE		O	METAL	O	
F-8	NONE		NONE		NONE			HARDWALL PLASTER		NONE			NONE		
F-7	CEMENT	A	METAL	C	NONE			HARDWALL PLASTER		EXPOSED STRUCTURE			METAL	C	
F-12	VINYL TILE	–	RUBBER	–	NONE			KEENE'S CEMENT	A	KEENE'S CEMENT	8'-0"	A	METAL	C	
F-13	TERRAZZO	–	TERRAZZO	–	NONE			ALUMINUM & WOOD	–	AC. PLASTIC	16'-0"		*	–	* SEE DETAILS
F-25	QUARRY TILE	–	QUARRY TILE	–	NONE			[illegible] CEMENT		[illegible] CEMENT	*		METAL	C	* SEE REFRIGERATOR DETAILS FOR CEILING HEIGHTS
F-28	CEMENT	D	METAL	C	NONE			PUTTYCOAT PLASTER	B	ACOUSTIC PLASTIC	[illegible]	P	METAL	C	[illegible]
F-14	CEMENT	A1	METAL	C	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	*	B	METAL	C	*SEE DETAILS FOR CLG. HT.
F-32	CEMENT	F	NONE	–	METAL	9'-0"	E	KEENE'S CEMENT	A	KEENE'S CEMENT	9'-0"	A	METAL	C	
F-35	EXPOSED STRUCTURE		NONE		NONE			EXPOSED STRUCTURE		EXPOSED STRUCTURE			NONE		
F-38	CEMENT	F	NONE	–	METAL	8'-0"	E	STONE & CEM. PLAS.	O	CEM. PLAS.	16'-0"	O	METAL	C	
F-40	TERRAZZO	–	TERRAZZO	–	NONE			PRECAST STONE & GLASS	–	ACOUSTIC PLASTIC	16'-0"	P	METAL	C	
F-76	QUARRY TILE		QUARRY TILE		NONE			PUTTYCOAT PLASTER		ACOUSTIC PLASTIC	9'-0"	P	–	–	*4" HIGH BASE
F-77	VINYL TILE		RUBBER		NONE			PUTTYCOAT PLASTER		ACOUSTIC PLASTIC	16'-0"	P	–	–	

DOOR SCHEDULE - CONTINUED

DOOR NO.	OPENING WIDTH	OPENING HT.	DOOR TYPE	DOOR TH.	DOOR MATERIAL	DOOR FIN.	FRAME DETAIL	FRAME MATERIAL	FRAME FIN.	THRESHOLD DETAIL	THRESHOLD MATERIAL	LOUVER SIZE	HARDWARE	FIRE LABEL	REMARKS
47/1	5'-0"	7'-0"	11/92	1¾"	WOOD		6/92	STL	–	–	–	–	31	–	EXPOSED CLOSERS-PR., 3'-6" HIGH PLATE.
48/1	7'-8"	7'-0"	15/92 A	2"	ALUM.		3/92A	STL	–	9/79	METAL	–	17	–	–
49/1	5'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	22		SEE 3/102 - PR. FL. CLOSERS
50/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	22		SEE 7/102 PR. FL. CLOSERS
51/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62	–	–	22		SEE 7/102 PR. FL. CLOSERS
52/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62	–	–	22		SEE 7/102 PR. FL. CLOSERS
53/1	5'-5¾"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	22		SEE 5/22 PR. FL. CLOSERS
54/1	2'-8"	7'-0"	11/92	1¾"	WOOD		20/56	ALUM.		–	–	1'-8"x9"	17		

DOOR SCHEDULE

DOOR NO.	OPENING WIDTH	OPENING HT.	DOOR TYPE	DOOR TH.	DOOR MATERIAL	DOOR FIN.	FRAME DETAIL	FRAME MATERIAL	FRAME FIN.	THRESHOLD DETAIL	THRESHOLD MATERIAL	LOUVER SIZE	HARDWARE	FIRE LABEL	REMARKS
1/1	[illegible]	[illegible]	[illegible]	2"	ALUM.		[illegible]	STL.		[illegible]	[illegible]	–	8	B	EXPOSED CLOSERS
2/1 – 9/1	[illegible]														[illegible]
10/1	3'-0"	7'-0"	11/92	1¾"	WOOD		6/92	STL.		–			31	–	EXPOSED CLOSERS PR. [illegible]
11/1	3'-0"	7'-0"	11/92	1¾"	WOOD		6/92	STL.		–			*	–	SEE SHT 1244 FOR HARDWARE
12/1	5'-0"	7'-0"	11/92	1¾"	WOOD		6/92	STL.		–			31	–	EXPOSED CLOSERS PR. 3'-6" [illegible]
13/1	3'-8"	7'-0"	8/92A	2"	[illegible]		8/92A	STL.		–	–	–	8	B	EXPOSED CLOSER.
14/1	2'-8"	7'-0"	5/92	1¾"	METAL		19/92	STL.		–	–	–	11	E	EXPOSED CLOSER
15/1	3'-0"	7'-0"	H	1¾"	WOOD		6/92	STL.		–	–	1'-8"x9"	35		EXPOSED CLOSER 3'-6" [illegible]
16/1	[illegible]	[illegible]	–		ALUM.										SEE 8/113
17/1	[illegible]	[illegible]	–		ALUM.										SEE 8/113
18/1	[illegible]	[illegible]	–		ALUM.										SEE 8/113. PR.
19/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/76 PR. FL. CLOSERS
20/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/76. PR. FL. CLOSERS
21/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/76. PR. FL. CLOSERS
22/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	19	–	SEE 5/76. PR. FL. CLOSERS
23/1	6'-0"	7'-1"	6/92	1¾"	ALUM.		–	ALUM.		18/79	METAL	–	20	–	SEE 5/76. PR. FL. CLOSERS
24/1	6'-1"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		10/70	METAL	–	19	–	SEE 5/70. PR. FL. CLOSERS
25/1	6'-1"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		10/79	METAL	–	19	–	SEE 5/76. PR. FL. CLOSERS
26/1	6'-1"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		10/79	METAL	–	19	–	SEE 5/76. PR. FL. CLOSERS
27/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 1/76. PR. FL. CLOSERS
28/1	6'-0"	7'-1"	6/92	1¾"	ALUM.		–	ALUM.		41/79	METAL	–	21	–	SEE 1/76. PR. FL. CLOSERS
29/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 1/76. PR. FL. CLOSERS
30/1	6'-0½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 1/76. PR. FL. CLOSERS
31/1	6'-7½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/77. PR. FL. CLOSERS
32/1	6'-7½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/77. PR. FL. CLOSERS
33/1	6'-5"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/77. PR. FL. CLOSERS
34/1	6'-5½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 5/77. PR. FL. CLOSERS
35/1	6'-1"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 4/77. PR. FL. CLOSERS
36/1	6'-6"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 4/77. PR. FL. CLOSERS
37/1	6'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 4/77. PR. FL. CLOSERS
38/1	6'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 4/77 PR. FL. CLOSERS
39/1	6'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	21	–	SEE 5/122. PR. FL. CLOSERS
40/1	6'-9½"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	21	–	SEE 5/122. PR. FL. CLOSERS
41/1	6'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	21	–	SEE 4/122. PR. FL. CLOSERS
42/1	6'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	21	–	SEE 4/122. PR. FL. CLOSERS
43/1	6'-0"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		14/62 OM.	–	–	21	–	SEE 4/122. PR. FL. CLOSERS
44/1	3'-0"	8'-6"	5/92	1¾"	METAL		19/92	STL.		9/92	STL.	–	36	E	SEE 8/113 PR.
45/1	1'-8"	7'-0"	4/92	1¾"	WOOD		4/92	STL.		–	–	–	8		
46/1	6'-6"	7'-1"	M/92	¾"	TEMP. GL.		–	ALUM.		21/79	METAL	–	19	–	SEE 4/77. PR. FL. CLOSERS

FOR CONTINUATION OF DOOR SCHEDULE SEE ABOVE

Revisions

DATE	NO.	REVISION	BY
JULY 25, '60		ADDED ENTRANCE [illegible] & PLATFORM [illegible] (F.C.A. [illegible])	A.D.T.
		ADDED DR. 54/1 TO SCHEDULE AS PER SHT. 1357 (F.C.A. # 605).	A.D.T.
		ADDED TELEPHONE BOOTHS AS PER SHEET 1258 (F.C.A. # 310).	R.L.S.
JAN. 11, '60		REVISED THRESH. DETAILS FOR DOORS 22/1 & 35/1 THRU 43/1 AS PER ELEVATIONS ON SHEETS 122-2 & 102-1, REVISED HARDWARE HEADING, DR. 39/1, & WIDTH OF PR. OPENINGS 34/1 & 40/1 IN SCHED.	W.E.B.
		REVISED DR. 11/1 IN SCHEDULE AS PER SHT. 1244 (F.C.A. # 215).	G.P.
		ADDED PARTN. IN BAY BTWN. COL. LINES 9 & 10, & WDW. WALL & DOORS 50/1 & 52/1 & N. WALL, ARCADE 11-35. ADDED DOORS 49/1, 50/1, 51/1, 52/1 & 53/1 TO SCHED. REVISED F-28 IN & ADDED F-76 TO SCHED.	
9-29-59		DOOR 48/1 ADDED	G.P.
		RELOCATED DRS. 7/1 & 8/1 & ADDED DR. 47/1 TO AGREE W/DWG. 1214	WEB
		CLARIFIED TERRAZZO DIM. @ ARCADE [illegible] ADDED	G.P.
		RELOCATED DR. 19/1 TO ARCADE [illegible]	
		REFERENCE [illegible] ADDED [illegible]	
		RELOCATED [illegible] PLANTING AREA REVISED	
		ARCADE [illegible] ADDED	
AUG 14, 1959		[illegible]	
		[illegible]	
JULY 1, 1959		REVISED DOOR SCHEDULE AS PER [illegible]	
		[illegible]	
		[illegible]	
MARCH [illegible]		[illegible]	
OCT. 31, 1958		REVISED DR. SCHED.	
		INDICATED PRECAST STONE PANEL TYPE	
		[illegible]	
MAY [illegible] 1958	2	[illegible]	
DEC. 31, 1957	1	ADDED HARDWARE [illegible]	

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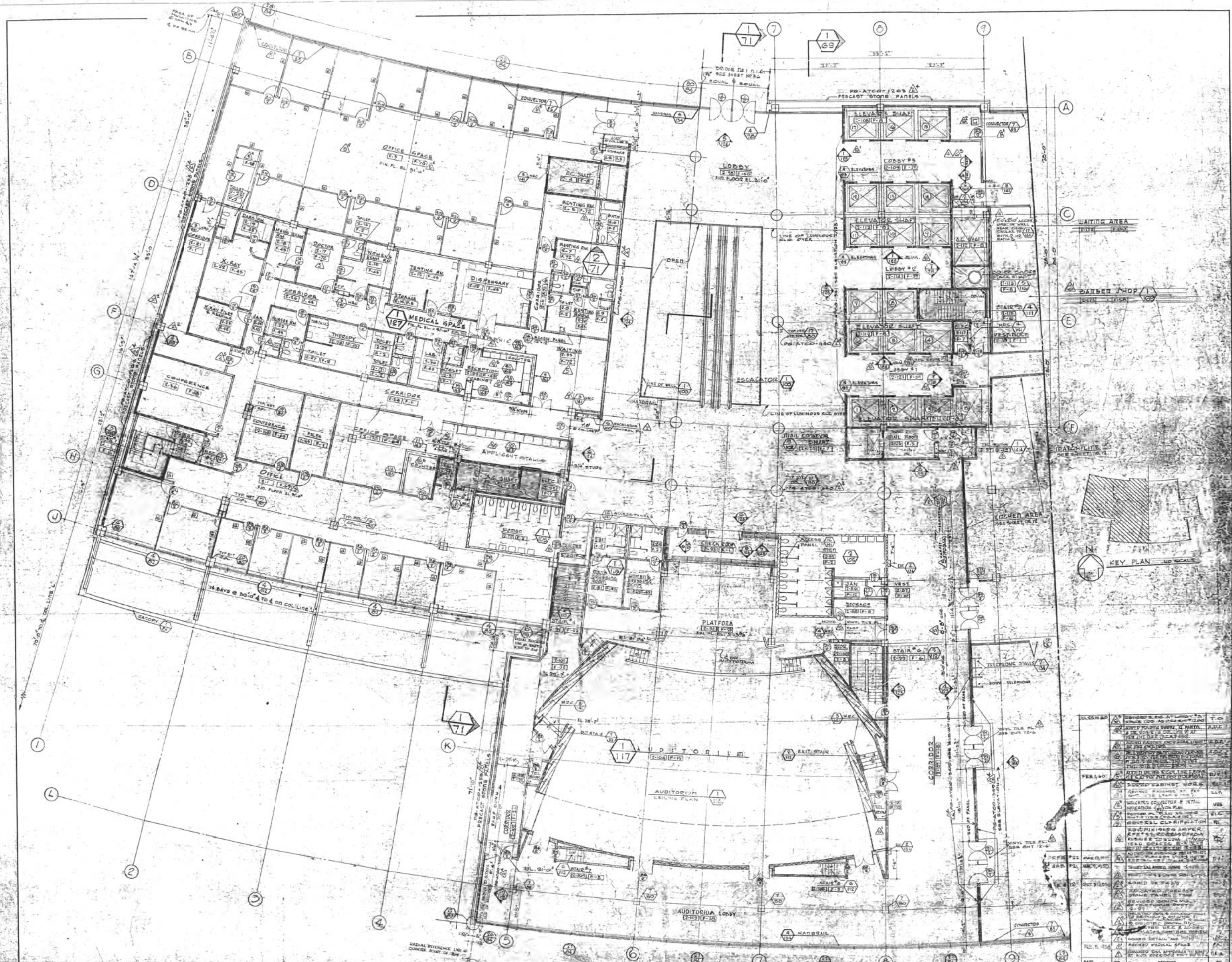
OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
1 ST FLOOR PLAN
SCALE: 1/8" = 1'-0"

DRAWN
TRACED
CHECKED
DATE NOVEMBER 15, 1957
JOB NO. 1437
SHEET NO. 10-9



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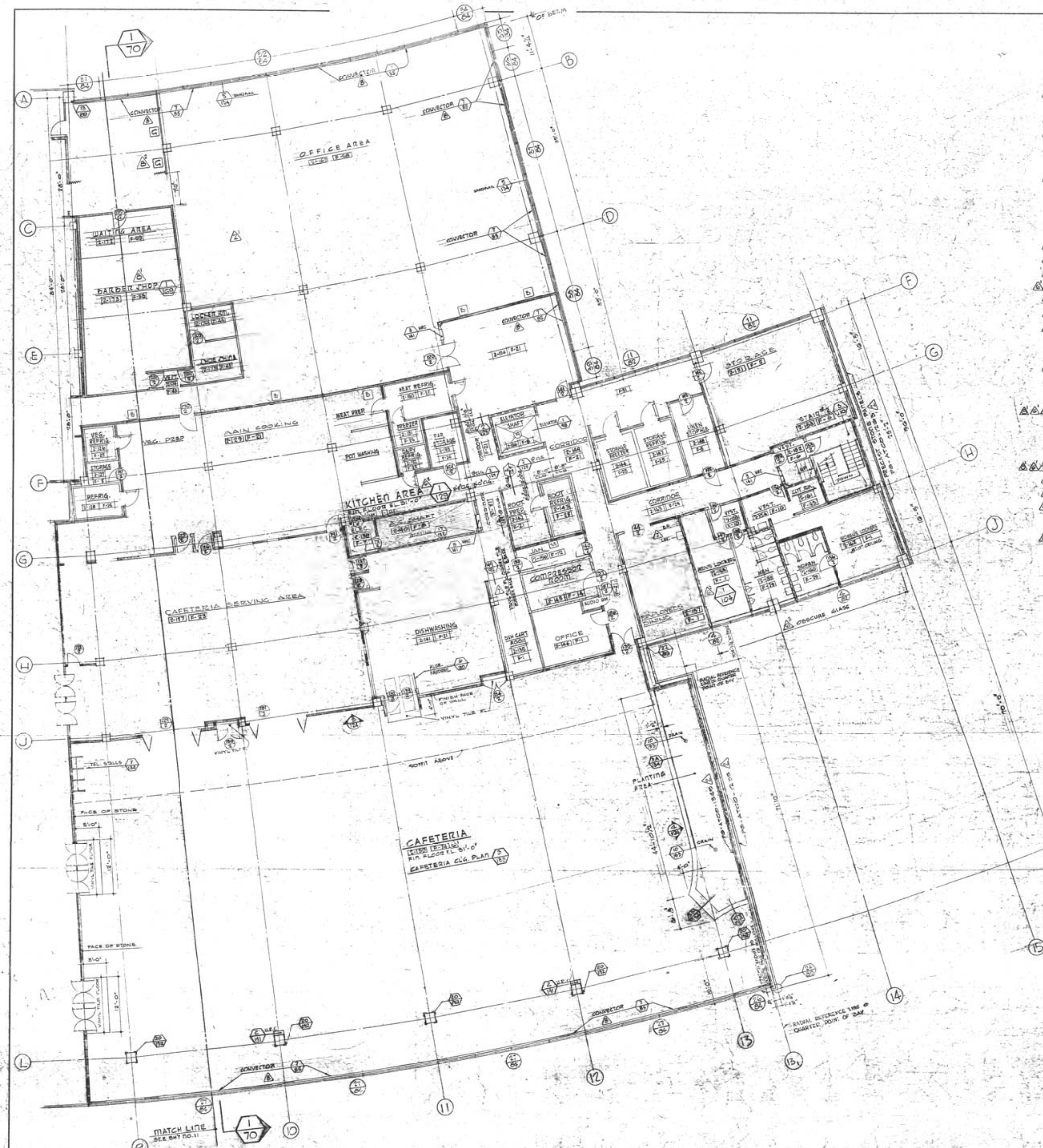
OFFICE BUILDING
2 ND FLOOR PLAN
SCALE: 1/8" = 1'-0"
PART ONE

DRAWN		DATE	NOVEMBER 15, 1957
TRACED		JOB NO.	1437
CHECKED		SHEET NO.	11-6

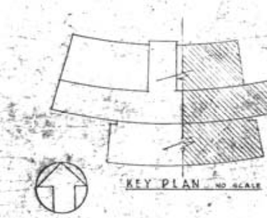


INTERIOR FINISH SCHEDULE

FIN. NO.	FLOOR COVERING	FIN	BASE MATERIAL	FIN	WAINSCOT MATERIAL	HT.	FIN	WALL MATERIAL	FIN	CEILING MATERIAL	FIN HT	FIN	TRIM MATERIAL	FIN	REMARKS
F.1	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8'-8"*	B	METAL	C	*8'-0" CLG @ SPACE 2-162
F.2	CERAMIC TILE	—	CERAMIC TILE	—	NONE			CERAMIC TILE	—	ACOUSTIC TILE	8'-0"	R	METAL	C	
F.3	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	B	METAL AC. TILE	8'-8"*	—	METAL	C	*8'-0" CLG. @ SPACE 2-138
F.5	ASPHALT TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	A	PUTTYCOAT PLASTER	8'-8"	A	METAL	C	
F.6	CEMENT	D	METAL	O	NONE			PUTTYCOAT PLASTER	O	EXPOSED STRUCTURE	—	O	METAL	O	
F.7	CEMENT	A	METAL	C	NONE			HARDWALL PLASTER	—	EXPOSED STRUCTURE	—	—	METAL	C	
F.8	NONE		NONE		NONE			HARDWALL PLASTER	—	NONE			NONE		EXPOSED CONC. @ 2ND. SHAFT WALLS & PIT FLOOR
F.12	VINYL TILE	—	RUBBER	—	NONE			KEENE'S CEMENT	A	KEENE'S CEMENT	8'-0"	A	METAL	C	
F.14	CEMENT	A1	METAL	C	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	*	B	METAL	C	*SEE DETAILS FOR CLG. HT.
F.18	CARPET & PAD (NIC)	—	ALUM.	—	NONE			STONE & WOOD	—	ACOUSTIC PLASTIC	15'-0"*	P	METAL	C	*COLS. L-5 THRU 8 ALUM COVERED. 8'-8" CLG. AS SHOWN ON PLAN.
F.19	CARPET & PAD (NIC)	—	WOOD, RUBBER & METAL	C	NONE			ACOUSTIC PLASTIC, PUTTYCOAT PLAS., WOOD & ALUM.	P, A	AC. PLASTIC & PUTTY COAT PLASTER	*	P/A	METAL	C	*SEE DETAILS FOR CEILING HEIGHTS
F.20	HARDWOOD	—	HARDWOOD	—	NONE			*PUTTYCOAT PLASTER	A	ACOUSTIC TILE	*	R	METAL	C	[illegible] *SEE DETAILS FOR CLG. HTS. WOOD MOLDINGS [illegible]
F.21	QUARRY TILE	—	QUARRY TILE	—	NONE			CERAMIC TILE	—	METAL AC. TILE	8'-8"*	R	METAL	C	8'-0" CLG. WHERE SHOWN ON PLAN.
F.23	VINYL	—	RUBBER	—	NONE			VINYL	—	MET. AC. TILE	*	P	METAL	C	COLUMNS VINYL COVERED *SEE DETAILS FOR CEILING HEIGHTS
F.24	QUARRY TILE	—	QUARRY TILE		NONE			PUTTYCOAT PLASTER	A	PUTTYCOAT PLASTER	8'-8"	A	METAL	C	
F.25	QUARRY TILE	—	QUARRY TILE	—	NONE			MINERAL CEMENT	—	MINERAL CEMENT	*	—	METAL	C	SEE REFRIGERATOR DETAILS FOR CEILING HEIGHTS
F.26	CARPET & PAD (NIC)	—	RUBBER		NONE			PUTTYCOAT PLASTER	A	AC. PLASTIC	*	P	METAL	C	*SEE DETAILS FOR CEILING HEIGHTS
F.29	CERAMIC TILE	—	CERAMIC TILE	—	CERAMIC TILE	[illegible]	—	KEENE'S CEMENT	B	KEENE'S CEMENT	8'-0"	A	METAL	C	
F.32	CEMENT	F	NONE		METAL	5'-0"	E	KEENE'S CEMENT	A	*KEENE'S CEMENT	8'-8"	A	METAL	C	*1" THICK KEENE'S CEMENT [illegible]
F.49	CARPET & PAD (NIC)	—	ALUM.	—	NONE			*PUTTYCOAT PLASTER	B	METAL AC. TILE	8'-8"		METAL	C	ALUM. TRIM @ CLG. SEE [illegible]
F.65	TERRAZZO	—	TERRAZZO	—	NONE			WOOD, METAL, AC. PLASTER, FORMICA	A	AC. PLASTIC & ALUM.	7'-6"	P	METAL	C	SEE DETAILS FOR CEILING HTS.
F.10	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8'-0"	B	METAL	C	
F.28	CEMENT	D	METAL	C	NONE			PUTTYCOAT PLASTER	B	AC. PLASTIC	*	P	METAL	C	SEE DETAILS FOR CLG. HT. OF STAIR NO. 4, SPACES [illegible]
F.58	VINYL TILE	—	ALUM.	—	NONE			PUTTYCOAT PLASTER	B	METAL AC. TILE	8'-8"		METAL	C	ALUM. TRIM @ CLG. SEE [illegible]
F.39	TERRAZZO	—	TERRAZZO	—	NONE			ALUM.		AC. PLASTIC	8'-8"	P	METAL	C	
F.43	VINYL TILE	—	*RUBBER		NONE			PUTTYCOAT PLASTER	B	ACOUSTIC TILE	9'-0"	R	METAL	C	[illegible]
F.40	TERRAZZO	—	TERRAZZO	—	NONE			PRE-CAST STONE & GLASS	—	AC. PLASTIC	8'-8"	P	METAL	C	*SEE DETAILS
F.76	CARPET & PAD (NIC)	—	ALUM.	—	NONE			PUTTYCOAT PLASTER	B	ACOUSTIC TILE	[illegible]	R	METAL	C	SEE DETAILS & SUPP'S FOR CLG. HTS. [illegible]
F.75	VINYL TILE	—	RUBBER	—	NONE			WOOD, METAL & PUTTYCOAT PLAS.	A	AC. PLASTIC & ALUM.	[illegible]	P	METAL	C	*SEE DET'S [illegible]
F.78	CARPET & PAD (NIC)	—	ALUM.	—	NONE			[illegible]	P	AC. PLASTIC & ALUM. TILE	*	P/R	METAL	C	SEE DETS FOR CLG. HT. [illegible] VINYL TILE [illegible] AS SHOWN ON PLAN.

GENERAL NOTES

1. SEE SHEET 2-13 [illegible]
2. [illegible]
3. SEE SHEET [illegible] FOR REFLECTED CLG. PLAN
4. SEE [illegible]
5. [illegible] INDICATES ALL DOORS [illegible]
6. TYPE [illegible] MOVABLE PARTITIONS SHALL BE FACTORY FINISHED [illegible] SEE SPECS. TYPE [illegible] MOVABLE PARTITIONS SHALL BE FIELD PAINTED. SEE SPECS.
7. SEE [illegible] FOR TRANSITION OF VINYL TILE OR ASPHALT TILE TO CARPET & PAD UNDER DOORS (CARPET & PAD N.I.C.).
8. SEE [illegible] FOR EXTENT OF VINYL TILE OR ASPHALT TILE UNDER MOVABLE PARTITIONS.



DATE	NO.	REVISION
		ADDED FOLDING DOORS & PARTITIONS [illegible]
		REVISED [illegible]
		INDICATED CONVECTOR & DETAIL INDICATION [illegible] ON PLAN
RFE #34 REVISED AUG. 27, 1958		[illegible]
AUG. 14, 1959		REVISED [illegible] GLASS TO OBSCURE GLASS [illegible]
RFE #24 REVISED AUG. 14, 1959		REVISED KITCHEN AREA [illegible]
AUG. 14, 1957		[illegible]
		[illegible]
RFE #22		[illegible]
RFE #24		[illegible]
RFE #1		[illegible]
RFE #16 OCT. 1957		DELETED PARTITIONS
		INDICATED PRECAST STONE [illegible] TYPE
		REVISED FIN. SCHEDULE & ELEVATIONS
		ADDED NOTE TO F-23 & F-3
6/2/58		ADD [illegible] BETWEEN MEN'S & WOMEN'S TOILETS & COOL [illegible]

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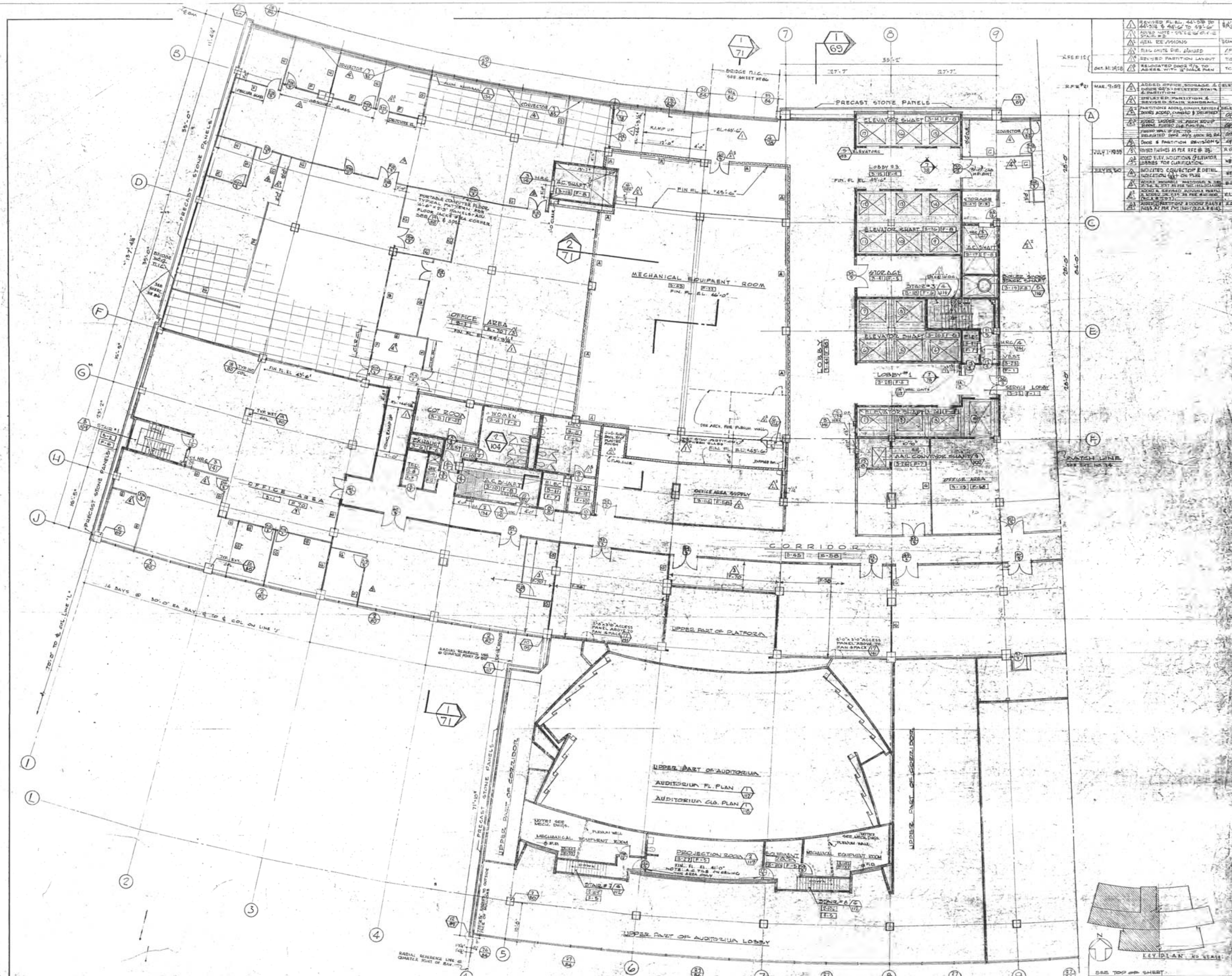
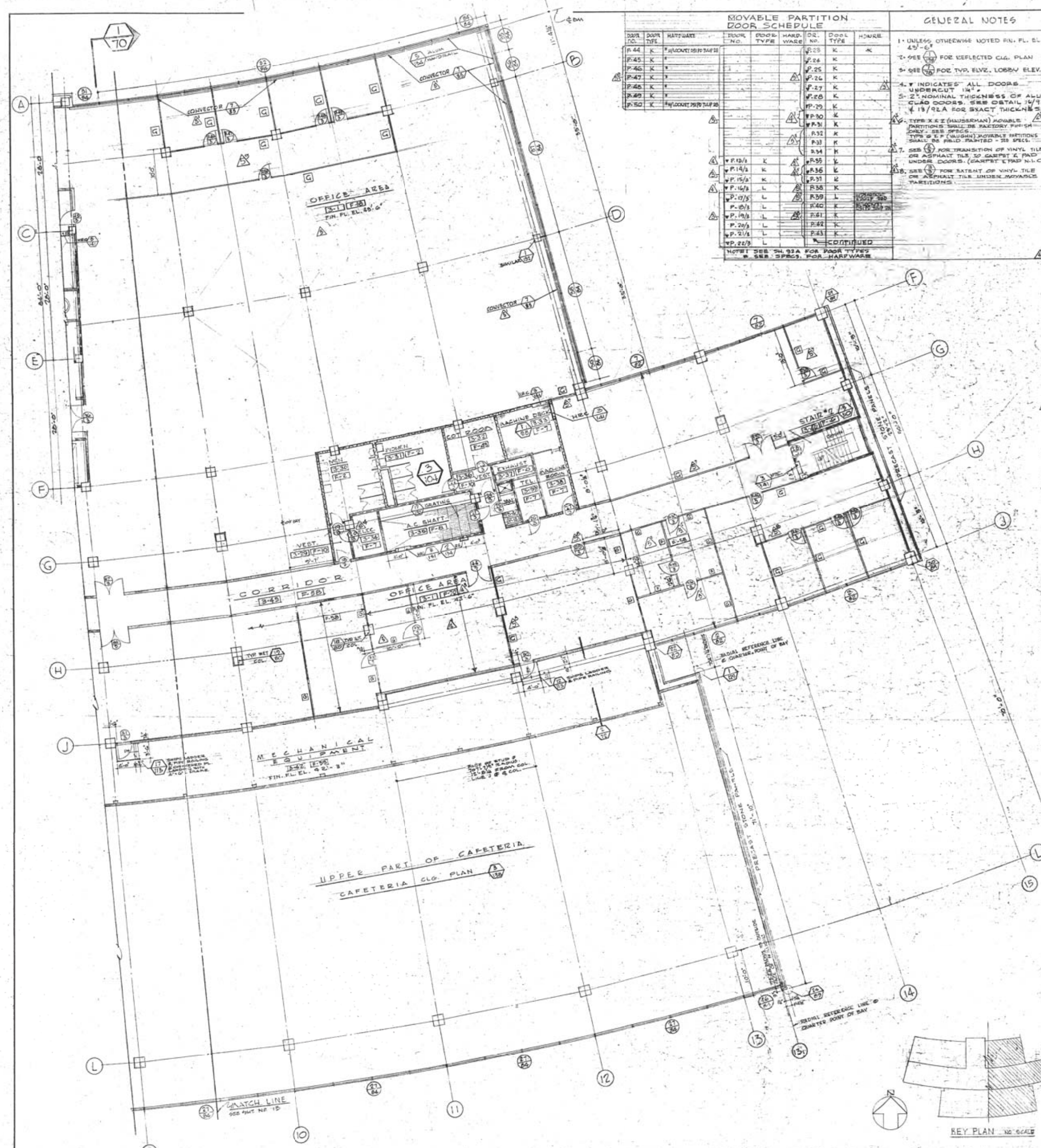


MURRAY ERICK ASSOCIATES STRUCTURAL ENGINEERS — LOS ANGELES, CALIF. DUDLEY DEANE & ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.	KAISER CENTER OAKLAND, CALIFORNIA	WELTON BECKET AND ASSOCIATES ARCHITECTS AND ENGINEERS LOS ANGELES CALIFORNIA	OFFICE BUILDING 3 RD FLOOR PLAN SCALE: 1/8" = 1'-0" PART ONE	DRAWN TRACED CHECKED	DATE NOVEMBER 15, 1957 JOB NO. 1437 SHEET NO. 13-4



MOVABLE PARTITION DOOR SCHEDULE

DOOR NO.	DOOR TYPE	HARDWARE	DOOR NO.	DOOR TYPE	HARDWARE	DR. NO.	DOOR TYPE	HDWRE
P-44	K	* W/LOCKSET DS1P0 3AUP 28				P-23	K	*
P-45	K	*				P-24	K	
P-46	K	*				P-25	K	
P-47	K	*				P-26	K	
P-48	K	*				P-27	K	
P-49	K	*				P-28	K	
P-50	K	* W/LOCKSET DS1P0 3AUP 28				▼P-29	K	
						▼P-30	K	
						▼P-31	K	
						P-32	K	
						P-33	K	
						P-34	K	
			▼P.13/3	K		P-35	K	
			▼P.14/3	K		P-36	K	
			▼P.15/3	K		P-37	K	
			▼P.16/3	L		P-38	K	
			▼P.17/3	L		P-39	L	W/PADLOCK EDUIP 3AUP W/LOCKSET DS1P0 3AUP 28
			P.18/3	L		P-40	K	
			▼P.19/3	L		P-41	K	
			P.20/3	L		P-42	K	
			▼P.21/3	L		P-43	K	
			▼P.22/3	L		CONTINUED		

NOTE: SEE SH. 92A FOR DOOR TYPES
* SEE SPECS. FOR HARDWARE

GENERAL NOTES

1. UNLESS OTHERWISE NOTED FIN. FL. EL. 43'-6"
2. SEE 1/138 FOR REFLECTED CLG. PLAN
3. SEE 7/78 FOR TYP. ELVR. LOBBY ELEV.
4. ▼ INDICATES ALL DOORS UNDERCUT 1¼".
5. 2" NOMINAL THICKNESS OF ALUM. CLAD DOORS. SEE DETAIL 16/92A & 13/92A FOR EXACT THICKNESS.
6. TYPE X & Z (HAUSERMAN) MOVABLE PARTITIONS SHALL BE FACTORY FINISH ONLY - SEE SPECS. TYPE Q & P (VAUGHN) MOVABLE PARTITIONS SHALL BE FIELD PAINTED - SEE SPECS.
7. SEE 2/3 FOR TRANSITION OF VINYL TILE OR ASPHALT TILE TO CARPET & PAD UNDER DOORS. (CARPET & PAD N.I.C.)
8. SEE 3/3 FOR EXTENT OF VINYL TILE OR ASPHALT TILE UNDER MOVABLE PARTITIONS.

INTERIOR FINISH SCHEDULE

FIN. NO.	FLOOR COVERING	FIN	BASE MATERIAL	FIN	WAINSCOT MATERIAL	HT.	FIN	WALL MATERIAL	FIN	CEILING MATERIAL	HT.	FIN	TRIM MATERIAL	FIN	REMARKS
F.1	VINYL TILE	–	RUBBER	–	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8.0	B	METAL	C	
F.2	CERAMIC TILE	–	CERAMIC TILE	–	NONE			CERAMIC TILE	–	ACOUSTIC TILE	8.0	R	METAL	C	
F.3															
F.4	VINYL TILE	–	ALUM	–	NONE			ALUMINUM	–	AC. PLASTIC	9.0	P	ALUM	–	SEE 10/92
F.5	ASPHALT TILE	–	RUBBER	–	NONE			PUTTYCOAT PLASTER	A	PUTTYCOAT PLASTER	9.0	A	METAL	C	
F.6	CEMENT	D	METAL	O	NONE			PUTTYCOAT PLASTER	O	EXPOSED STRUCTURE		O	METAL	O	
F.8	NONE	–	NONE	–	NONE			HARDWALL PLASTER	–	NONE		–	NONE	–	GRATING AT 3-35 3-10
F.10	VINYL TILE	–	RUBBER	–	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8.0	B	METAL	C	
F.12	VINYL TILE	–	RUBBER	–	NONE			KEENE'S CEMENT	A	KEENE'S CEMENT	8.0	A	METAL	C	
F.7	CEMENT	A	METAL	C	NONE			HARDWALL PLASTER	–	EXPOSED STRUCT.		–	METAL	C	
F.43	VINYL TILE	–	RUBBER	–	NONE			PUTTYCOAT PLASTER	B	ACOUSTIC TILE	8.0	R	METAL	C	
F.33	BITUMINOUS	–	BITUMINOUS	–	NONE			HARDWALL PLASTER	A	EXPOSED STRUCTURE		N	METAL	C	
F.58	VINYL TILE	–	ALUM	–	NONE			PUTTYCOAT PLASTER	B	METAL ACOUSTIC	9.0		METAL	C	ALUM. TRIM @ CLG. SEE 8/92A
F.70	CARPET & PAD (NIC)	–	ALUM	–	NONE			PUTTYCOAT PLASTER	B	METAL AC. TILE	9.0		METAL	C	ALUM. TRIM @ CLG. SEE 8/92A

DOOR SCHEDULE (CONTINUED)

DOOR NO.	OPENING WIDTH	OPENING HT.	DOOR TYPE	DOOR THK.	DOOR MATERIAL	DOOR FIN.	FRAME DETAIL	FRAME MATERIAL	FRAME FIN.	THRESHOLD DETAIL	THRESHOLD MATERIAL	LOUVER SIZE	HARDWARE	FIRE LABEL	REMARKS
57/3	3'-0"	8'-9"	D/92A	2"	ALUM		D/92A	ALUM							
													34		
▼59/3	6'-0"	8'-9"	F/92A	2"	ALUM		F/92A	ALUM.					45		PR. EXPOSED CLOSERS
▼60/3	6'-0"	8'-9"	F/92A	2"	ALUM		F/92A	ALUM					45		PR. EXPOSED CLOSERS
▼61/3	6'-0"	8'-9"	F/92A	2"	ALUM		F/92A	ALUM					45		PR. EXPOSED CLOSERS
63/3	6'-0"	8'-9"	F/92A	2"	ALUM		F/92A	ALUM					45		PR. EXPOSED CLOSERS
▼64/3	6'-0"	8'-9"	F/92A	2"	ALUM		F/92A	ALUM					45		PR. EXPOSED CLOSERS.
65/3	3'-0"	8'-9"	D/92A	2"	ALUM		D/92A	ALUM					12		

DOOR SCHEDULE

DOOR NO.	OPENING WIDTH	OPENING HT.	DOOR TYPE	DOOR THK.	DOOR MATERIAL	DOOR FIN.	FRAME DETAIL	FRAME MATERIAL	FRAME FIN.	THRESHOLD DETAIL	THRESHOLD MATERIAL	LOUVER SIZE	HARDWARE	FIRE LABEL	REMARKS
1/3	3'-0"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.					1	B	EXPOSED CLOSER
2/3	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.					8	B	EXPOSED CLOSER
3/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–		1'-8"x9"	12	–	
4/3	2'-8"	7'-0"	C/92A	2"	ALUM.		11/92	STL.		23/92	METAL		8	B	EXPOSED CLOSER
5/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–		1'-8"x9"	37	–	EXPOSED CLOSER
6/3	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		–		–	3	–	EXPOSED CLOSER
7/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3	–	EXPOSED CLOSER
8/3	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		–		–	8	B	EXPOSED CLOSER
9/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3	–	EXPOSED CLOSER
10/3	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		–	–	–	3	–	EXPOSED CLOSER
11/3	3'-0"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–	–	–	1	B	EXPOSED CLOSER
12/3	3'-0"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–	–	–	5	–	EXPOSED CLOSER
13/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–	–	–	8	B	EXPOSED CLOSER
14/3	6'-0"	7'-0"	C/92	1¾"	ALUM.		14/92	ALUM.		–	–	–	45		EXPOSED CLOSER
15/3	3'-0"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–	–	–	12	B	EXPOSED CLOSER
16/3	3'-0"	6'-8"	C/92A	2"	ALUM		C/92A	STL.		–	–	–	17	B	EXPOSED CLOSER - NO LATCH
17/3	3'-0"	6'-8"	C/92A	2"	ALUM		C/92A	STL.		–	–	–	12	B	EXPOSED CLOSER - NO LATCH
18/3	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		–	–	–	3	–	EXPOSED CLOSER
19/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3	–	EXPOSED CLOSER
20/3	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		–	–	–	8	B	EXPOSED CLOSER
21/3	2'-8"	7'-0"	C/92A	2"	ALUM.		11/92	STL.		23/92	METAL	–	8	B	EXPOSED CLOSER
22/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3	–	EXPOSED CLOSER
23/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–	–	1'-8"x9"	37	–	EXPOSED CLOSER
24/3	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		–	–	–	3	–	EXPOSED CLOSER
25/3	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		–	–	1'-8"x9"	12	–	
26/3	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		–	–	–	8	B	EXPOSED CLOSER
27/3	3'-0"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		23/92	METAL	–	8	B	EXPOSED CLOSER, SOUND INSUL
28/3	3'-0"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		–	–	–	1	B	EXPOSED CLOSER
29/3	6'-0"	7'-0"	G/92A	2"	ALUM.		G/92A	ALUM.				1'-8"x9"	41	–	EXPOSED CLOSERS. PR
30/3	3'-0"	7'-0"	A/92A	2"	ALUM		14/92A	STL.		23/92	METAL	–	17	B	EXPOSED CLOSER
31/3	3'-0"	7'-0"	A/92A	2"	ALUM		14/92A	STL.		23/92	METAL	–	17	B	EXPOSED CLOSER
32/3	6'-0"	8'-9"	F/92A	2"	ALUM.		F/92A	ALUM		–	–	–	45		PR EXPOSED CLOSERS
33/3	6'-0"	8'-9"	F/92A	2"	ALUM.		F/92A	ALUM		–	–	–	46		PR. EXPOSED CLOSERS
34/3	6'-0"	7'-0"	G/92A	2"	ALUM.		G/92A	ALUM		–	–	–	44	–	EXPOSED CLOSERS. PR.
35/3	5'-0"	7'-0"	G/92	1¾"	ALUM.		10/92	ALUM.		–	–	–	45	–	PR. FL. CLOSERS - SEE ELEV. 7/78
36/3	5'-0"	7'-0"	G/92A	2"	ALUM		G/92A	ALUM.		–	–	–	26	–	PR. FL. CLOSERS -
38/3	2'-8"	6'-8"	C/92A	2"	ALUM		11/92	STL.		23/92	METAL	–	17	B	EXPOSED CLOSER
39/3	2'-8"	6'-8"	C/92A	2"	ALUM		11/92	STL.		23/92	METAL	–	17	B	EXPOSED CLOSER.
40/3	6'-0"	7'-0"	G/92A	2"	ALUM.		G/92A	ALUM		–	–	–	45	–	PR. FLOOR CLOSERS
42/3	6'-0"	8'-9"	F/92A	2"	ALUM.		F/92A	ALUM		–	–	–	45		PR. EXPOSED CLOSERS
43/3	6'-0"	8'-9"	F/92A	2"	ALUM		F/92A	ALUM		–	–	–	45		PR. EXPOSED CLOSERS
▼44/3	6'-0"	8'-9"	F/92A	2"	ALUM								45		PR. EXPOSED CLOSERS
45/3	3'-0"	7'-0"	E/92A	2"	ALUM.		E/92A	ALUM.		–	–	–	43	–	EXP. CLOSER.
46/3	6'-0"	8'-9"	F/92A	2"	ALUM.		F/92A	ALUM.		–	–	–	45	–	EXP. CLOSERS. PR.
47/3	6'-0"	8'-9"	F/92A	2"	ALUM.		F/92A	ALUM.		–	–	–	45	–	EXP. CLOSERS. PR.

CONTINUED

REVISIONS

DATE	NO.	REVISION	BY
JULY 25, '60	21	[illegible]	K.D.C.
JULY 1, 1959	7	[illegible]	[illegible]
	6	[illegible]	K.D.C.
		[illegible]	R.L.S.
MARCH 9, 1959		[illegible]	
OCT. 8, 1958		[illegible]	D.J.Y.
		[illegible]	R.L.S.
		INDICATED CONVECTOR & DETAIL INDICATION ON PLAN	N.T.B.
		REVISED DOORS & PARTITIONS AS PER [illegible]	R.L.S.
	3	REVISED FINISH IN SPACE 3-1 AND ADDED F-70 IN FINISH SCHEDULE AS PER RFB # 33.	W.E.S.
	1	DELETED F-3; REVISED F-4 & F-58 IN FINISH SCHEDULE & ADDED GENERAL NOTES 6, 7, & 8 FOR CLARIFICATION.	R.G.
		[illegible]	G.P.
		[illegible]	R.L.S.
		ADDED GENERAL NOTE # 4 & # 5.	R.L.S.
		REVISED PARTN. LAYOUT & DR. SCHED.	R.L.S.
		[illegible]	
		REVISED DR. SCHED. & PARTN. LAYOUT	
		GEN. REVISIONS	
		[illegible]	F.B.
DEC. 31, 1957		ADDED HARDWARE SCHEDULE.	R.L.

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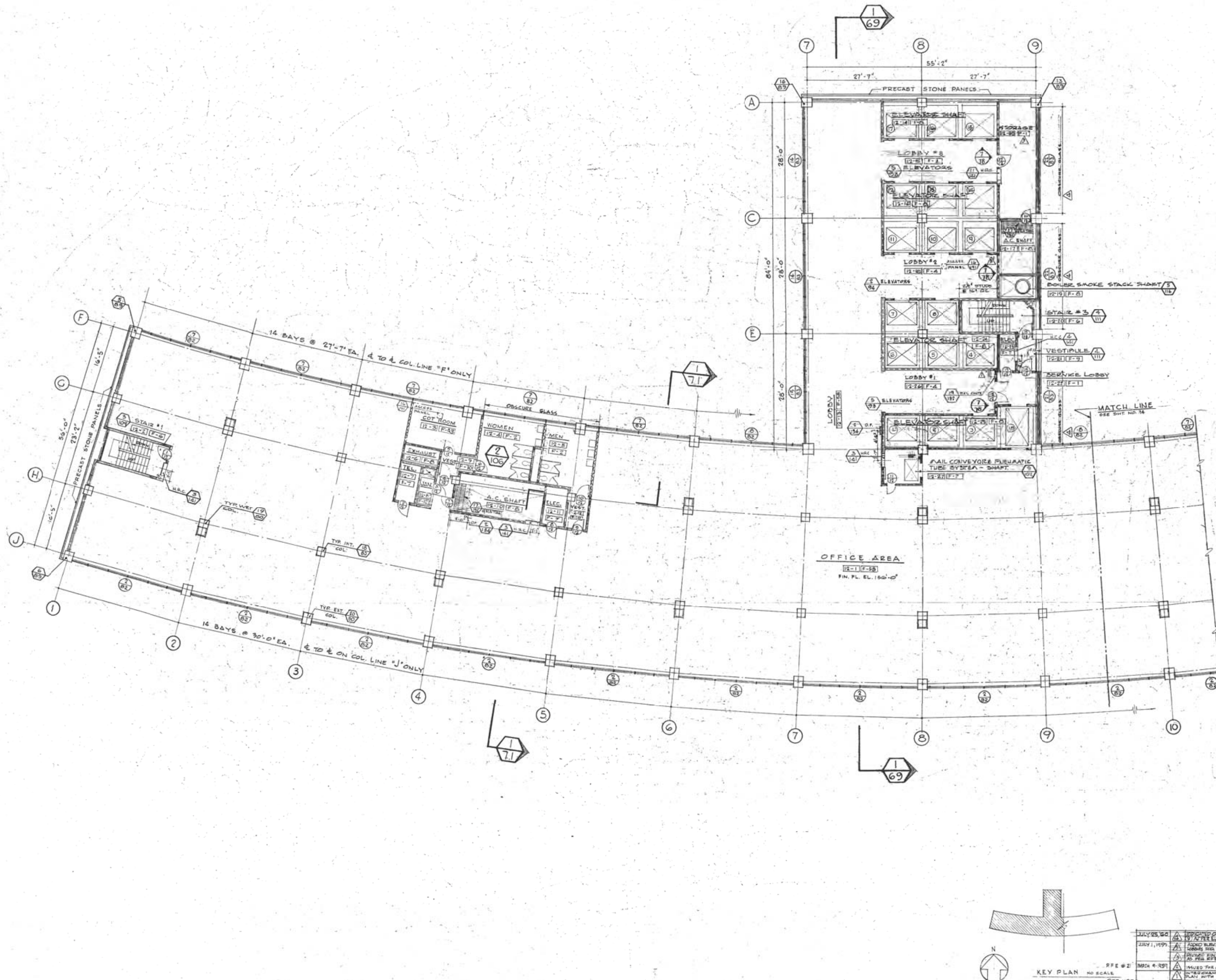
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
3 RD FLOOR PLAN
SCALE: 1/8" = 1'-0"
PART TWO

DRAWN	DATE NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO. 14-5



DATE	NO.	REVISION	BY
JULY 25, '60	4	INDICATED OBSCURE GL. @ ECC. LINE (9) AFTER ELEVATIONS, SHT. 53.	A.R.C.
JULY 1, 1959	2	ADDED ELEV. INDICATION IN ELEVATOR LOBBIES FOR CLARIFICATION.	GP
	3	REVISED FINISH IN SPACE 12-39 AS PER RFE #33.	RG
MARCH 4, 1959	2	ISSUED FOR CLARIF. W/SHT. 32-4	F.B.
	1	INTERCHANGED 13TH FLOOR PLAN WITH 12TH FLOOR PLAN	[illegible]
MAY 28, 58	1	MAIL CHUTE DIM. CHANGED	GP

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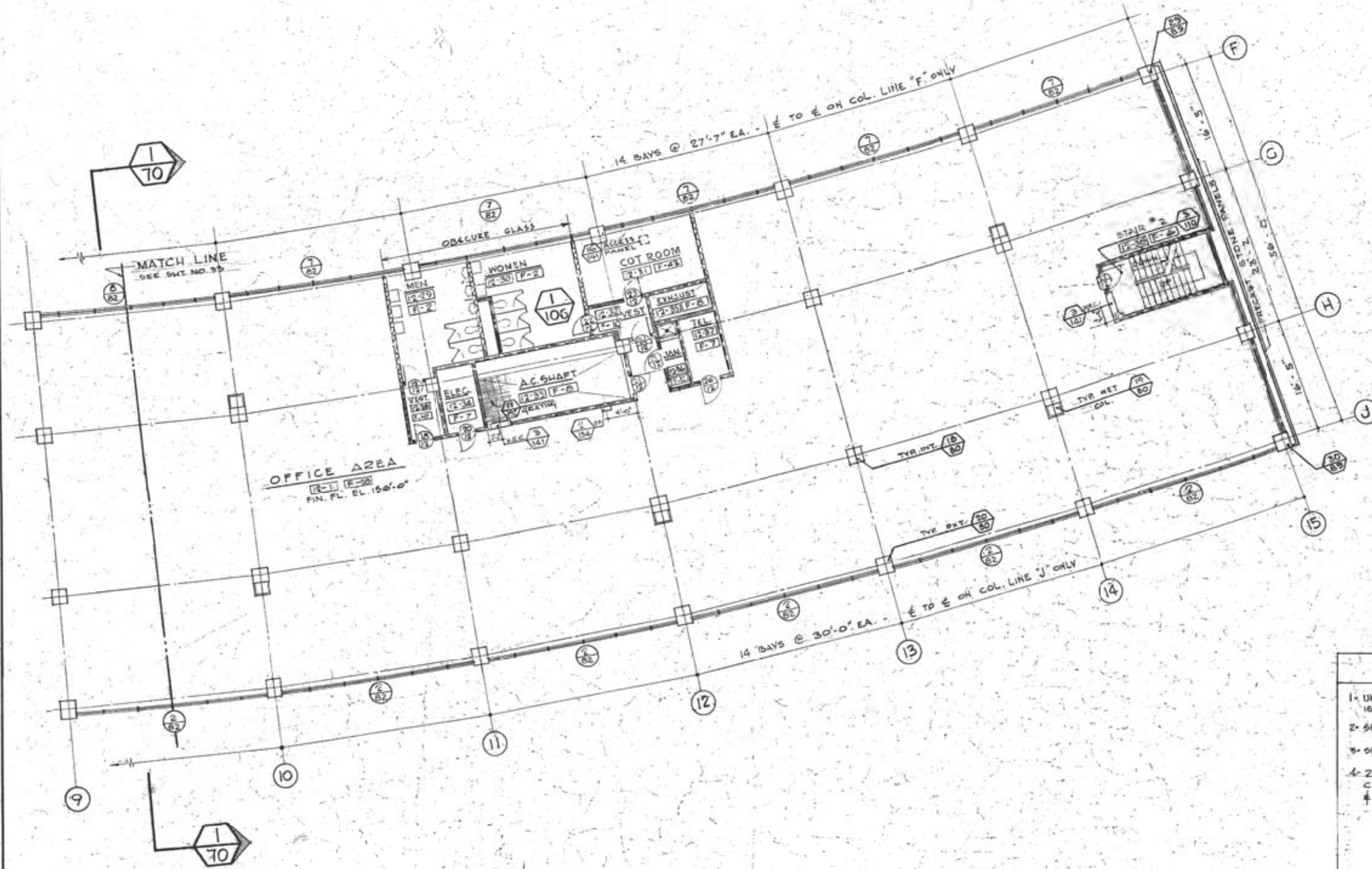
OFFICE BUILDING
12 TH FLOOR PLAN
SCALE: 1/8" = 1'-0"
PART ONE

DRAWN	DATE NOVEMBER 15, 1957
TRACED	JOB NO. - 1437
CHECKED	SHEET NO. 31-4



INTERIOR FINISH SCHEDULE

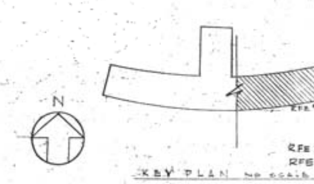
FIN NO.	FLOOR COVERING	FIN	BASE MATERIAL	FIN	VAINSCOT MATERIAL	HT.	FIN	WALL MATERIAL	FIN	CEILING MATERIAL	FIN'D HT	FIN	TRIM MATERIAL	FIN	REMARKS
F-1	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	*B	PUTTYCOAT PLASTER	9'-0"	*B	METAL	C	* TYPE "A" WALL & CLG. FIN. @ SPACE 12-39
F-2	CERAMIC TILE	—	CERAMIC TILE	—	NONE			CERAMIC TILE	—	ACOUSTIC TILE	8'-0"	R	METAL	C	
F-3	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	B	METAL ACOUSTIC TILE	9'-0"	—	METAL	C	
F-4	VINYL TILE	—	ALUM	—	NONE			ALUMINUM		AC. PLASTIC	9'-8"	P	ALUM	—	SEE 10/92
F-6	CEMENT	D	METAL	O	NONE			PUTTYCOAT PLASTER	O	EXPOSED STRUCT.		O	METAL	O	
F-7	CEMENT	A	METAL	C	NONE			HARDWALL PLASTER	—	EXPOSED STRUCT.		—	METAL	C	
F-8	NONE	—	NONE	—	NONE			HARDWALL PLASTER	—	NONE		—	NONE	—	GRATING AT 12-35 12-17 12-10
F-9	CEMENT	A1	CEMENT	A1	NONE			CEMENT PLASTER	O	CEMENT PLASTER	9'-0"	O	METAL	O	
F-10	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	B	PUTTYCOAT PLASTER	8'-0"	B	METAL	C	
F-12	VINYL TILE	—	RUBBER	—	NONE			KEENE'S CEMENT	A	KEENE'S CEMENT	8'-0"	A	METAL	C	
F-13	VINYL TILE	—	RUBBER	—	NONE			PUTTYCOAT PLASTER	B	ACOUSTIC TILE	8'-0"	R	METAL	C	
F-38	VINYL TILE	—	ALUM	—	NONE			PUTTYCOAT PLASTER	B	METAL	9'-0"	—	METAL	C	ALUM. TRIM @ CLG. SEE DET. B/92A

GENERAL NOTES

1. UNLESS OTHERWISE NOTED FIN. FL. EL. 166'-0"
2. SEE 1/138 FOR REFLECTED CLG. PLAN
3. SEE 7/78 FOR TYP. ELVR. LOBBY ELEV.
4. 2" NOMINAL THICKNESS OF ALUM. CLAD DOORS. SEE DETAIL 16/92A & 13/92A FOR EXACT THICKNESS.

DOOR SCHEDULE

DOOR NO.	OPENING WIDTH	OPENING HT.	DOOR TYPE	DOOR TH	DOOR MATERIAL	DOOR FIN	FRAME DETAIL	FRAME MATERIAL	FRAME FIN	THRESHOLD DETAIL	THRESHOLD MATERIAL	LOUVER SIZE	HARDWARE	FIRE LABEL	REMARKS
1/12	3'-0"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		—	—		1	B	EXPOSED CLOSER
2/12	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		—	—	—	8	B	EXPOSED CLOSER
3/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		—	—	1'-8"x9"	12		
4/12	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		—	—	—	3		EXPOSED CLOSER
5/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		—	—	1'-8"x9"	37		EXPOSED CLOSER
6/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3		EXPOSED CLOSER
7/12	2'-8"	7'-0"	C/92A	2"	ALUM.		11/92	STL.		23/92	METAL	—	8	B	EXPOSED CLOSER
8/12	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		—	—	—	8	B	EXPOSED CLOSER
9/12	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		—	—	—	3		EXPOSED CLOSER
10/12	2'-6"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3		EXPOSED CLOSER
11/12	2'-0"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		—	—	—	42	B	EXPOSED CLOSER
12/12	5'-0"	7'-0"	G/92	1¾"	ALUM.		10/92	ALUM.		—	—	—	45		EXPOSED CLOSERS - PR.
13/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		—	—	—	8	B	EXPOSED CLOSER
14/12	3'-0"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		19/92	METAL	—	5	E	EXPOSED CLOSER - EXT. GRADE DR.
15/12	3'-0"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		19/92	METAL	—	1	B	EXPOSED CLOSER - EXT. GRADE DR.
16/12	2'-0"	7'-0"	J/92	1¾"	WOOD		11/92	STL.		23/92	METAL	—	5	B	EXPOSED CLOSER
17/12	3'-0"	7'-0"	H/92	1¾"	ALUM		10/92	ALUM		—	—	—	17		EXPOSED CLOSER
18/12	2'-8"	7'-0"	A/92A	2"	ALUM		A/92A	STL.		—	—	—	3		EXPOSED CLOSER
19/12	2'-6"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3		EXPOSED CLOSER
20/12	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		—	—	—	8	B	EXPOSED CLOSER
21/12	2'-8"	7'-0"	C/92A	2"	ALUM.		11/92	STL.		23/92	METAL	—	8	B	EXPOSED CLOSER
22/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		21/92	MARBLE	1'-8"x9"	3		EXPOSED CLOSER.
23/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		—	—	1'-8"x9"	37		EXPOSED CLOSER.
24/12	2'-8"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		—	—	—	3		EXPOSED CLOSER.
25/12	2'-8"	7'-0"	C/92A	2"	ALUM.		C/92A	STL.		—	—	1'-8"x9"	12		
26/12	2'-8"	7'-0"	B/92A	2"	ALUM.		B/92A	STL.		—	—	—	8	B	EXPOSED CLOSER
27/12	3'-0"	7'-0"	A/92A	2"	ALUM.		A/92A	STL.		—	—	—	1	B	EXPOSED CLOSER



RFE NO. 12
RFE NO 2

DATE	NO.	REVISION	BY
JULY 25, '60	10	DELETE LOUVERS DOOR 9, 4, 9, 16, & 24 LT PER F.C.A. & DZ.	DJY
JULY 1, 1959	9	REVISED FINISH SCHEDULE AS PER RFE #33.	RGE
	6	REVISED FINISH SCHEDULE FOR CLARIFICATION	KG
	5	CORRECTED DR. SCHEDULE PER SHT. 105-3.	RLS
MAR. 9, 1959	4	DR. SCHEDULE REVISION	FB.
	3	REV. RUBBER BASE TO ALUM. AT F-4; ADDED F-38 & 9'-0" CEILING CHANGE TO 8'-0" AT F-43	TC
OCT. 31, 1958	3	REVISED DR. SCHED.	HRK
	2	INTERCHANGED 13TH FLOOR PLAN WITH 12TH FLOOR PLAN	TC
MAY 28, 58	1	REVISED FIN. SCHED. AS PER SHT. 101	FB.
DEC. 31, 1957	1	ADDED HARDWARE SCHEDULE	R.L.

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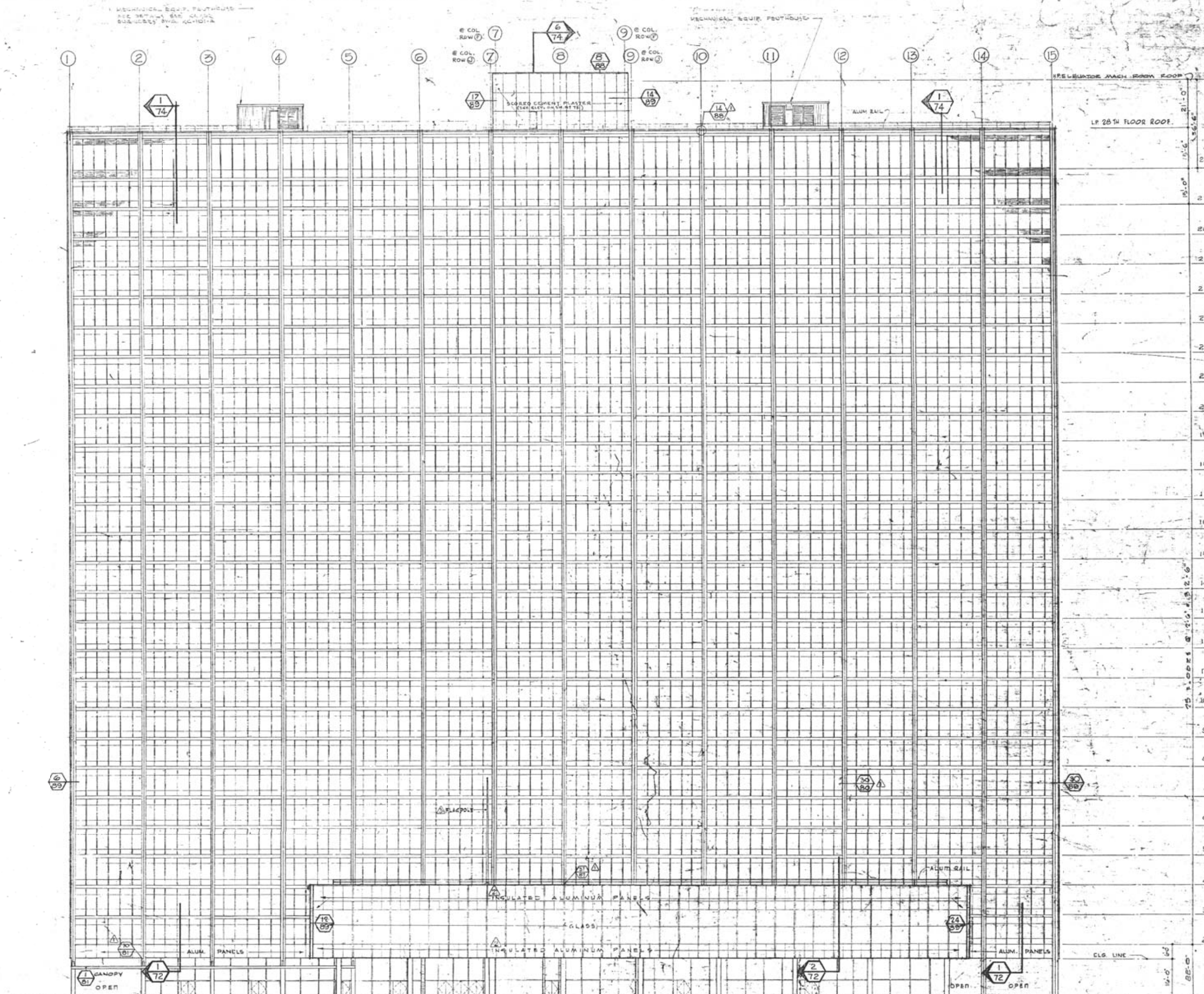
LOS ANGELES CALIFORNIA

OFFICE BUILDING
12TH FLOOR PLAN
SCALE: 1/8" = 1'-0"
PART TWO

DRAWN
TRACED
CHECKED
DATE NOVEMBER 15, 1957
JOB NO. 1437
SHEET NO. 32-6



SOUTH ELEVATION

SCALE 1/16" = 1'-0"

NOTE: SEE SHEETS 76 & 77 FOR 1/4" SCALE 1ST FLOOR EXT ELEVATIONS.

JULY 25, 60			
7-15-58			
FEB 5, 1958			
DATE	NO.	REVISION	BY

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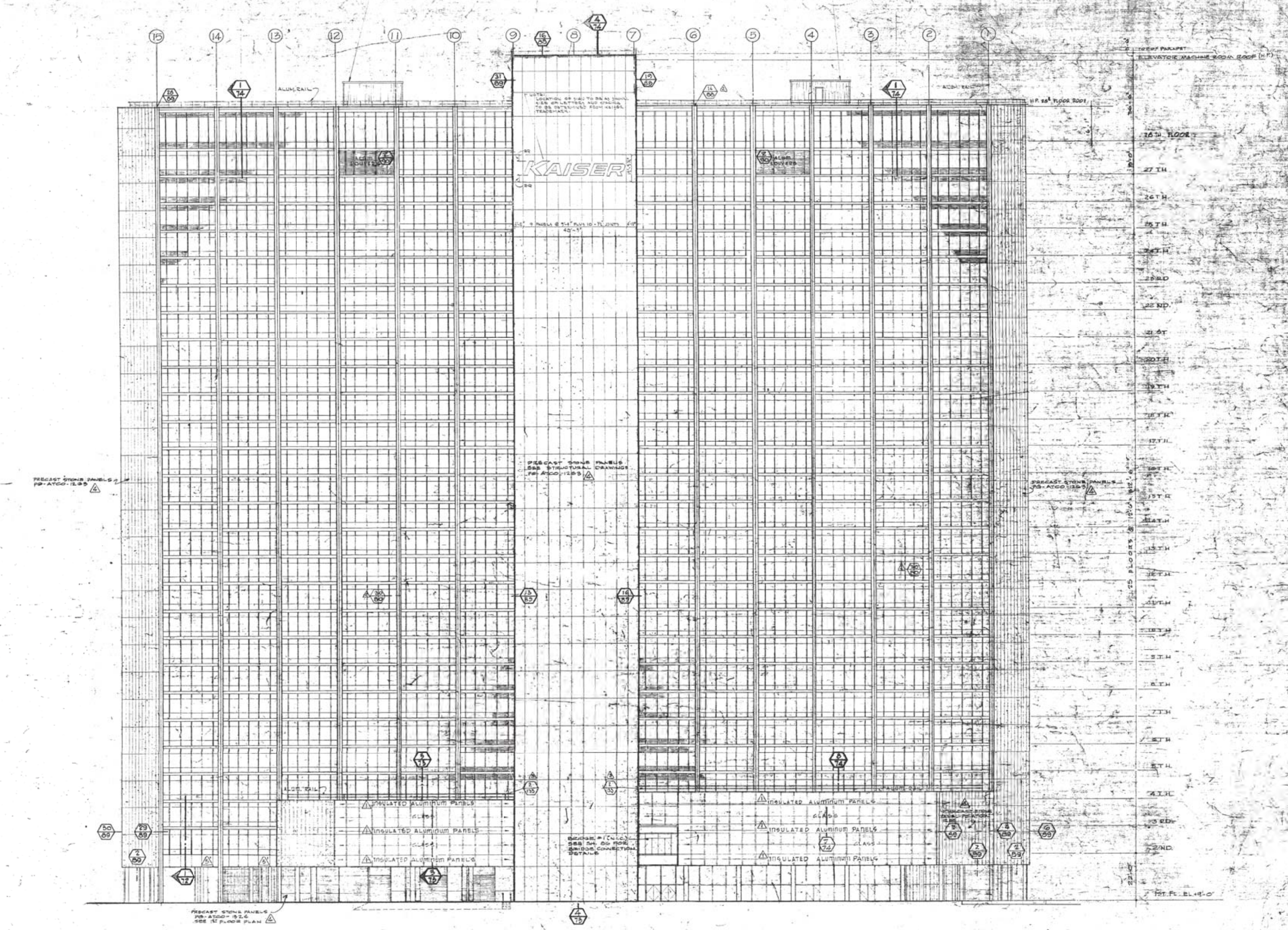
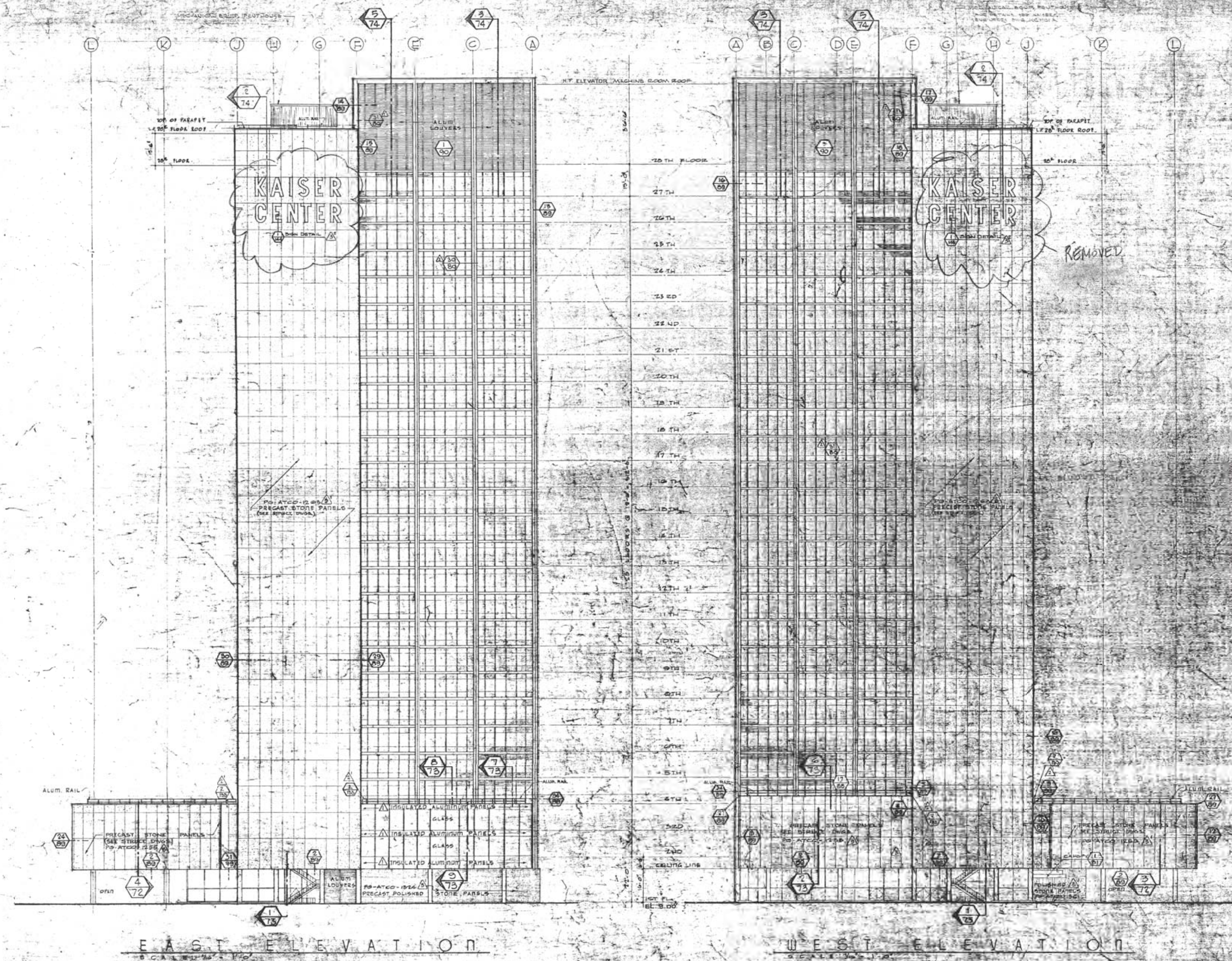
OFFICE BUILDING
SOUTH ELEVATION
SCALE 1/16" = 1'-0"

DRAWN	DATE NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO. 66 4



NORTH ELEVATION

MURRAY ERICK ASSOCIATES STRUCTURAL ENGINEERS — LOS ANGELES, CALIF. DUDLEY DEANE & ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.	KAISER CENTER OAKLAND, CALIFORNIA	WELTON BECKET AND ASSOCIATES ARCHITECTS AND ENGINEERS LOS ANGELES, CALIFORNIA	OFFICE BUILDING NORTH ELEVATION	DRAWN / TRACED / CHECKED DATE NOVEMBER 15, 1957 JOB NO. 1437 SHEET 67-6



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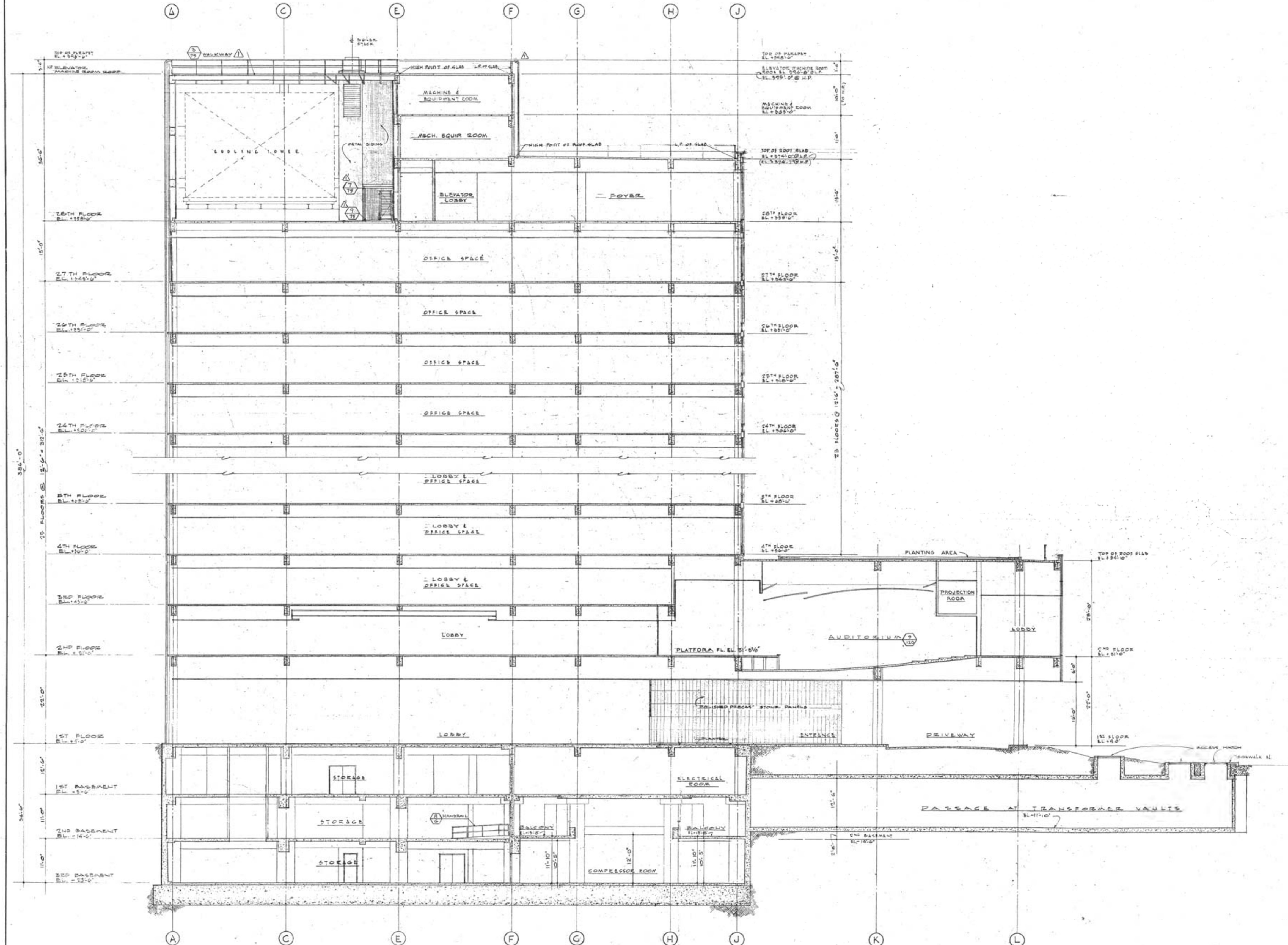
68-4



SECTION 1/69

MURRAY ERICK ASSOCIATES
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OAKLAND, CALIFORNIA

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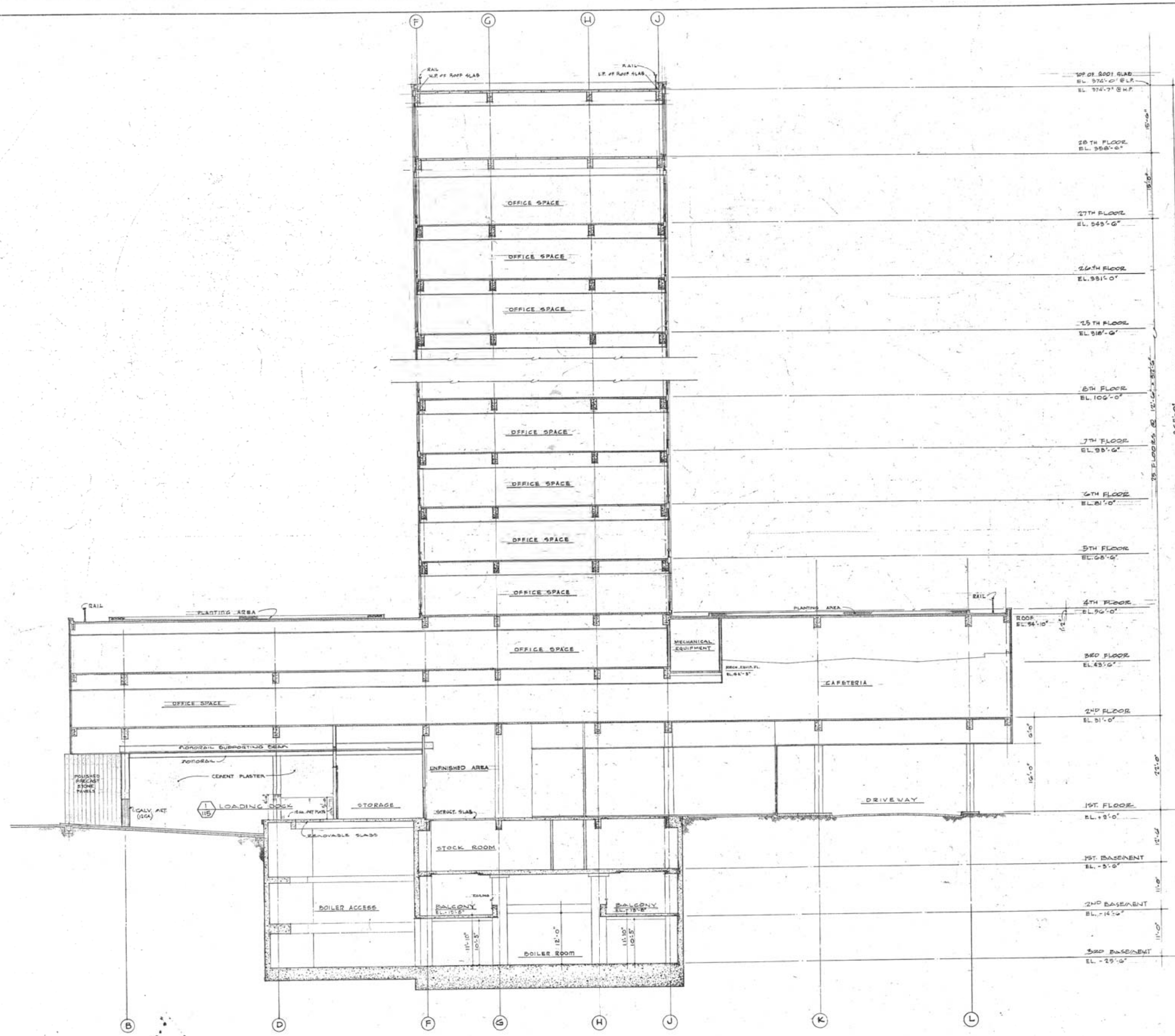
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

OFFICE BUILDING
CROSS SECTION
SCALE: 1/8" = 1'-0"

DRAWN	DATE NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO. 69-1



1/70 SECTION

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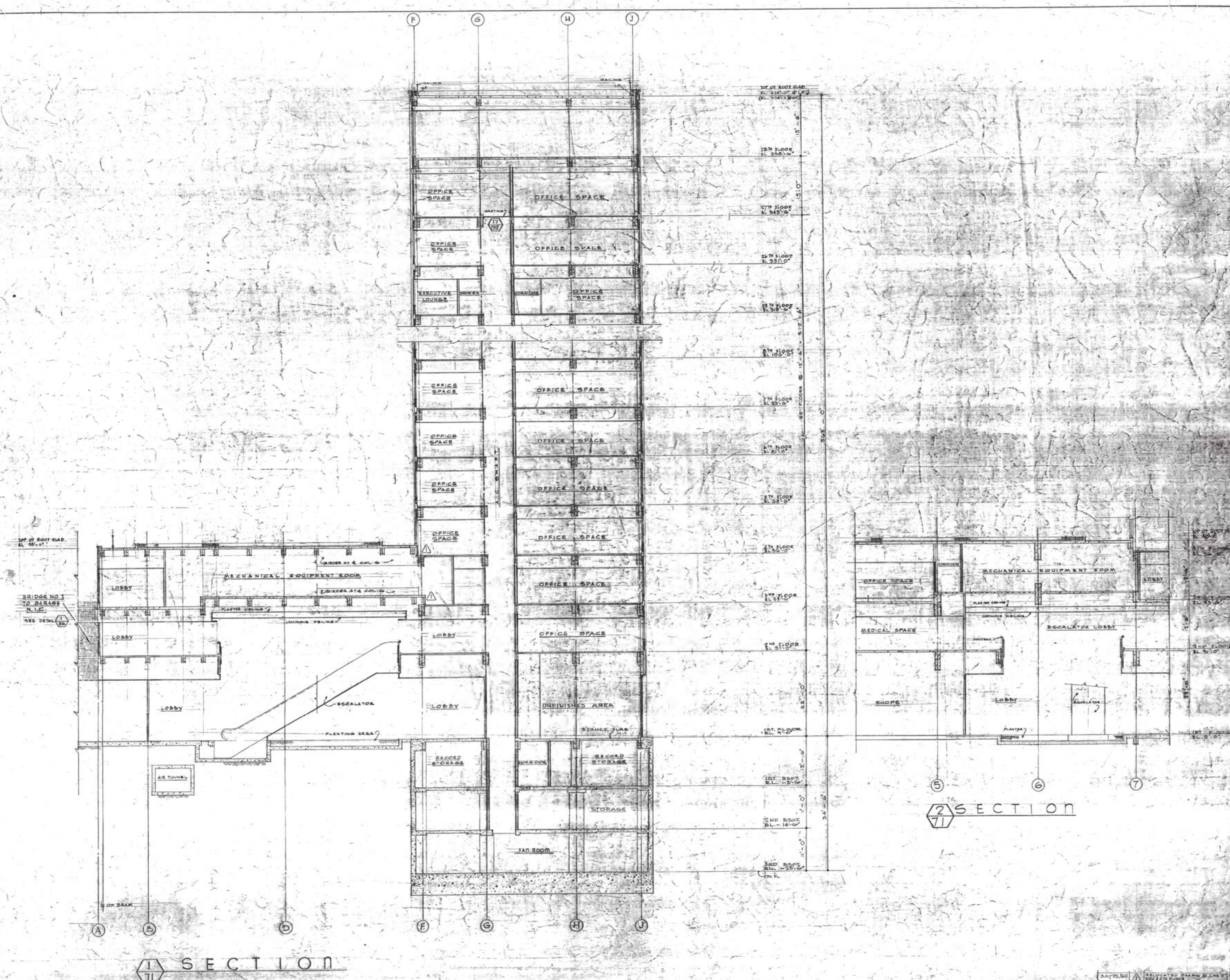
DATE	NO.	REVISION	BY
DRAWN		DATE NOVEMBER 15, 1957	
TRACED		JOB NO. 1437	
CHECKED		SHEET NO. 70	



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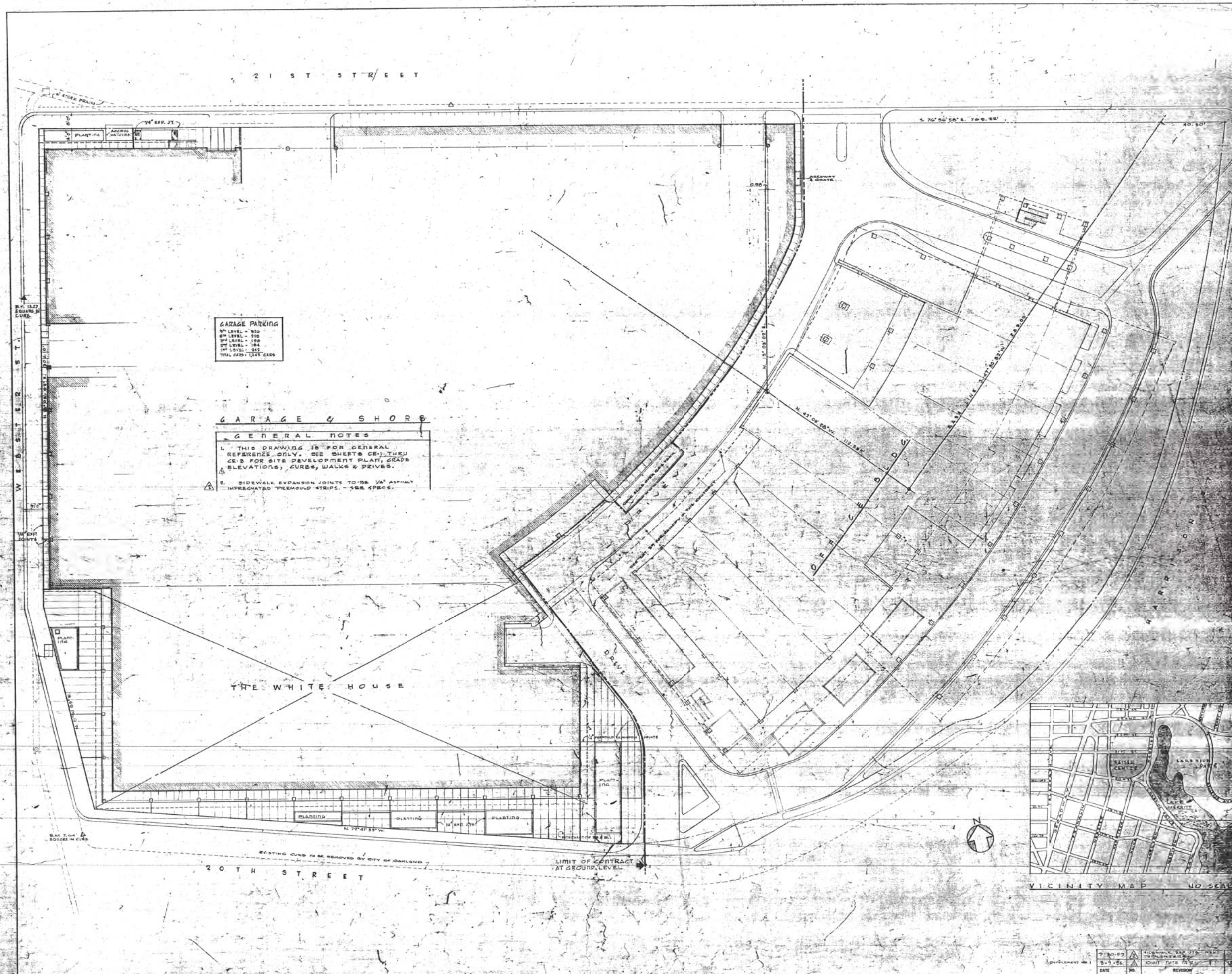
OFFICE BUILDING
CROSS SECTION
SCALE: 1/8" = 1'-0"

DRAWN	DATE NOVEMBER 15, 1957
TRACED	JOB NO. 1437
CHECKED	SHEET NO. 71-1



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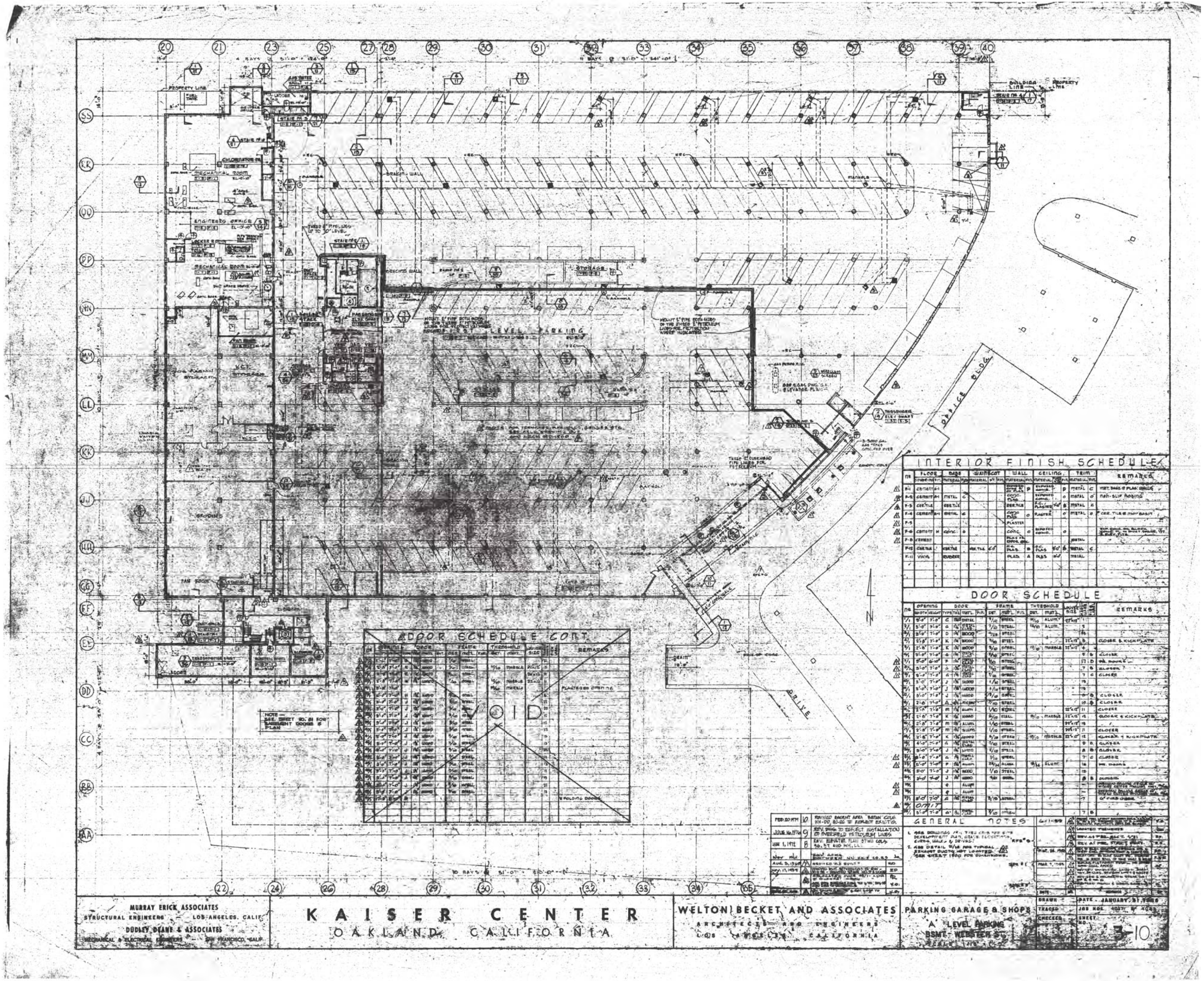
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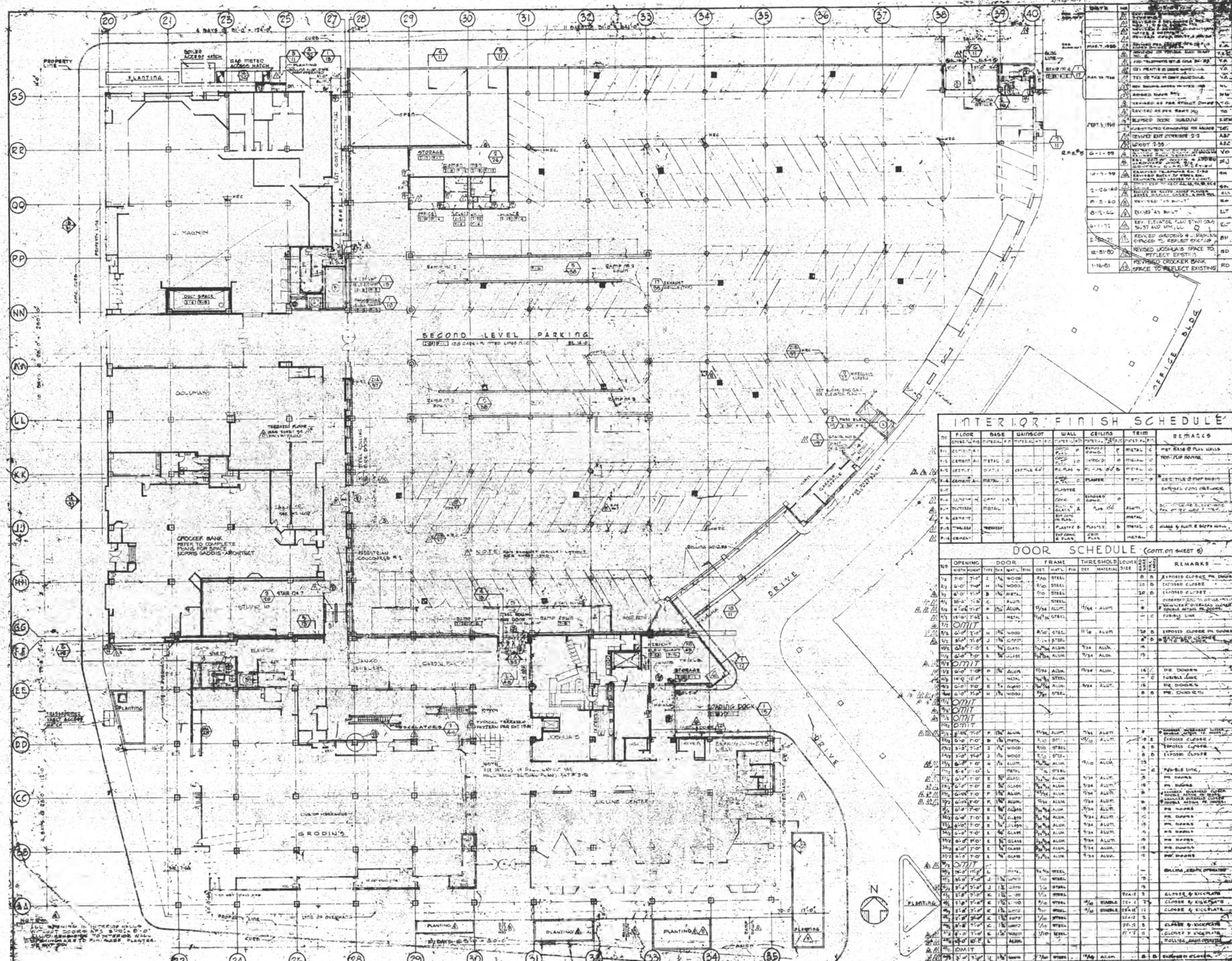
OAKLAND CALIFORNIA
WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES CALIFORNIA
PARKING GARAGE & SHOPS
"A" LEVEL PARKING
BSMT. WEBSTER ST.
INTERIOR FINISH SCHEDULE
DOOR SCHEDULE
DOOR SCHEDULE CONT.
VOID
GENERAL NOTES
OFFICE BLDG.
DRIVE
3-10



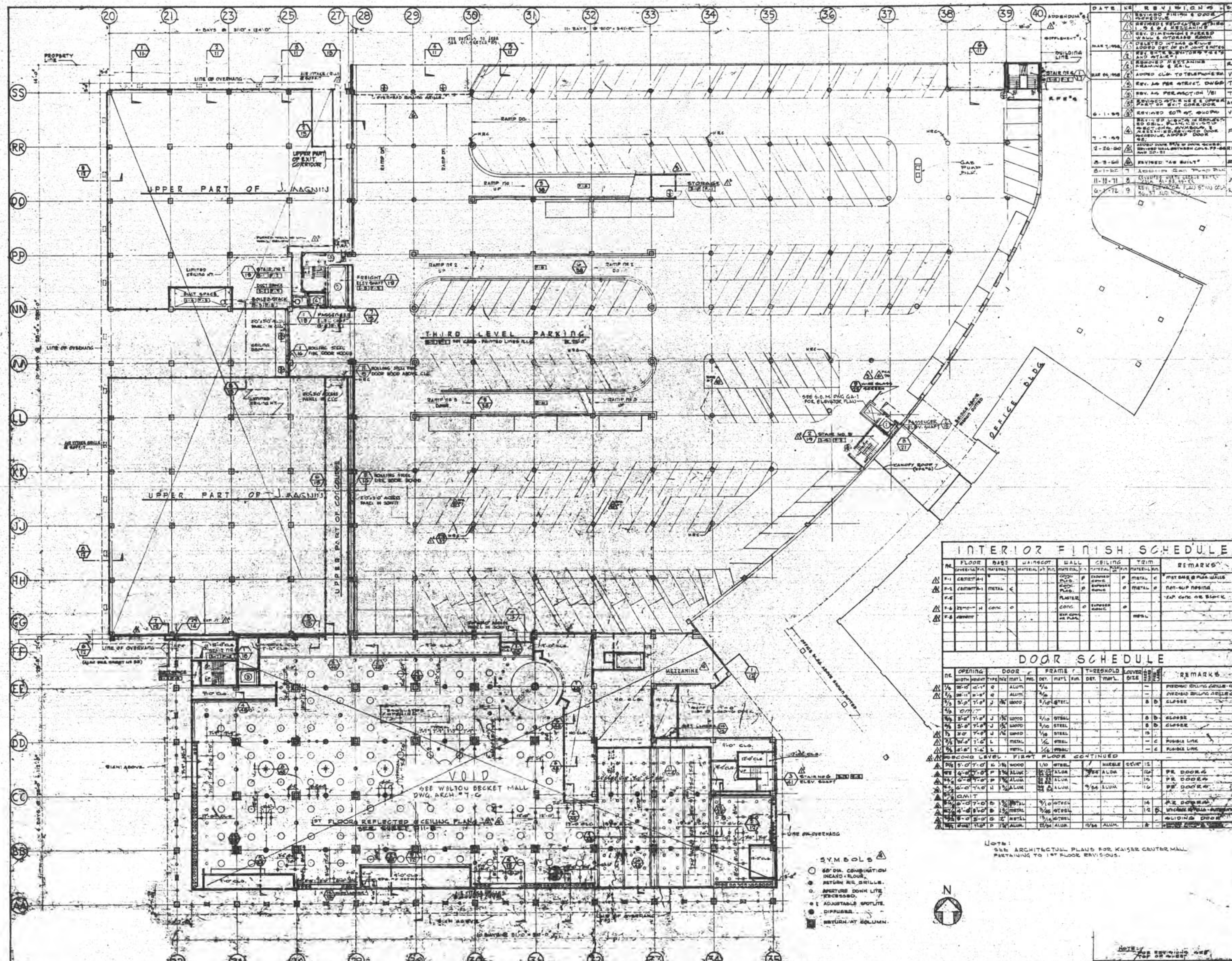
MURRAY ERICK ASSOCIATES
STRUCTURAL ENGINEERS LOS ANGELES, CALIF.
DUDLEY DEANE & ASSOCIATES

KAISER CENTER
OAKLAND CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES CALIFORNIA

PARKING GARAGE & SHOPS
B LEVEL PARKING
1ST FLOOR SHOPS

DRAWN	DATE JANUARY
TRACED	JOB NOS.
CHECKED	SHEET NO. 4-13



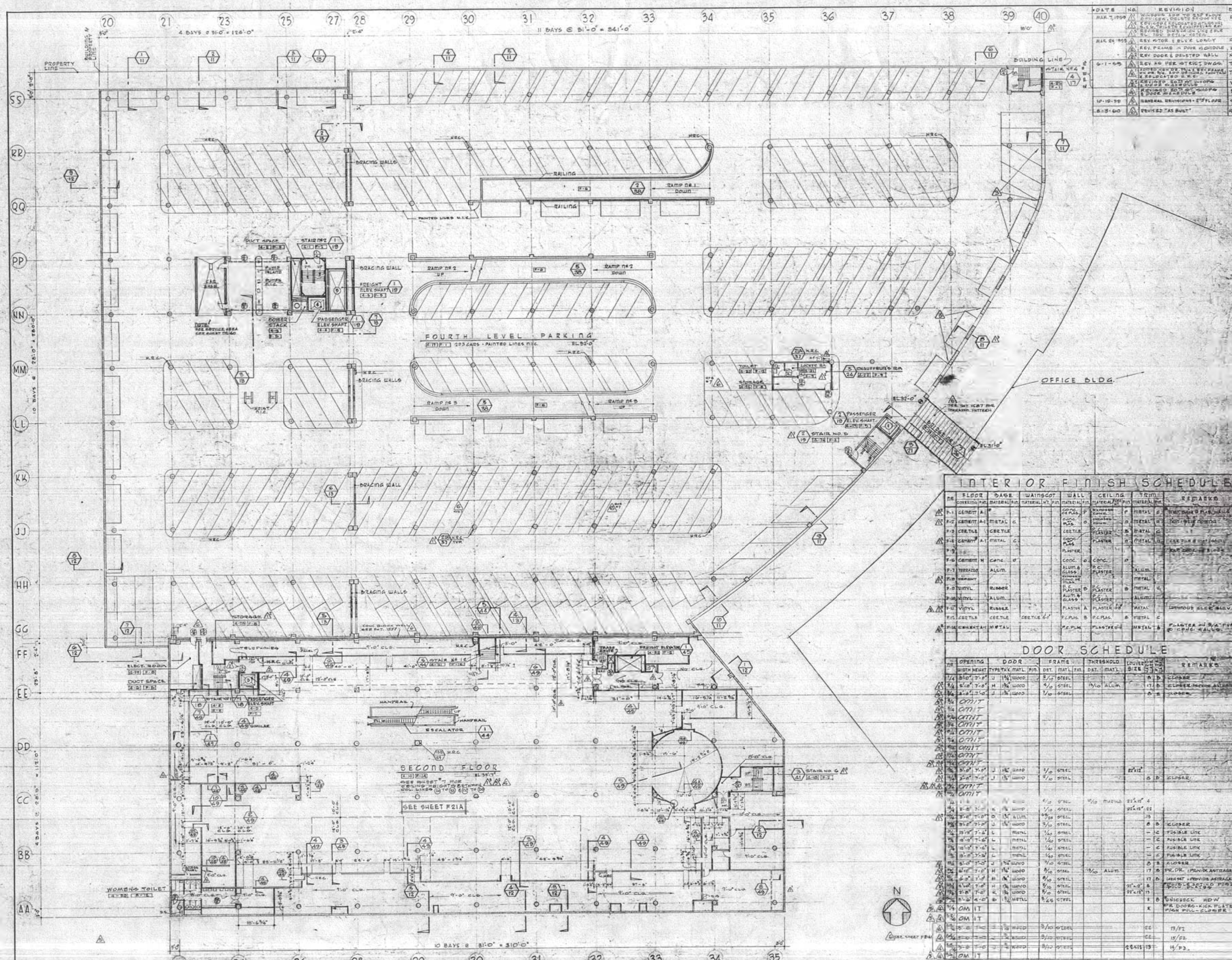
KAISER CENTER
OAKLAND CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS

PARKING GARAGE & SHOPS
'C' LEVEL PARKING
UPPER PART - SHOPS

DATE JANUARY 31, 1958

5-9

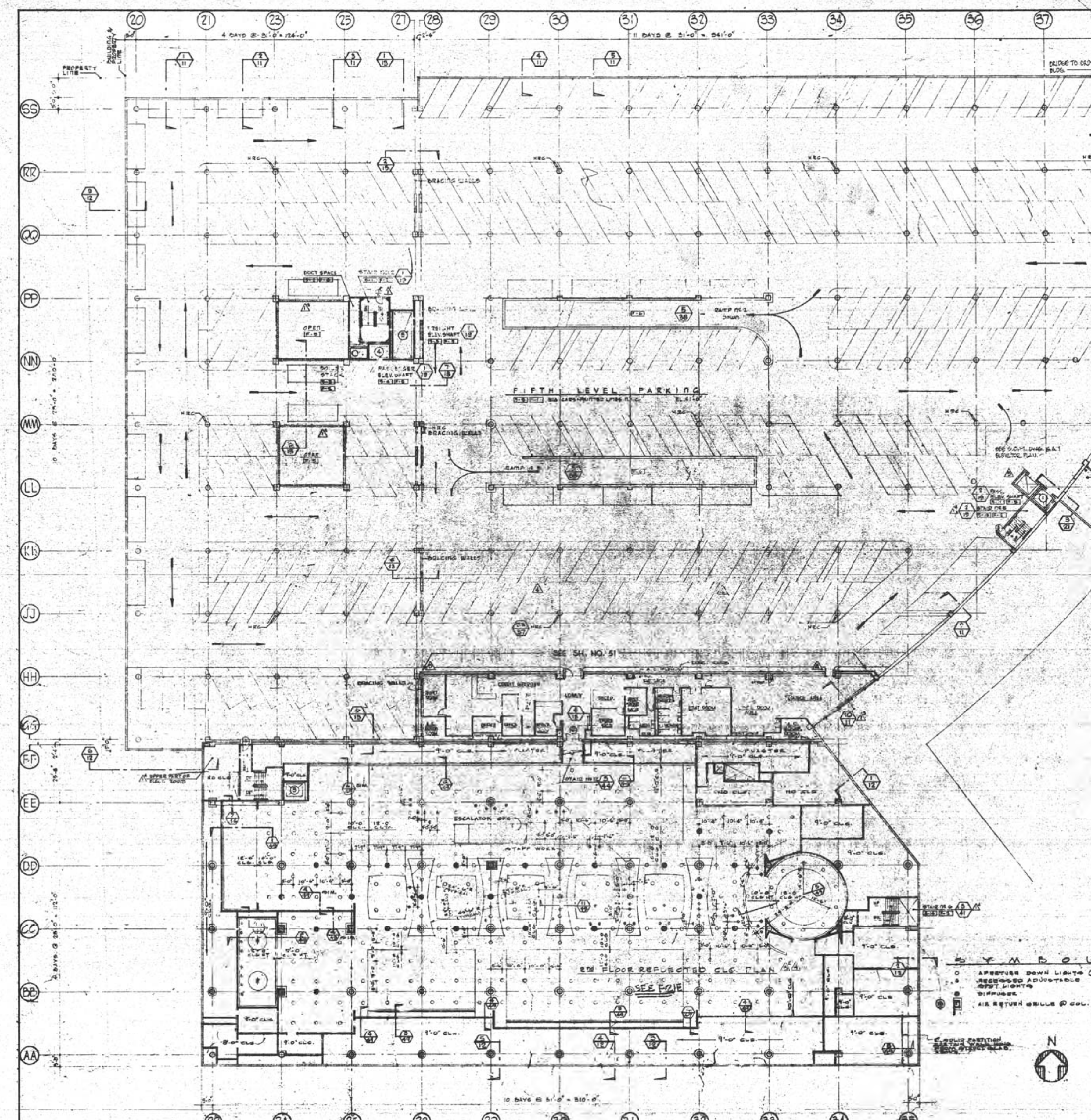


INTERIOR FINISH SCHEDULE

DOOR SCHEDULE

MURRAY ERICK ASSOCIATES STRUCTURAL ENGINEERS — LOS ANGELES, CALIF. DUDLEY DEANE & ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.	KAISER CENTER OAKLAND, CALIFORNIA	WELTON BECKET AND ASSOCIATES ARCHITECTS AND ENGINEERS LOS ANGELES, CALIFORNIA

PARKING GARAGE & SHOPS 4TH. LEVEL PARKING 2ND. FL. - 20TH. ST. OFFICES SCALE 1/16" = 1'-0	DRAWN TRACED CHECKED
DATE JANUARY 3, 1958	JOB NOS. 4037 & 4049
SHEET NO.	6-6



SYMBOLS

- APERTURE DOWN LIGHTS (RECESSED)
- RECESSED ADJUSTABLE SPOT LIGHTS
- DIFFUSER
- AIR RETURN GRILLE @ COL.

NOTE:
SEE KCI DWG'S 118, 119, 121, 122 FOR 2ND FLOOR OFFICE LAYOUT REVISIONS

INTERIOR FINISH SCHEDULE

NO.	FLOOR COVERING	FLOOR FIN.	BASE MATERIAL	BASE FIN.	WAINSCOT MATERIAL	WAINSCOT HT.	WAINSCOT FIN.	WALL MATERIAL	WALL FIN.	CEILING MATERIAL	CEILING HT.	CEILING FIN.	TRIM MATERIAL	TRIM FIN.	REMARKS
F-2	CEMENT	A-1	METAL	6				CONC. PLAS.	O	EXPOSED CONC.		P	METAL	O	NON-SLIP NOSING
F-5								PLASTER							EXPOSED CONC. OR BLOCK
F-8	CEMENT							EXP. CONC. OR PLAS.					METAL		
F-1	CEMENT	A-1	*					CONC. OR PLAS.	P	EXPOSED CONC.		P	METAL	6	*INST. BASE @ PLAS. WALLS
F-6	CEMENT	H	CONC.	P				CONC.	P	CONC.		P			

DOOR SCHEDULE

NO.	OPENING WIDTH	OPENING HEIGHT	DOOR TYPE	DOOR T/K	DOOR MAT'L.	DOOR FIN.	FRAME DET.	FRAME MAT'L.	FRAME FIN.	THRESHOLD DET.	THRESHOLD MAT'L.	LOUVRE SIZE			REMARKS
1/8	3'-0"	7'-0"	J	1¾"	WOOD		7/10	STEEL					6	6	CLOSER
2/8	3'-0"	7'-0"	J	1¾"	WOOD		7/10	STEEL					6	6	CLOSER
3/8	3'-0"	7'-0"	J	1¾"	WOOD		7/10	STEEL					6	6	CLOSER
4/8	3'-0"	7'-0"	J	1¾"	WOOD		7/10	STEEL					6	6	CLOSER
5/8	6'-0"	7'-0"	H	1¾"	WOOD		7/10	STEEL		7/23	ALUM.		17	6	DBL. PR. LOCK

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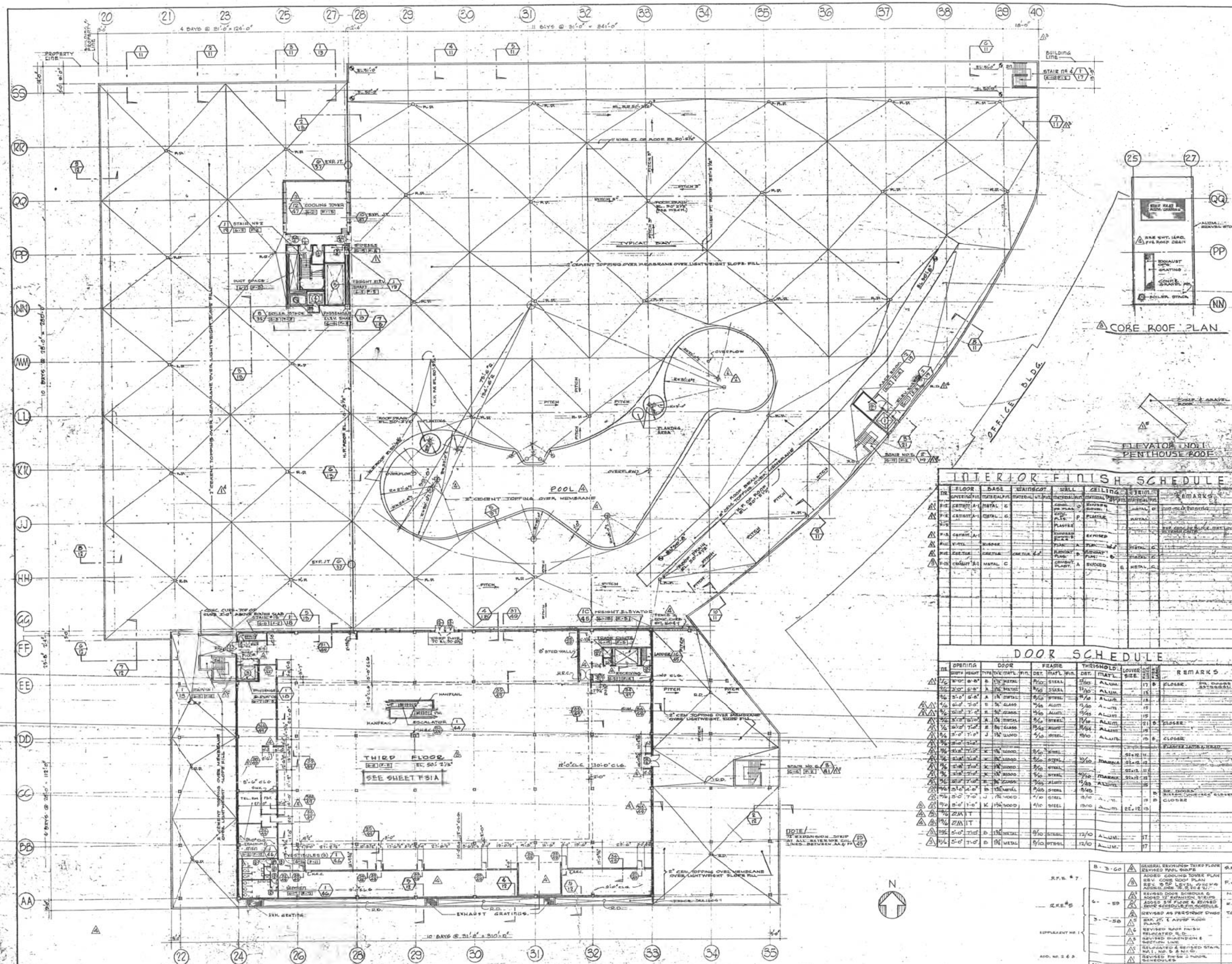
OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

PARKING GARAGE & SHOPS
5 LEVEL PARKING
UPPER PART - 20TH ST. OFFICES

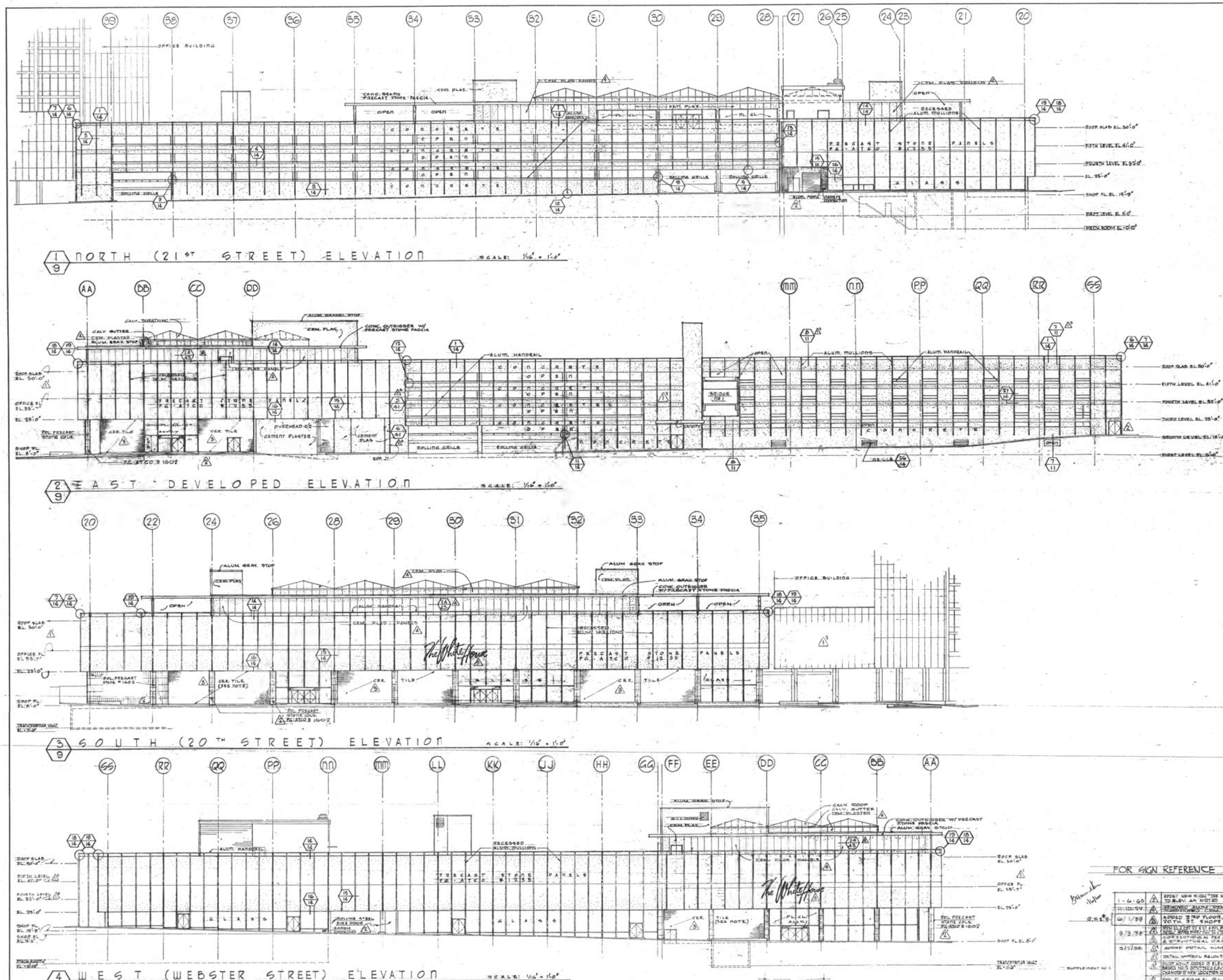
DRAWN | TRACED | CHECKED | DATE | JOB NOS. | SHEET

7-5



MURRAY ERICK ASSOCIATES STRUCTURAL ENGINEERS — LOS ANGELES, CALIF. DUDLEY DEANE & ASSOCIATES MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.	KAISER CENTER OAKLAND, CALIFORNIA	WELTON BECKET AND ASSOCIATES ARCHITECTS AND ENGINEERS LOS ANGELES, CALIFORNIA	PARKING GARAGE & SHOPS 6TH. LEVEL ROOF PLAN SCALE: 1/16" = 1'-0"

DRAWN	DATE JANUARY 31, 1958	
TRACED	JOB NOS. 4037 & 4049	
CHECKED	SHEET NO.	8-4



FOR SIGN REFERENCE ONLY

DATE	NO.	REVISION	BY
1-6-60	5	ADDED NEW SIGN "THE WHITE HOUSE" TO ELEV. AS NOTED	GM
11-10-59	4	REMOVED ALUM. PANELS & SUBSTITUTED CEM. PLAS.	E.A.P.
6/1/59	3	ADDED 3RD FLOOR, REV. 20TH. ST. SHOPS FRONT.	H.R.M.
9/3/58	2	[illegible]	A.D.F.
	1	CORRECTIONS AS PER ARCH. & STRUCTURAL DRAWINGS	T.C.
3/7/58		ADDED DETAIL NUMBERS	
		DETAIL SYMBOL RELOCATED	
		[illegible] ADDED @ ELEV. 2, 3 & 4 [illegible] CHANGED @ NEW LOCATION OF STAIRS	
		REV. FL. & ROOF EL. @ ELEV. 2, 3, 4	F.B.

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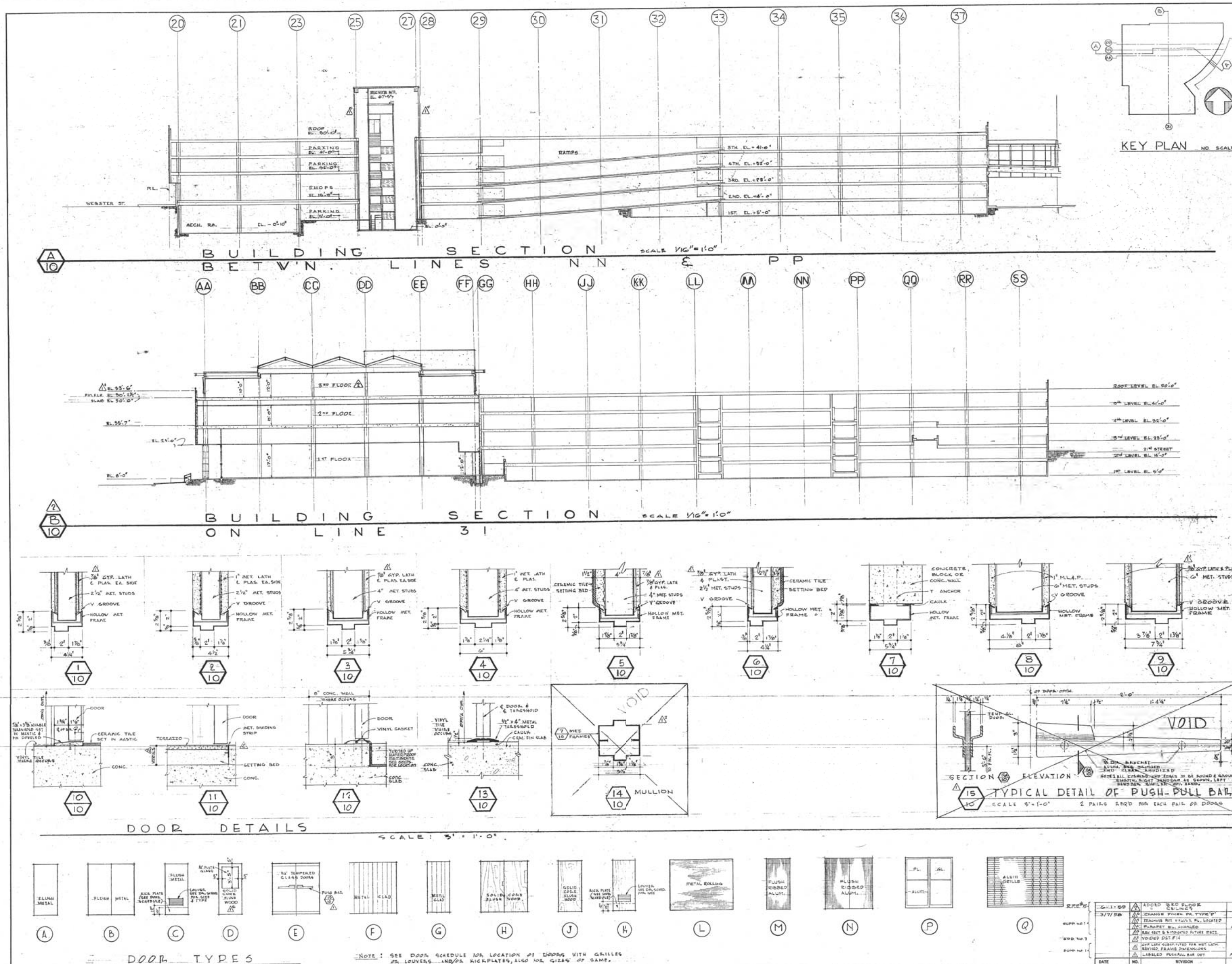
KAISER CENTER
OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

PARKING GARAGE & SHOPS
EXTERIOR ELEVATIONS
SCALE: 1/16" = 1'-0"

DRAWN	DATE JANUARY 31, 1958
TRACED	JOB NOS. 4037 & 4049
CHECKED	SHEET NO. 9-5



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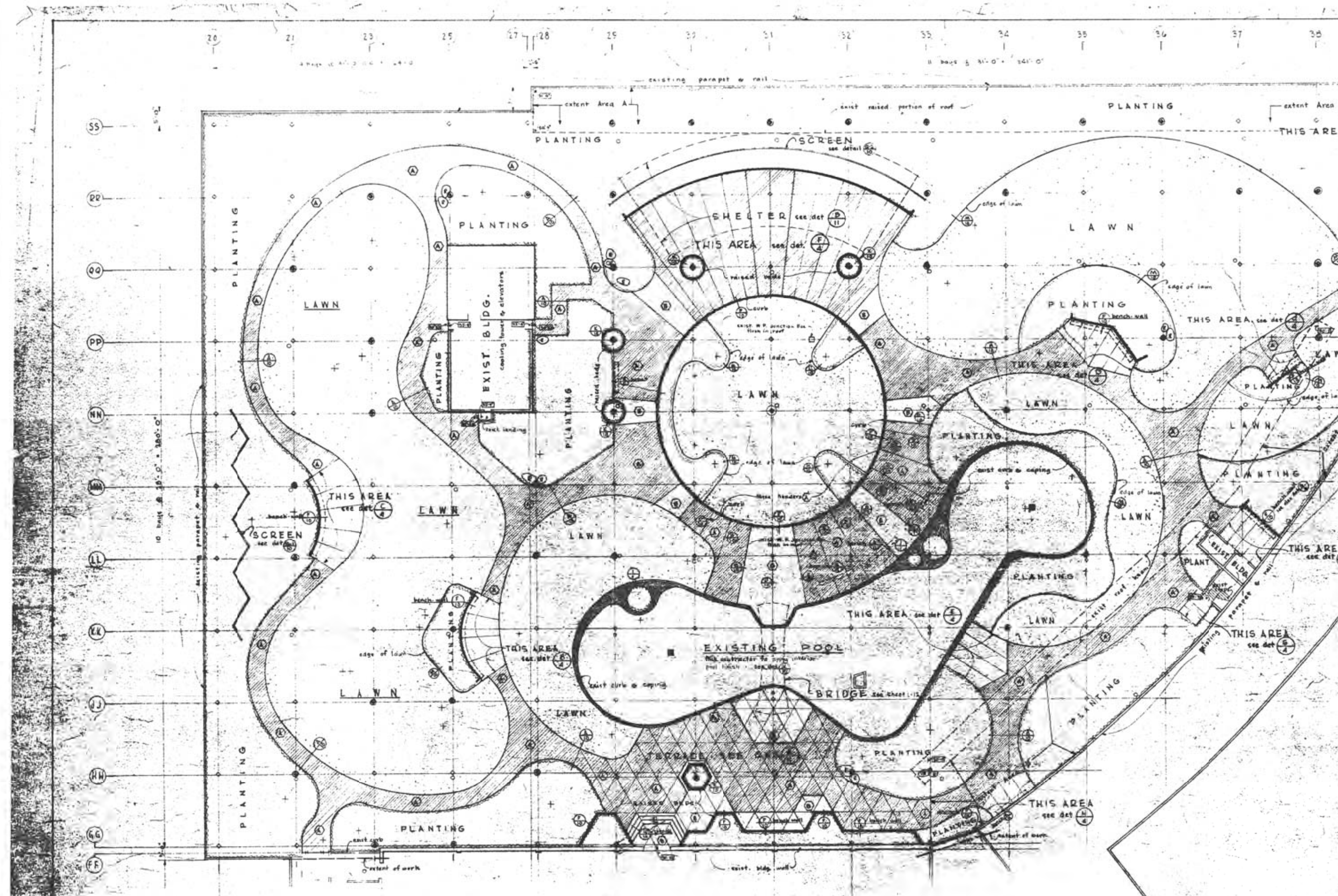
MECHANICAL & ELECTRICAL ENGINEERS — SAN FRANCISCO, CALIF.

KAISER CENTER
OAKLAND, CALIFORNIA

WELTON BECKET AND ASSOCIATES
ARCHITECTS AND ENGINEERS
LOS ANGELES, CALIFORNIA

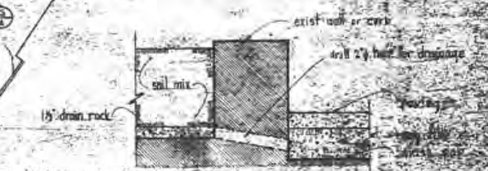
PARKING GARAGE & SHOPS
BUILDING SECTIONS
DOOR TYPES & SCHEDULE
SCALE 1/16" = 1'-0"

DRAWN — DATE JANUARY 31, 1958
TRACED — JOB NO. 4037 & 4049
CHECKED — SHEET NO. 10-2



PLOT PLAN (of parking garage roof.)

scale 1" = 16'-0"



(1) POOL PLANTER DRAINAGE
no scale

CONC. FINISHING SCHEDULE

Cement Plaster, sand finish all curb, walls & vertical surfaces with ¼" - 7/16" #140 Conrad Sovig Kolorblend over dash coat w/ Duraweld [illegible] unless otherwise specified.

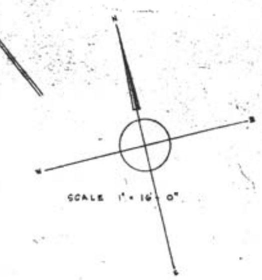
(A) exposed aggregate concrete w/ #1969-2 Conrad Sovig Integral Color, aggregate to be ⅜" max. Kaiser Pebbles, seeded on surface to [illegible] finished job max. distance between pebbles shall not exceed [illegible]

(B) exposed aggregate concrete with white Portland Cement [illegible] aggregate to be ⅜" x ½" Kaiser Pebbles, seeded on surface [illegible] on finished job max. distance between pebbles shall not [illegible]

(C) bridge finish - see detail

LEGEND

- ● specimen tree location
- ○ roof support
- ○ roof drain
- lawn
- detail number
- sheet number
- path - see A/10 also (A) conc. fin. schedule this sheet
- [illegible]
- planting
- (B) boulder (schedule - see sheet L-2)
- t.c. top of curb



GENERAL NOTES

All concrete shall be lightweight concrete. See specifications.
See finishing schedule this sheet for color & texture.

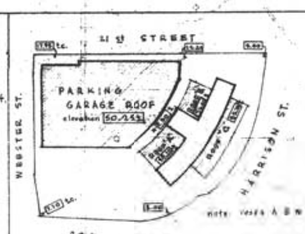
typical existing elevations are as follows: 50'-2½" @ roof drain, 50'-5½" @ column locations where roof drain does not occur; exceptions as noted on plan.

Contractor to pour 4' square samples each of concrete (A), (B), (C), (see schedule this sheet) on site, to be approved by Landscape Architect as standard of quality for all subsequent work. All work not equal to samples in quality shall be removed and replaced @ no extra cost to the owner. Samples shall be removed from site by contractor when all pours have been completed and approved by the L.A.

Max. allowable roof loads are as follows: 125 lbs. per sq ft & 15,000 lbs. [illegible] of vert & columns; with the following exceptions. Area A - 90 lbs per ft². Area B - 125 lbs. per sq ft. no concentrated loads allowed. Contractor shall observe these limitations in carrying out his work.

SCHEDULE of DRAWINGS

L-1	key map, conc. finishing schedule, general notes, plot plan-parking garage roof.
L-2	grading plan - parking garage roof (L-2a supplementary grading plan)
L-3	staking plan
L-4	areas drawn @ ⅛" scale & details
L-5	planting plan - parking garage roof
L-6	irrigation plan
L-7	omitted from contract.
L-8	
L-9	
L-10	details
L-11	details
S-1	bridge details
E-1	electrical plan
E-2	electrical details
ME-1	reflection pool



SITE PLAN & KEY MAP
scale - none

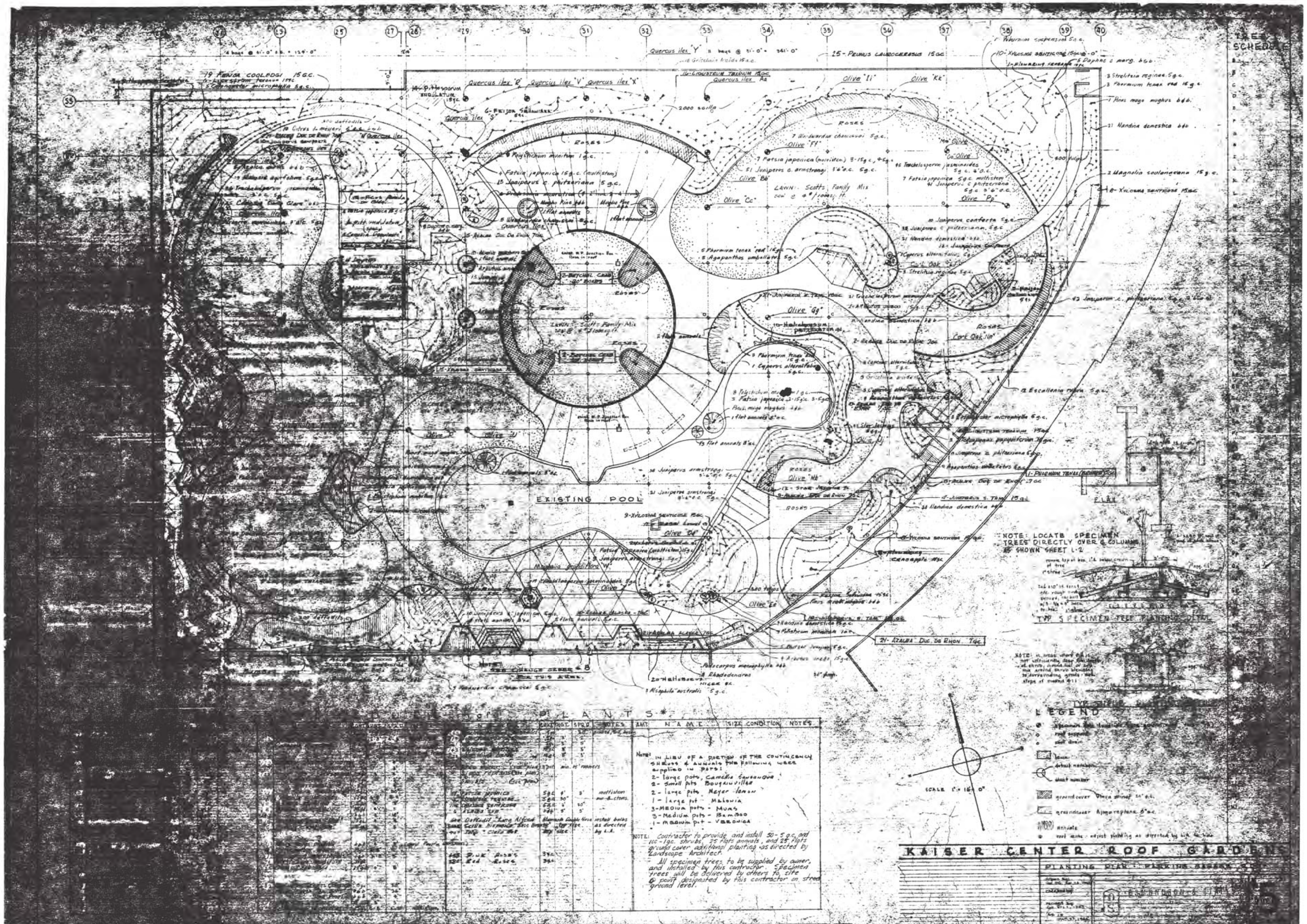
NOTE:
note relative elevations of roofs & ground level as given in site plan above.

KAISER CENTER ROOF GARDENS

PLOT PLAN - PARKING GARAGE ROOF

drawn by: [illegible]
checked by:
revised by:

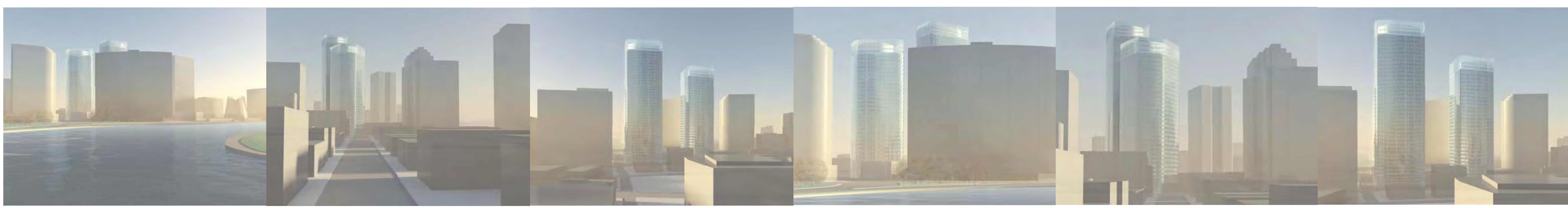
OSMUNDSON & STALEY



KAISER CENTER ROOF GARDENS
PLANTING PLAN
EXISTING POOL
LEGEND
TREE SCHEDULE
PLANTS
NOTE: LOCATE SPECIMEN TREES DIRECTLY OVER COLUMNS AS SHOWN SHEET L-2
TYP. SPECIMEN TREE PLANTING DETAIL
ROSES
LAWN: Scotts Family Mix
Quercus ilex
Olive
NOTE: Contractor to provide and install 50 - 5 g.c. and 100 - 1 g.c. shrubs, 25 flats annuals, and 25 flats ground cover additional planting as directed by Landscape Architect.
All specimen trees to be supplied by owner, and installed by this contractor. Specimen trees will be delivered by others to site @ point designated by this contractor on street ground level.

APPENDIX F

Proposed Project Drawings



KAISER CENTER

DEVELOPMENT REVIEW

MARCH 14 2008

KAISER CENTER

INDEX

The following drawings are conceptual and for illustrative purposes only and remain subject to change.

PROJECT CONTEXT

EXISTING KAISER CENTER

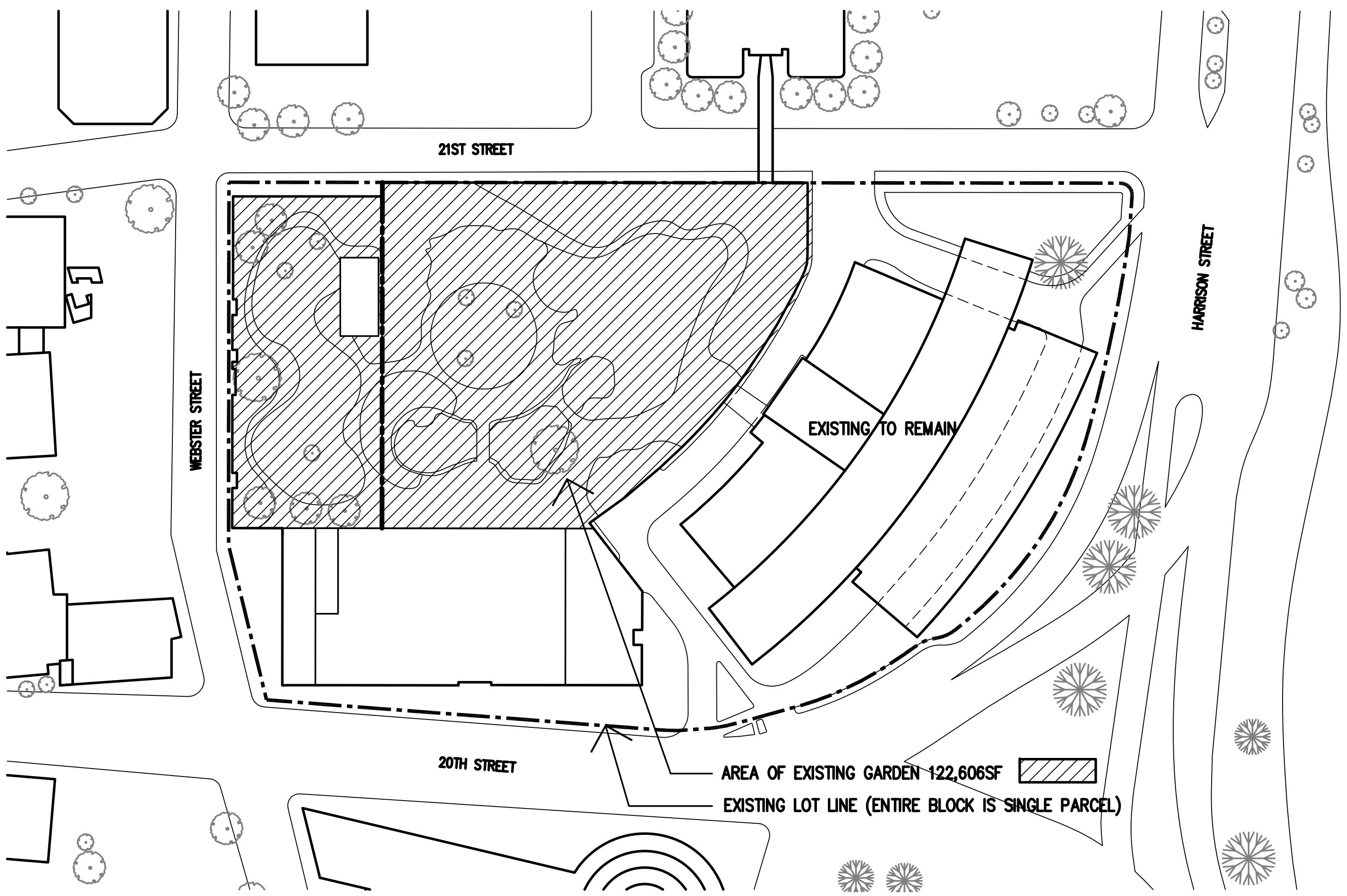
EXISTING & PROPOSED AREA OVERVIEW

	TOTAL EXISTING	- EXISTING TO BE DEMOLISHED	= EXISTING TO REMAIN	+ NEW	= TOTAL	% CHANGE
TOTAL LOT AREA*	311,741GSF	0	311,741GSF	0	311,741GSF	0%
TOTAL BUILDING FOOTPRINT AREA	197,460GSF	74,900GSF	122,560GSF	80,168GSF	202,728GSF	+3%
TOTAL FLOOR AREA	1,690,879GSF	280,002GSF	1,410,877GSF	1,830,984GSF	3,241,861GSF	+92%
BUILDING HEIGHT						
MAXIMUM STORIES	29	N/A	29	42	N/A	N/A
MAXIMUM FEET	386'	N/A	386'	±566.5'	±566.5'	+47%
NUMBER OF PARKING SPACES **	1340	155	1185	852	2037	+52%

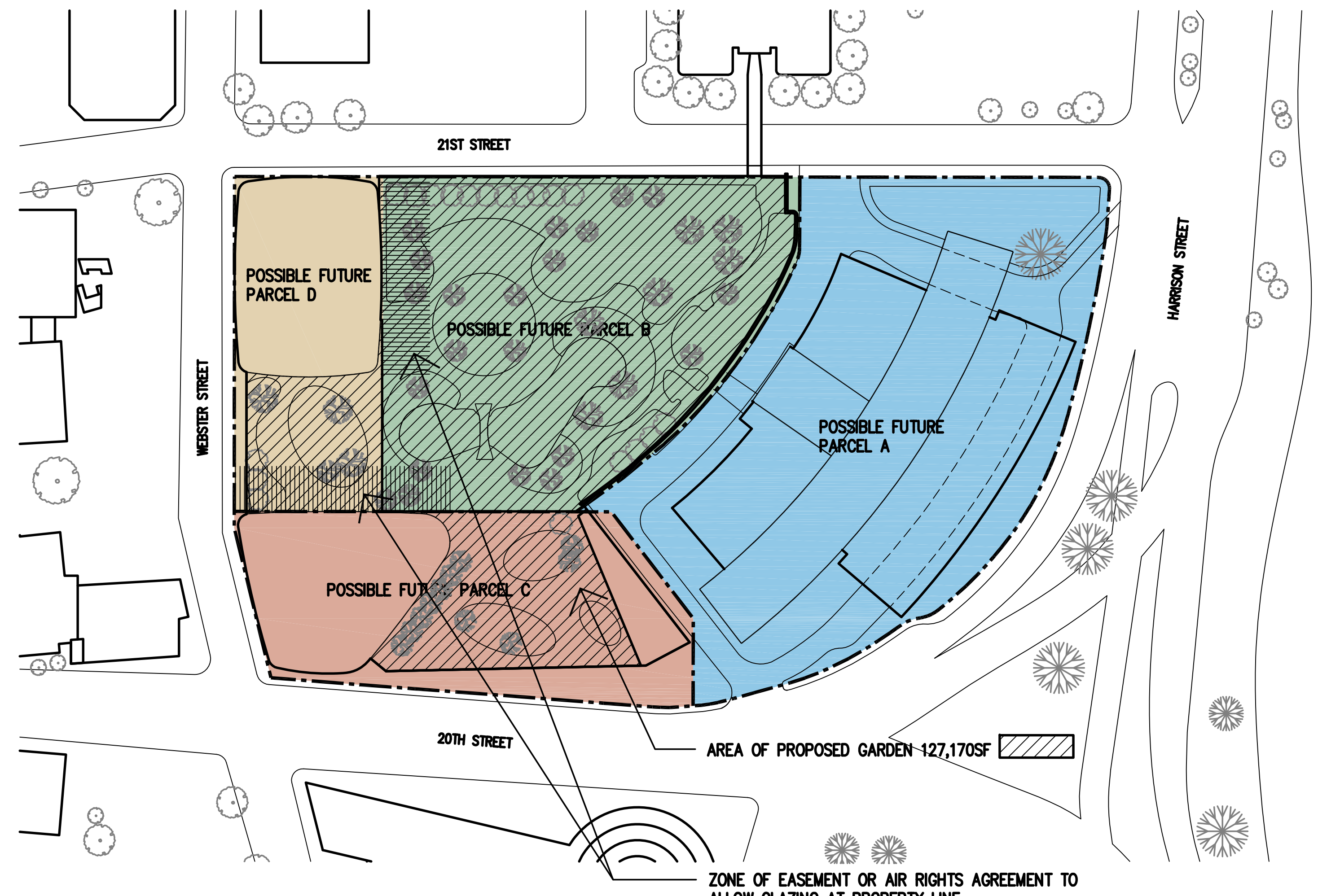
* LOT AREA INCLUDES ALL FOUR POSSIBLE FUTURE PARCELS

** PARKING INCLUDES SPACES RESERVED FOR (E) KAISER CENTER TOWER AND ORDWAY BUILDING. SEE ASK-059

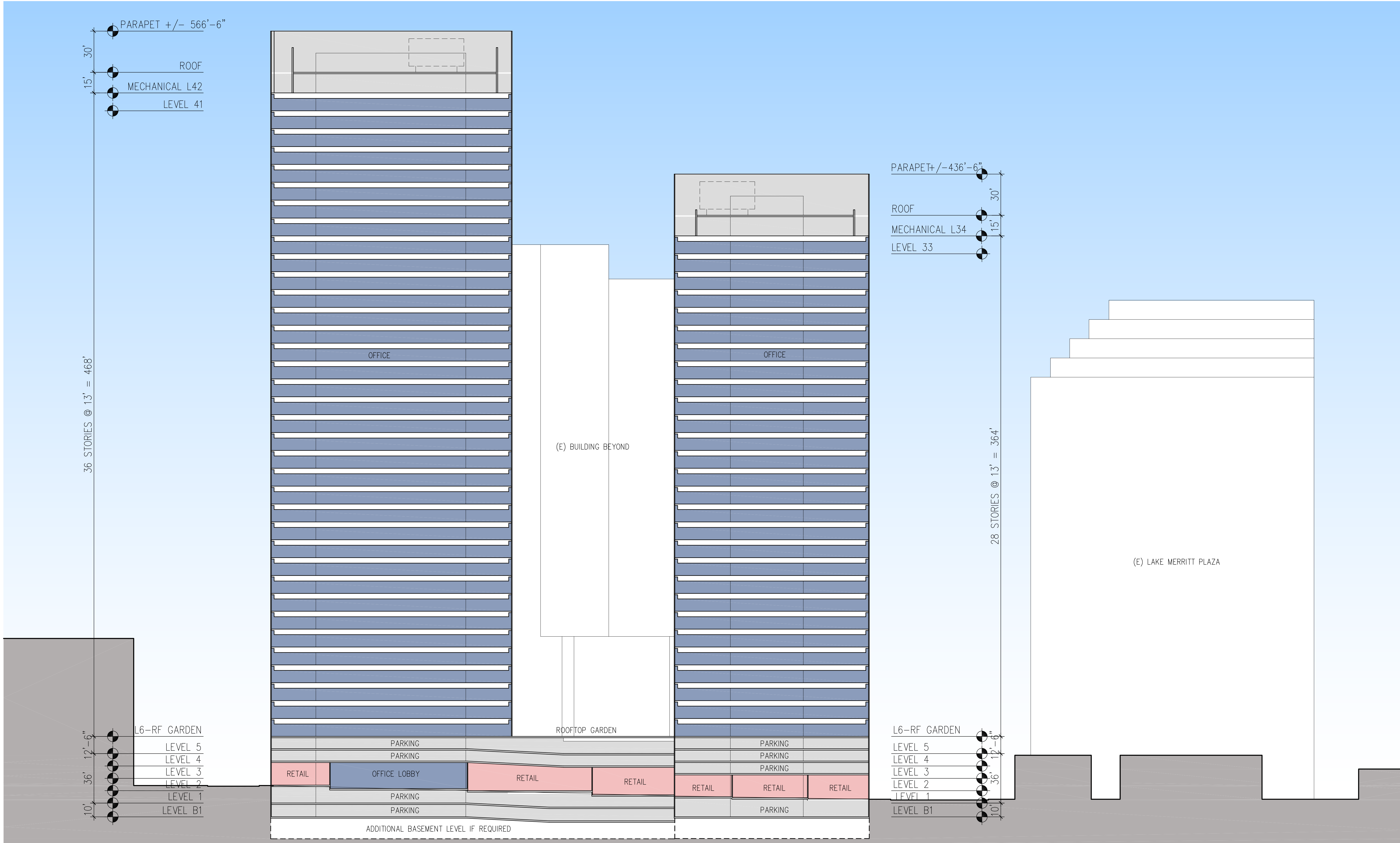
NOTE : POSSIBLE PARCELS SHOWN ON THIS DRAWING ARE FOR REFERENCE ONLY AND ARE INTENDED ONLY TO FACILITATE DESCRIPTION OF THE RELEVANT AREAS AND LOCATION OF THE PROPOSED PROJECT. THIS DRAWING DOES NOT SUGGEST OR PROPOSE A LEGAL SUBDIVISION.



EXISTING



PROPOSED

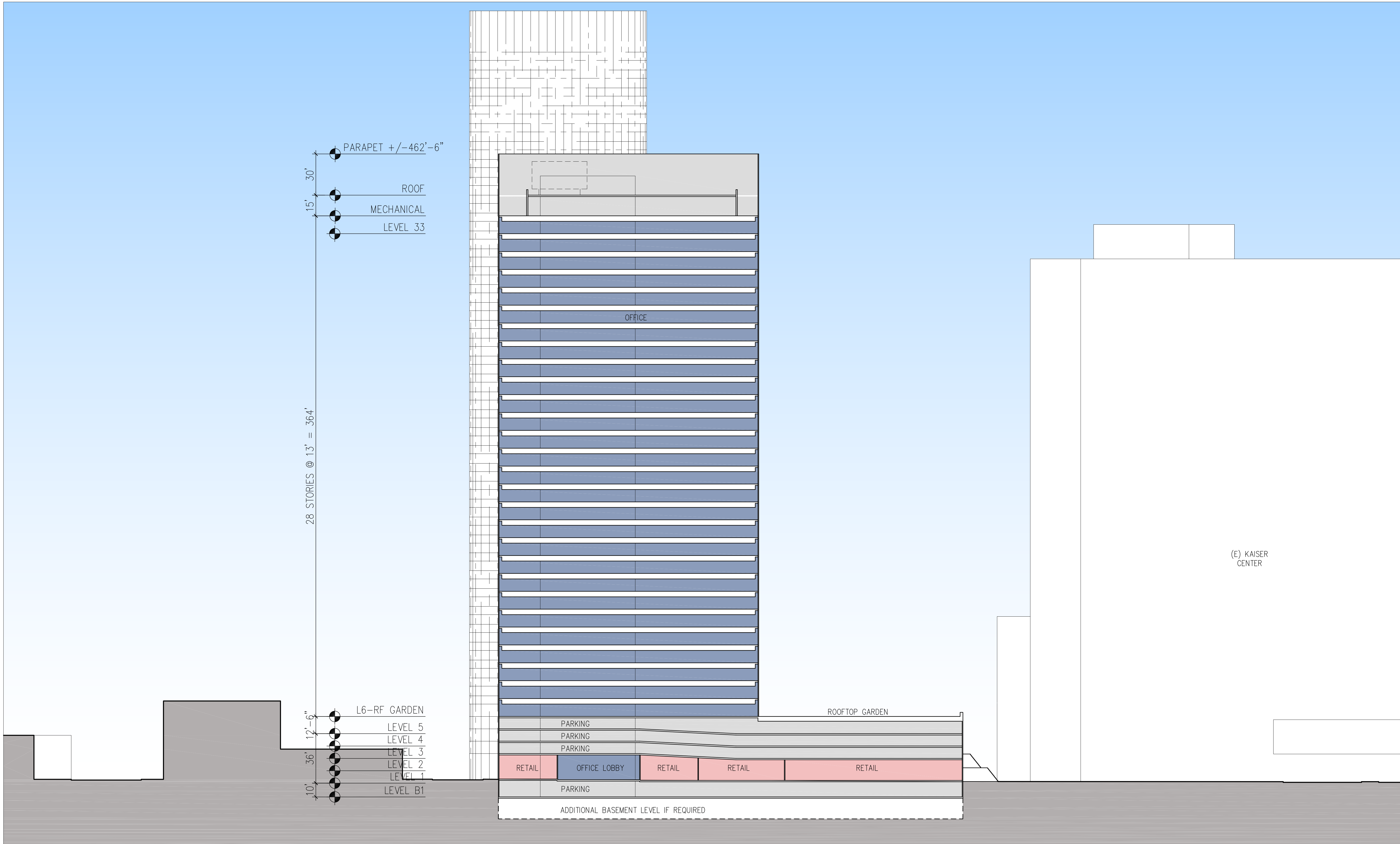


BUILDING SECTION LOOKING EAST
ASK - 048

0 16' 32' 64'

March 14, 2008
Scale: 1" = 64'-0"

KAISER CENTER
THE SWIG COMPANY
SOM



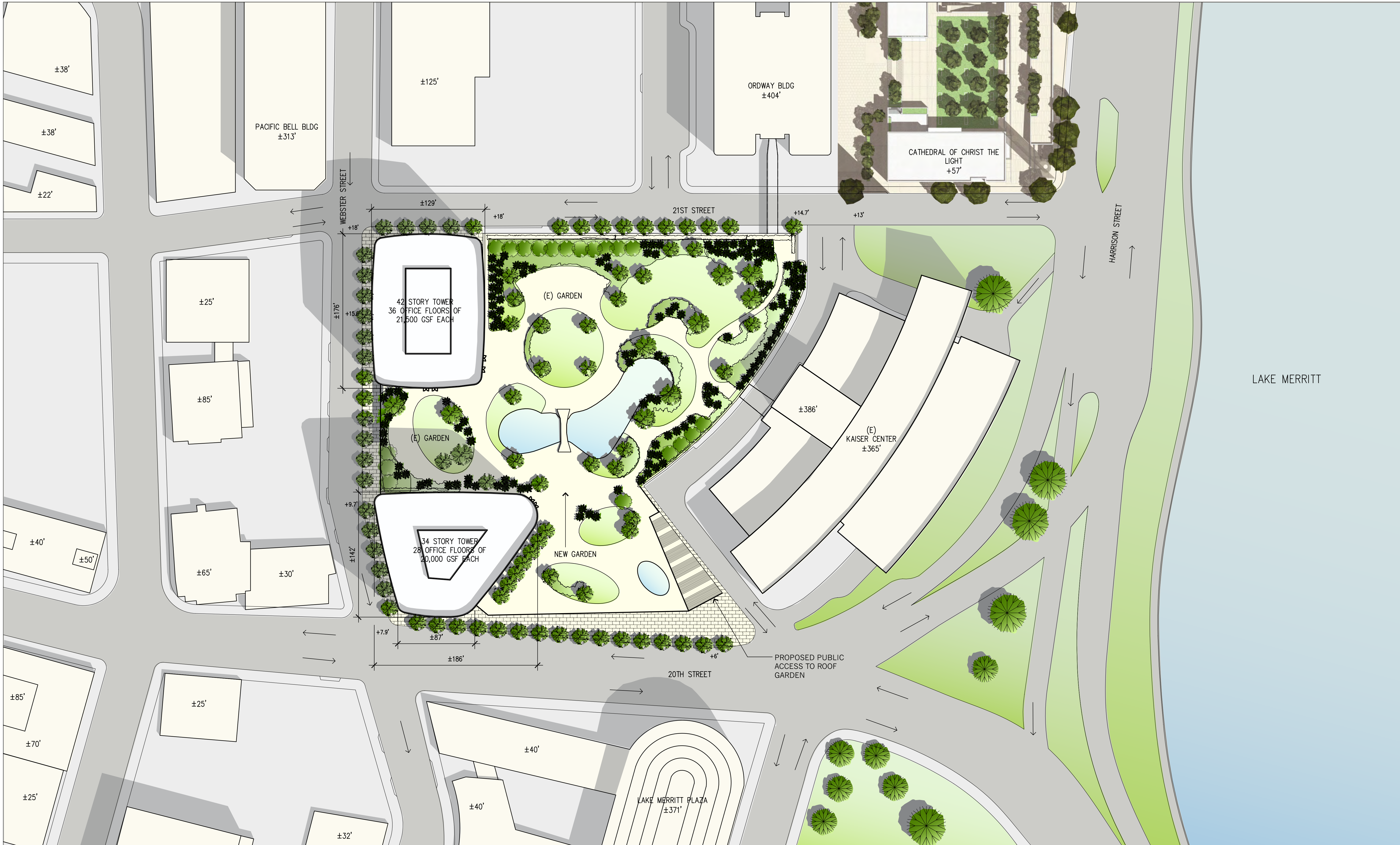
BUILDING SECTION LOOKING NORTH
ASK - 049

0 16' 32' 64'

March 14, 2008
Scale: 1" = 64'-0"

NORTH

KAISER CENTER
THE SWIG COMPANY
SOM



SITE PLAN
ASK - 050

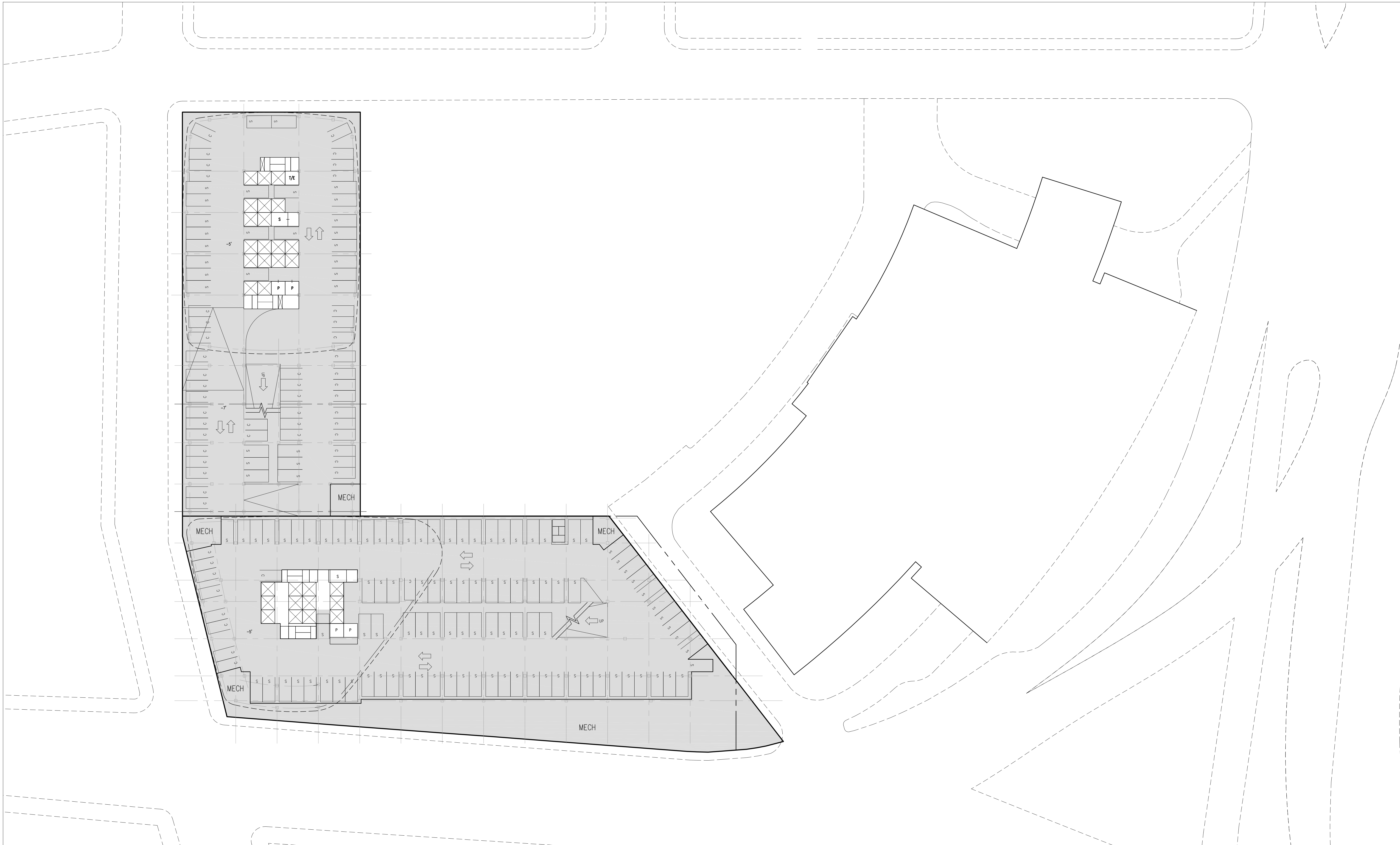
0 20' 50' 100'

March 14, 2008
Scale: 1" = 100'-0"

NORTH

KAISER CENTER
THE SWIG COMPANY

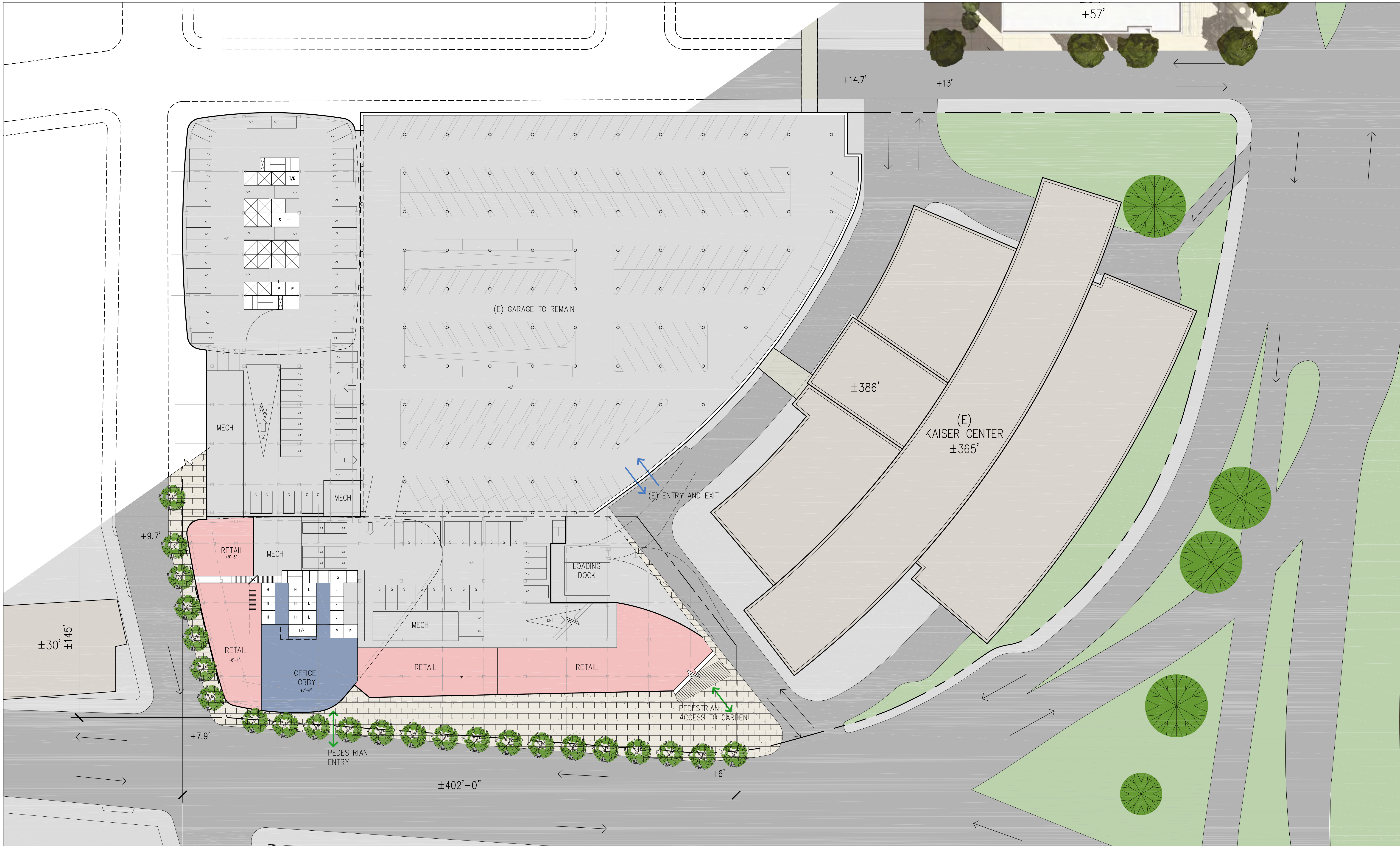
SOM



BASEMENT LEVEL FLOOR PLAN
ASK - 051

March 14, 2008
Scale: 1" = 64'-0"

KAISER CENTER
THE SWIG COMPANY
SOM



FIRST LEVEL FLOOR PLAN
ASK - 052

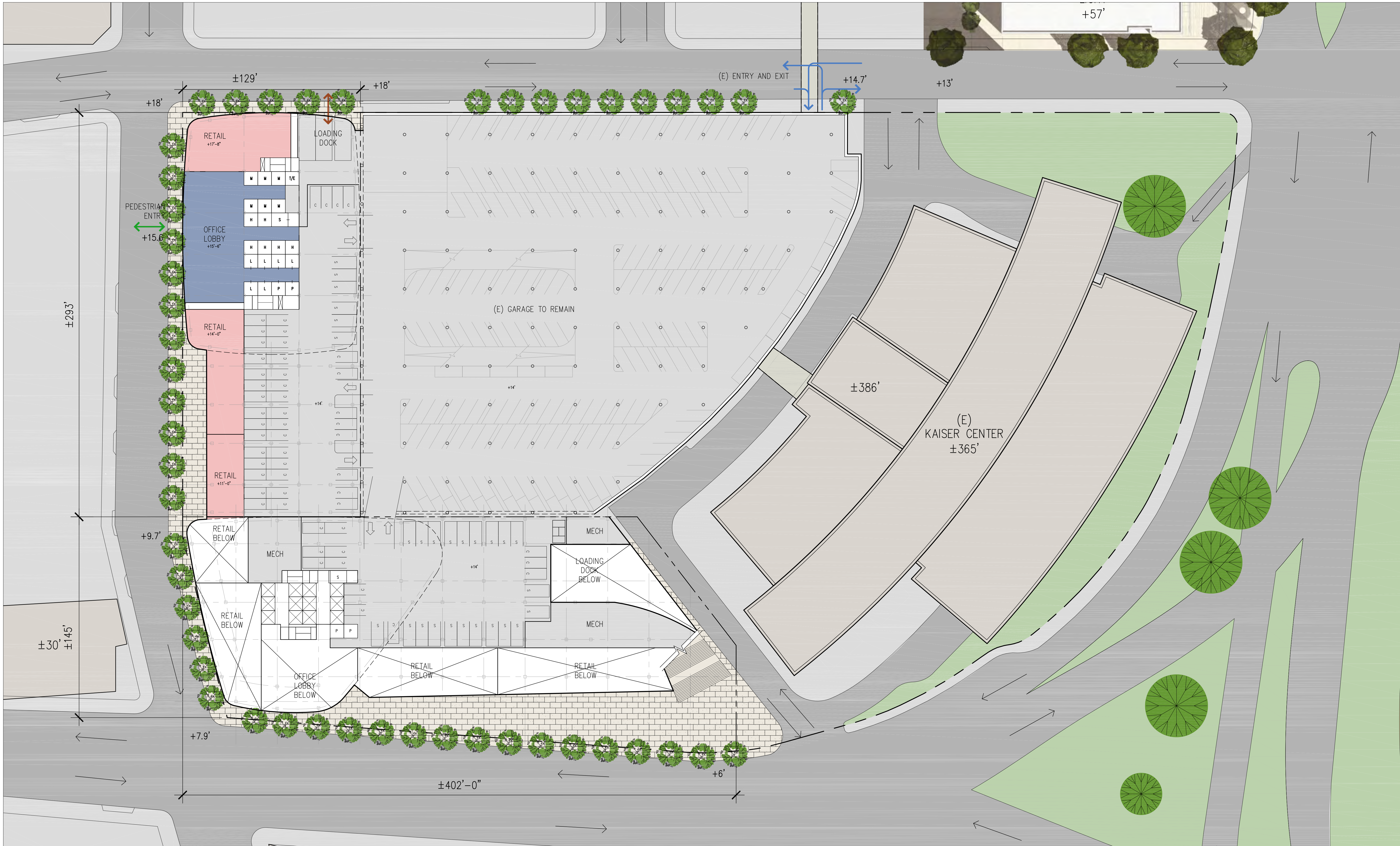
March 14, 2008
Scale: 1" = 64'-0"

0 16' 32' 64'

NORTH

KAISER CENTER
THE SWIG COMPANY

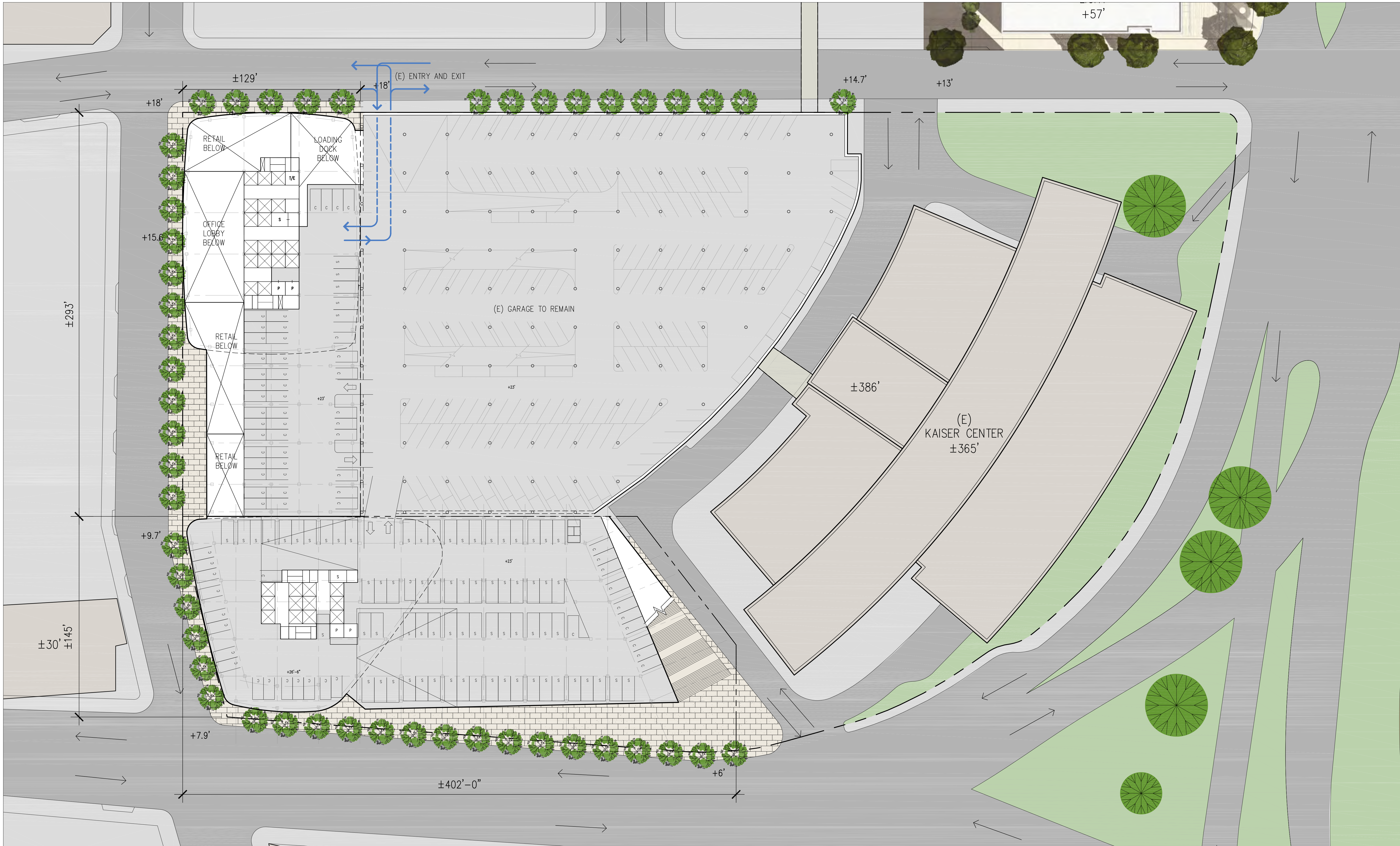
SOM



SECOND LEVEL FLOOR PLAN
ASK - 053

March 14, 2008
Scale: 1" = 64'-0"

KAISER CENTER
THE SWIG COMPANY
SOM



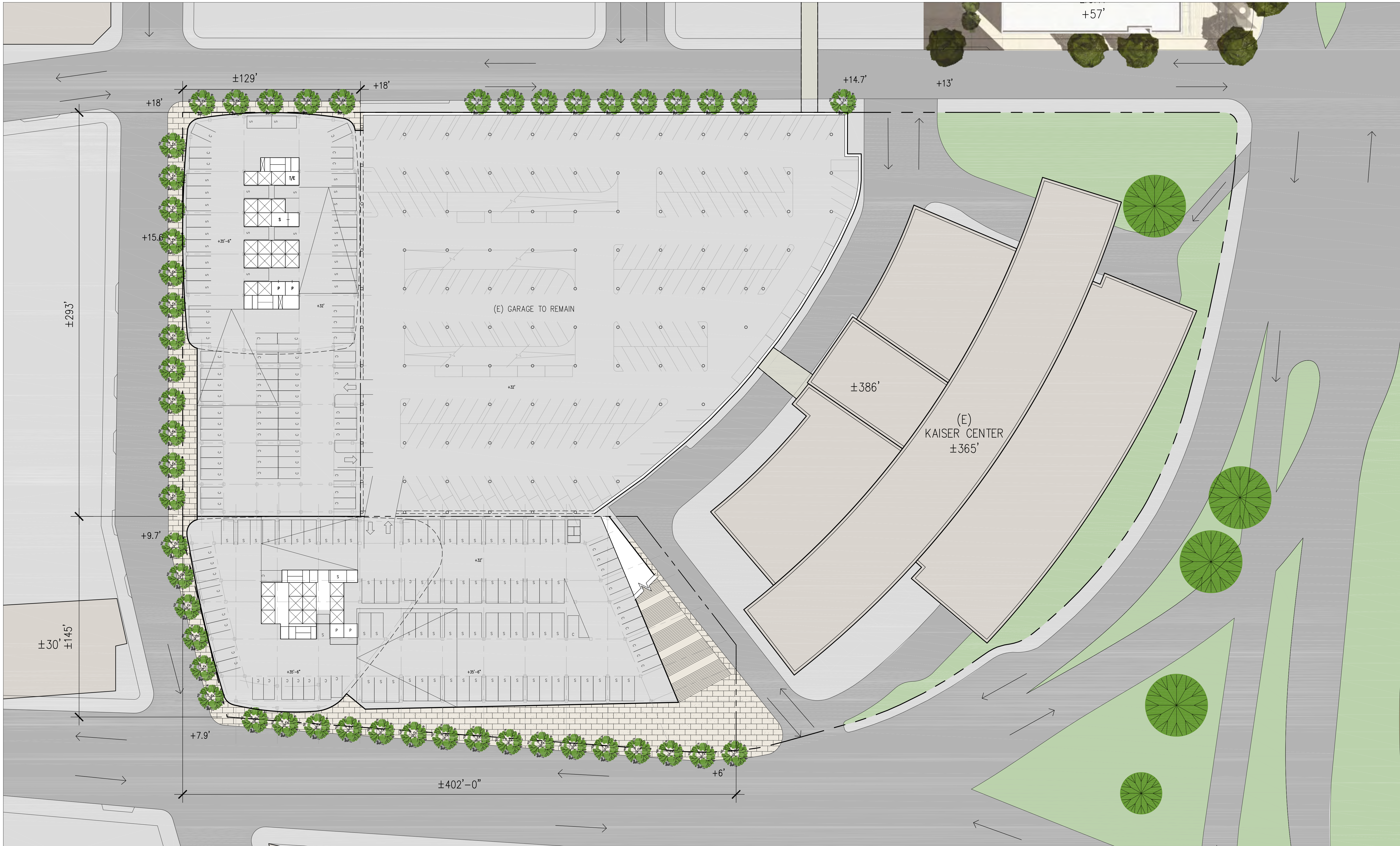
THIRD LEVEL FLOOR PLAN
ASK - 054

March 14, 2008
Scale: 1" = 64'-0"

0 16' 32' 64'

NORTH

KAISER CENTER
THE SWIG COMPANY
SOM



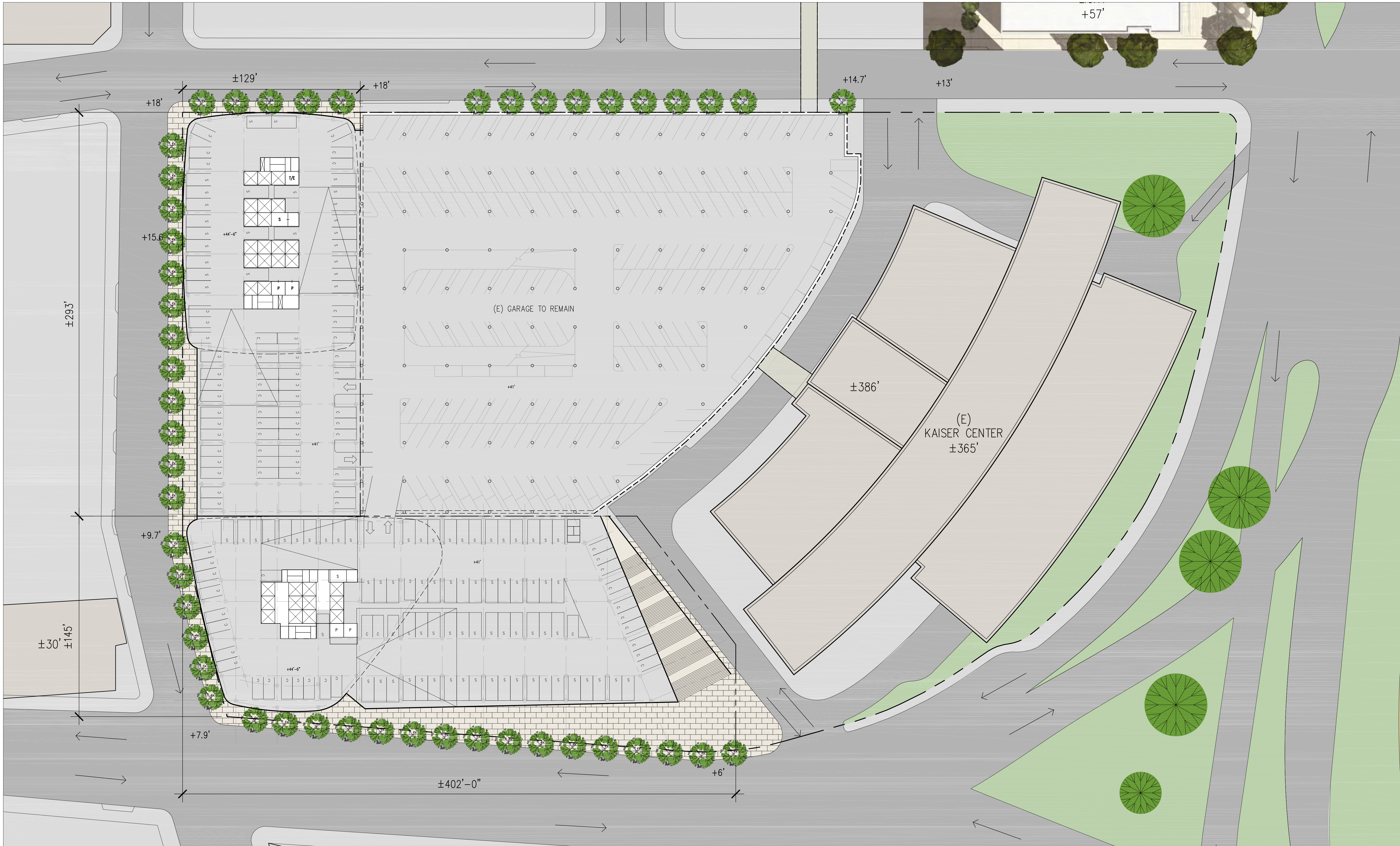
FOURTH LEVEL FLOOR PLAN
ASK - 055

March 14, 2008
Scale: 1" = 64'-0"

0 16' 32' 64'

NORTH

KAISER CENTER
THE SWIG COMPANY
SOM



FIFTH LEVEL FLOOR PLAN
ASK - 056

March 14, 2008
Scale: 1" = 64'-0"

NORTH

0 16' 32' 64'

KAISER CENTER
THE SWIG COMPANY
SOM

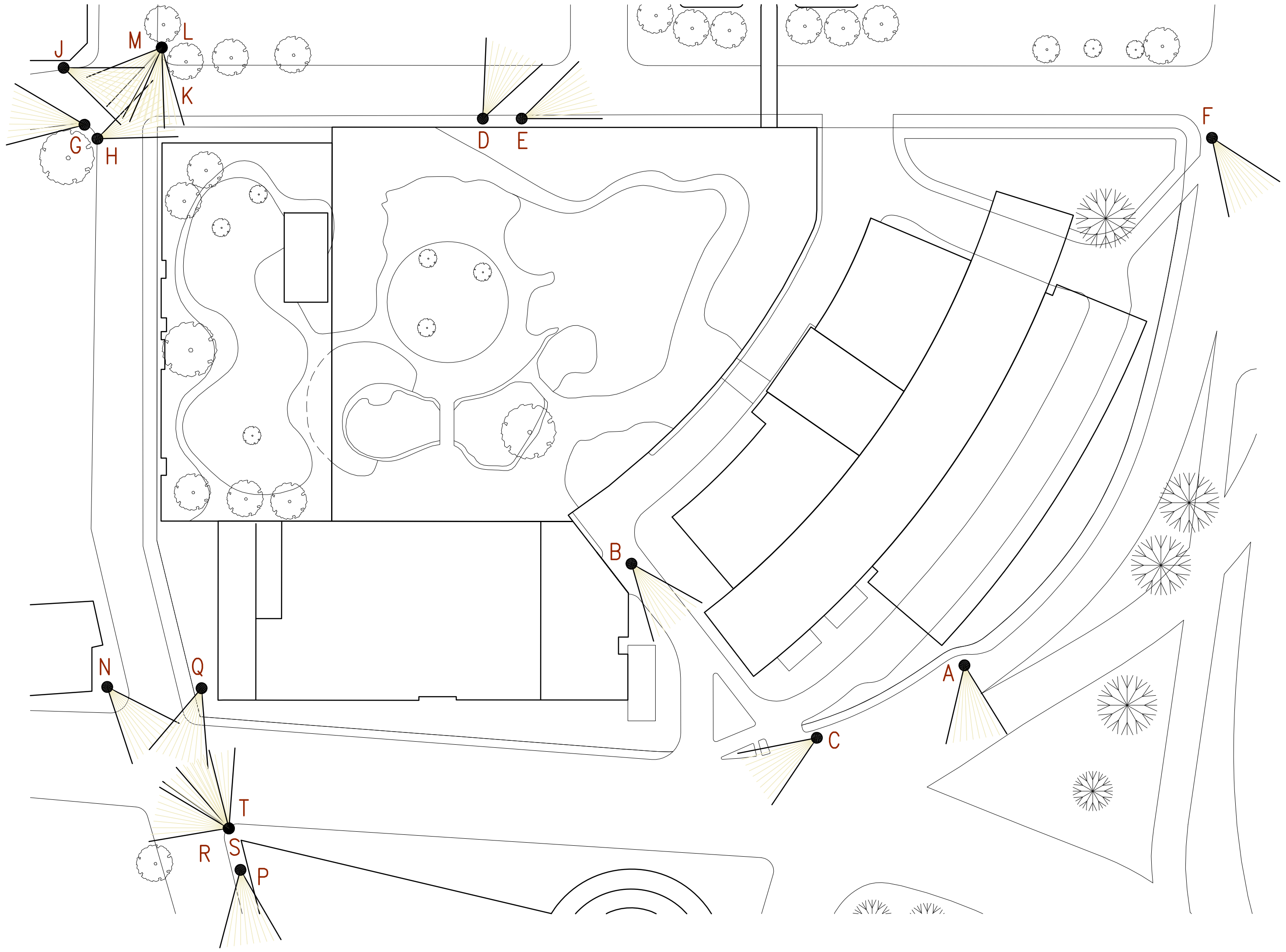
SIXTH LEVEL FLOOR PLAN
ASK - 057

March 14, 2008
Scale: 1" = 64'-0"

0 16' 32' 64'

NORTH

KAISER CENTER
THE SWIG COMPANY
SOM



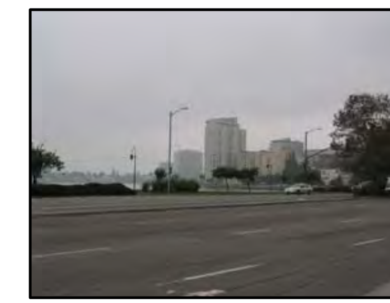
A

B

C

D

E



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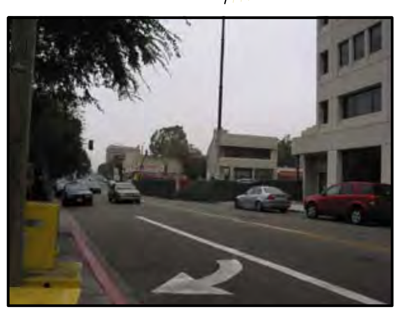

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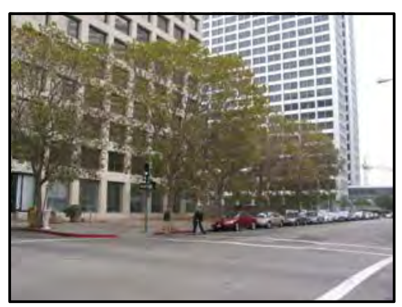
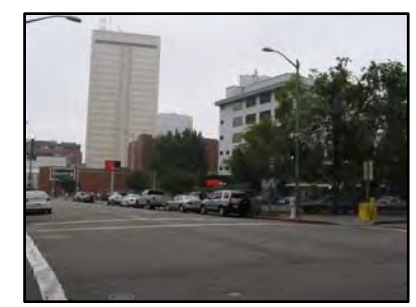


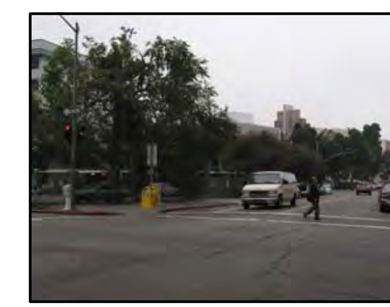
H

J

K



L



M

N

P

Q

R

S

T

SITE CONTEXT PHOTOS
ASK 058

March 14, 2008
NTS

NORTH

KAISER CENTER
THE SWIG COMPANY

SOM

PARKING SUMMARY

CURRENT CAPACITY	1340
STALLS TO BE DEMOLISHED FOR NEW CONSTRUCTION	-155
NEW STALLS @ 20TH STREET	467
NEW STALLS @ WEBSTER STREET	385
TOTAL PARKING WHEN CONSTRUCTION COMPLETE	2037
STALLS IN USE BY (E) BUILDING	-790
STALLS IN USE BY ORDWAY	-150
TOTAL STALLS AVAILABLE FOR NEW BUILDINGS	1097*
SPACES REQUIRED BY CODE	0
TOTAL OFFICE GSF	1,342,600
PREDICTED USABLE/GROSS	83%
PREDICTED NET SF	1,100,000
PARKING RATIO	.99 PER 1,000 NSF

*PARKING CALCULATIONS BASED ON ONE BASEMENT LEVEL.
ADDITIONAL BASEMENT LEVELS MAY BE ADDED.

AREA SUMMARY

20th STREET

	OFFICE GSF	RETAIL GSF	PARKING GSF	# STALLS	OTHER/MECH GSF
R					
34					20,000
33	20,000				
32	20,000				
31	20,000				
30	20,000				
29	20,000				
28	20,000				
27	20,000				
26	20,000				
25	20,000				
24	20,000				
23	20,000				
22	20,000				
21	20,000				
20	20,000				
19	20,000				
18	20,000				
17	20,000				
16	20,000				
15	20,000				
14	20,000				
13	20,000				
12	20,000				
11	20,000				
10	20,000				
9	20,000				
8	20,000				
7	20,000				
6	20,000				
5			41,028	99	2,680
4			41,028	99	2,680
3			41,028	99	2,680
2			15,234	33	8,410
1	4,440	14,900	14,416	29	10,760
B1			41,488	108	15,422
B2			tbd	tbd	tbd
TOTAL	564,440	14,900	194,222	467	62,632

WEBSTER STREET

	OFFICE GSF	RETAIL GSF	PARKING GSF	# STALLS	OTHER/MECH GSF	
R						+533'
42					21,500	+518'
41	21,500					+505'
40	21,500					+492'
39	21,500					+479'
38	21,500					+466'
37	21,500					+453'
36	21,500					+440'
35	21,500					+427'
34	21,500					+414'
33	21,500					+401'
32	21,500					+388'
31	21,500					+375'
30	21,500					+362'
29	21,500					+349'
28	21,500					+336'
27	21,500					+323'
26	21,500					+310'
25	21,500					+297'
24	21,500					+284'
23	21,500					+271'
22	21,500					+258'
21	21,500					+245'
20	21,500					+232'
19	21,500					+219'
18	21,500					+206'
17	21,500					+193'
16	21,500					+180'
15	21,500					+167'
14	21,500					+154'
13	21,500					+141'
12	21,500					+128'
11	21,500					+115'
10	21,500					+102'
9	21,500					+89'
8	21,500					+76'
7	21,500					+63'
6	21,500					+50'
5			32,800	79	3,080	+36'
4			32,800	79	3,080	+27'
3			16,600	48	3,080	+18'
2	5,500	7,400	16,600	48	5,500	+9'
1			28,670	57	6380	
B1			34,300	74	3,500	
B2			tbd	tbd	tbd	
TOTAL	779,500	7,400	161,770	385	46,120	

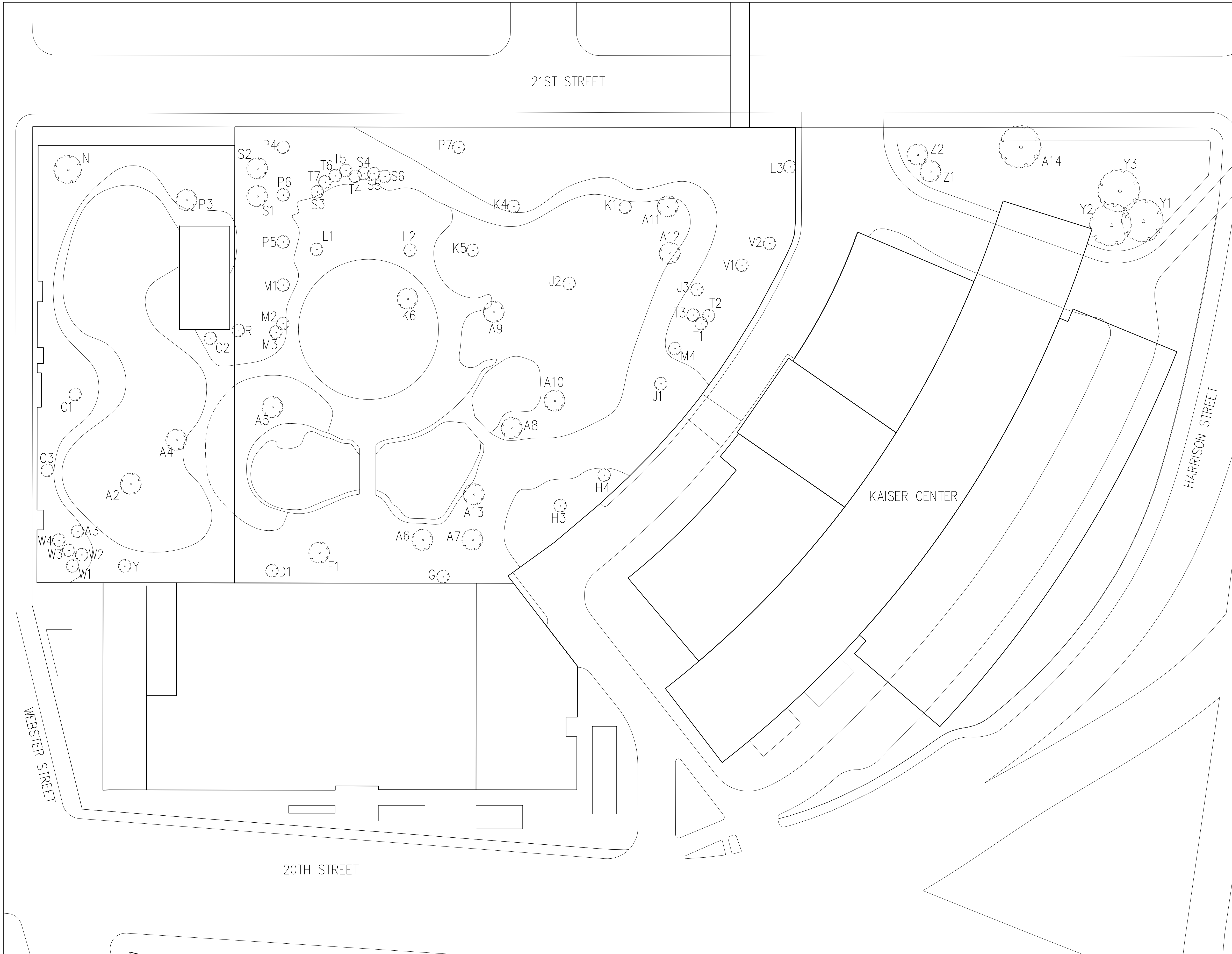
	20th STREET	WEBSTER STREET
AREA ATTRIBUTABLE TO FAR*	641,972	833,020
TOTAL AREA ATTRIBUTABLE TO FAR*	1,474,992	

*EXCLUDES PARKING

PARKING AND AREA SUMMARIES
ASK 059

March 14, 2008

KAISER CENTER
THE SWIG COMPANY
SOM



TREE	SPECIES	COMMON NAME	TRUNK DIAMETER
A2	OLEA EUROPEA	EUROPEAN OLIVE	30.1"
A3	OLEA EUROPEA	EUROPEAN OLIVE	11.5"
A4	OLEA EUROPEA	EUROPEAN OLIVE	43.3"
A5	OLEA EUROPEA	EUROPEAN OLIVE	24.4"
A6	OLEA EUROPEA	EUROPEAN OLIVE	34.1"
A7	OLEA EUROPEA	EUROPEAN OLIVE	22.9"
A8	OLEA EUROPEA	EUROPEAN OLIVE	36.0"
A9	OLEA EUROPEA	EUROPEAN OLIVE	45.5"
A10	OLEA EUROPEA	EUROPEAN OLIVE	35.0"
A11	OLEA EUROPEA	EUROPEAN OLIVE	33.9"
A12	OLEA EUROPEA	EUROPEAN OLIVE	32.0"
A13	OLEA EUROPEA	EUROPEAN OLIVE	27.3"
A14	OLEA EUROPEA	EUROPEAN OLIVE	33.6"
C1	PITTOSPORUM UNDULATUM	VICTORIAN BOX	16.2"
C2	PITTOSPORUM UNDULATUM	VICTORIAN BOX	23.3"
C3	PITTOSPORUM UNDULATUM	VICTORIAN BOX	23.9"
D1	ACER PALMATUM	JAPANESE MAPLE	35.1"
F1	MAGNOLIA GRANDIFLORA	SAMUEL SOMMER MAGNOLIA	23.3"
G	PODOCARPUS MACROPHYLIA	JAPANESE YEW PINE	11.3"
H3	MALUS FLORIBUNDA	JAPANESE FLOWERING CRABAPPLE	11.9"
H4	MALUS FLORIBUNDA	JAPANESE FLOWERING CRABAPPLE	9.2"
J1	QUERCUS SUBER	CORK OAK	29.0"
J2	QUERCUS SUBER	CORK OAK	16.0"
J3	QUERCUS SUBER	CORK OAK	31.5"
K1	RHUS LANCEA	AFRICAN SUMAC	14.3"
K4	RHUS LANCEA	AFRICAN SUMAC	21.2"
K5	RHUS LANCEA	AFRICAN SUMAC	18.5"
K6	RHUS LANCEA	AFRICAN SUMAC	14.0"
L1	PINUS MUGO	SWISS MOUNTAIN PINE	19.1"
L2	PINUS MUGO	SWISS MOUNTAIN PINE	21.0"
L3	PINUS MUGO	SWISS MOUNTAIN PINE	19.0"
M1	ARBUTUS UNEDO	STRAWBERRY TREE	32.4"
M2	ARBUTUS UNEDO	STRAWBERRY TREE	29.5"
M3	ARBUTUS UNEDO	STRAWBERRY TREE	21.7"
M4	ARBUTUS UNEDO	STRAWBERRY TREE	30.3"
N	BETULA PENDULA	EUROPEAN WHITE BIRCH	24.0"
P3	QUERCUS ILEX	HOLLY OAK	9.1"
P4	QUERCUS ILEX	HOLLY OAK	17.2"
P5	QUERCUS ILEX	HOLLY OAK	12.7"
P6	QUERCUS ILEX	HOLLY OAK	15.3"
P7	QUERCUS ILEX	HOLLY OAK	18.6"
R	PRUNUS CAROLINIANA	CAROLINA CHERRY LAUREL	19.4"
S1	GRISELINA LITTORALIS	KAPUKA	32.2"
S2	GRISELINA LITTORALIS	KAPUKA	18.5"
S3	GRISELINA LITTORALIS	KAPUKA	16.6"
S4	GRISELINA LITTORALIS	KAPUKA	29.3"
S5	GRISELINA LITTORALIS	KAPUKA	26.1"
S6	GRISELINA LITTORALIS	KAPUKA	26.1"
T1	FEIJOA SELLOWIANA	PINAPPLE GUAVA	25.5"
T2	FEIJOA SELLOWIANA	PINAPPLE GUAVA	29.3"
T3	FEIJOA SELLOWIANA	PINAPPLE GUAVA	8.4"
T4	FEIJOA SELLOWIANA	PINAPPLE GUAVA	21.0"
T5	FEIJOA SELLOWIANA	PINAPPLE GUAVA	24.2"
T6	FEIJOA SELLOWIANA	PINAPPLE GUAVA	19.8"
T7	FEIJOA SELLOWIANA	PINAPPLE GUAVA	16.6"
V1	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	26.3"
V2	MAGNOLIA SOULANGIANA	SAUCER MAGNOLIA	22.8"
W1	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	13.3"
W2	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	16.3"
W3	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	12.1"
W4	ILEX ALTACLARENSIS "WILSONII"	WILSON'S HOLLY	14.5"
X1	LIQUIDAMBAR STYRACIFLUA	SWEETGUM	14.3"
X2	LIQUIDAMBAR STYRACIFLUA	SWEETGUM	15.8"
X3	LIQUIDAMBAR STYRACIFLUA	SWEETGUM	15.9"
Y1	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	18.5"
Y2	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	17.4"

EXISTING TREE DESCRIPTION
ASK - 060

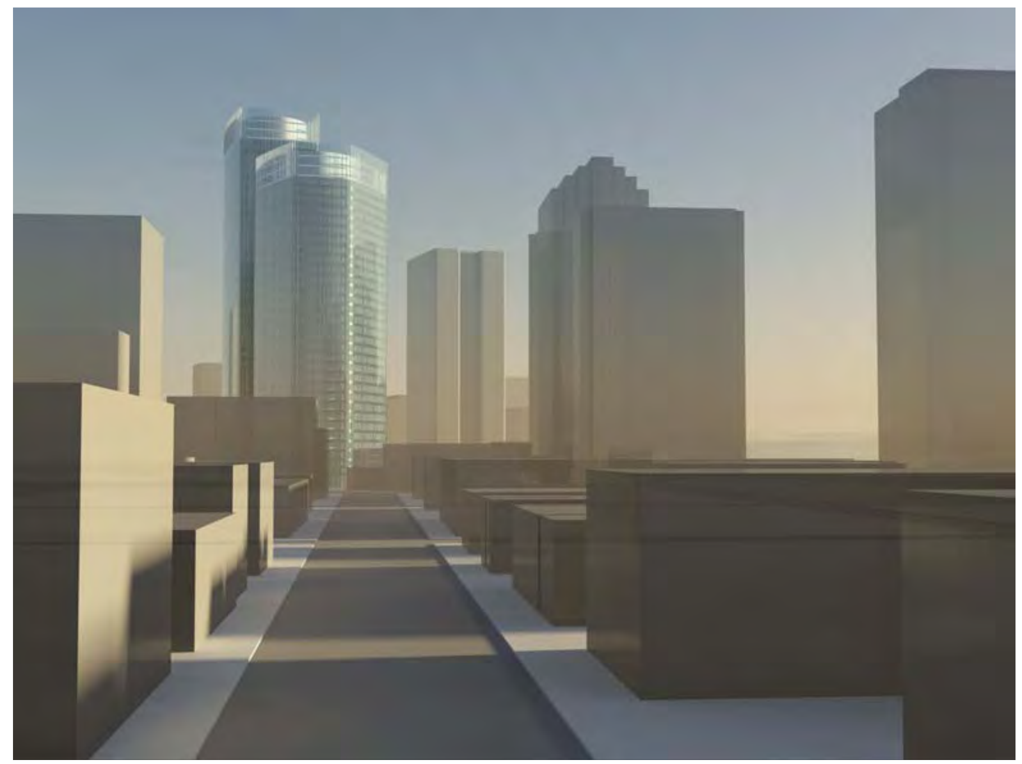
0 16' 32' 64'

March 14, 2008
Scale: 1" = 64'-0"

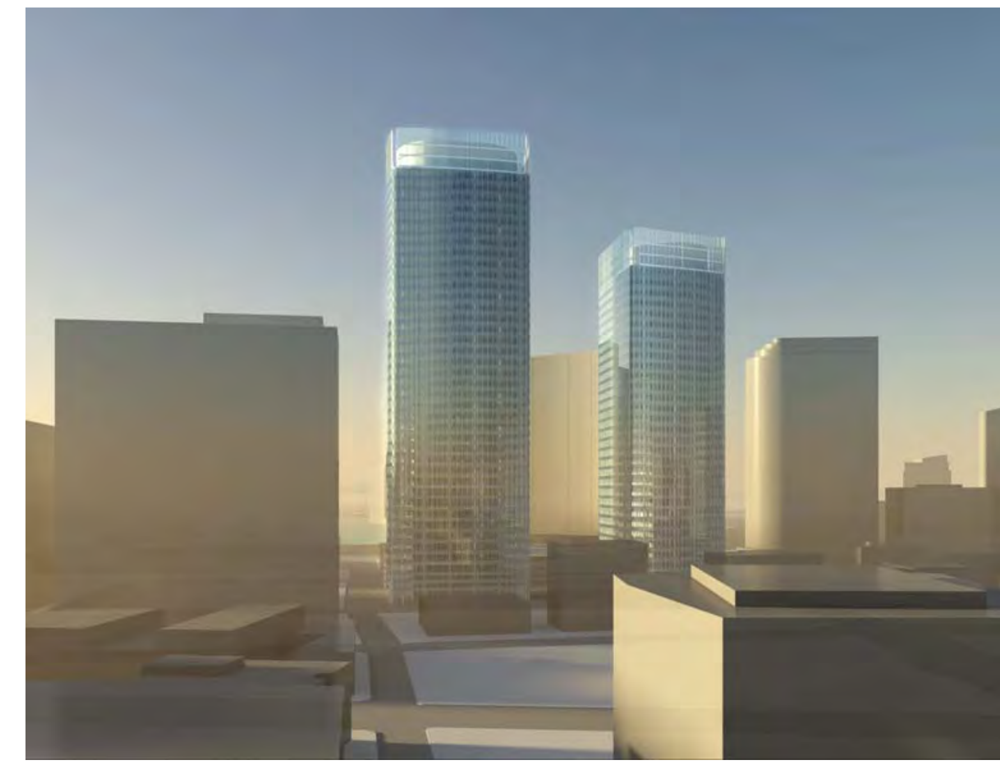
NORTH

KAISER CENTER
THE SWIG COMPANY
SOM

VIEW FROM EAST



VIEW FROM SOUTH



VIEW FROM WEST

APPENDIX E.2

Native American Heritage Commission Communications

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Jakki Kehl
720 North 2nd Street
Patterson, California 95363

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Kehl:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Katherine Erolinda Perez
P.O. Box 717
Linden, California 95236

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Perez:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

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Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Amah/Mutsun Tribal Band
789 Canada Road
Woodside, California 94062
Attn: Irene Zwierlein, Chairperson

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Zwierlein:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

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Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Indian Canyon Mutsun Band of Costanoan
P.O. Box 28
Hollister, California 95024
Attn: Ann Marie Sayers, Chairperson

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Sayers:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

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Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

The Ohlone Indian Tribe
P.O. Box 3152
Mission San Jose, California 94539
Attn: Andrew Galvan

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Mr. Galvan:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Trina Marine Ruano Family
16010 Halmar Lane
Lathrop, California 95330
Attn: Ramona Garibay

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Garibay:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

ESA

1425 N. McDowell Boulevard
Suite 105
Petaluma, CA 94954
707.795.0900 phone
707.795.0902 fax

www.esassoc.com

April 28, 2008

Muwekma Ohlone Indian Tribe of the San Francisco Bay Area
P.O. Box 360791
Milpitas, California 95036
Attn: Rosemary Cambra, Chairperson

Re: Three proposed cultural resource studies in Alameda County
Kaiser Center Oakland Redevelopment Project, Oakland (ESA Project #D206213)
Children's Hospital and Research Center Replacement Project, Oakland (ESA Project # 207558)
Sutter Medical Center, Castro Valley (ESA Project #207766)

Dear Ms. Cambra:

Environmental Science Associates (ESA) is conducting cultural resources study for three projects in Alameda County. The Kaiser Center Oakland Redevelopment Project is located in downtown Oakland and consists of the removal of existing buildings and construction of two 42- and 34-story towers. The Children's Hospital and Research Center Replacement Project in also in Oakland and consists of the construction of a new 12-story hospital tower, a new central utility plant and parking structure. The Sutter Medial Center Project is located further south in Castro Valley and includes the demolition of an existing 8-story hospital and the construction of a new 6-story hospital and medical office (see attached maps).

In an effort to address any potential impact to archaeological or ethnographic resources, we are seeking comments from Native American representatives; your name was supplied to us by the Native American Heritage Commission as a contact for this area. We would appreciate your comments identifying any concerns or issues pertinent to this project.

Thank you for your cooperation on this matter. If you have any questions, please contact me at 707/795-0920.

Sincerely,

Heidi Koenig

Heidi Koenig
Cultural Resources Group

STATE OF CALIFORNIA Arnold Schwarzenegger, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

April 25, 2008

Heidi Koenig
Cultural Resources Group
ESA
1425 N. McDowell Blvd., Suite 105
Petaluma, A 94954

Sent by Fax: 707-795-0902
Number of Pages: 4

Re: Proposed: Kaiser Center Oakland Redevelopment project. Childrens Hospital and Research Center Replacement project. Sutter Medical Center, Castro Valley. All projects in Alameda County.

Dear Ms. Koenig:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

Gloria Tomee
for
Debbie Pilas-Treadway
Environmental Specialist III

Native American Contacts
Alameda County
April 25, 2008

Jakki Kehl
720 North 2nd Street
Patterson , CA 95363
jakki@bigvalley.net
(209) 892-2436
(209) 892-2435 - Fax
Ohlone/Costanoan

Muwekma Ohlone Indian Tribe of the SF Bay Area
Rosemary Cambra, Chairperson
PO Box 360791
Milpitas , CA 95036
muwekma@muwekma.org
408-434-1668
408-434-1673
Ohlone / Costanoan

Katherine Erolinda Perez
PO Box 717
Linden , CA 95236
(209) 887-3415
Ohlone/Costanoan
Northern Valley Yokuts
Bay Miwok

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152
Fremont , CA 94539
chochenyo@AOL.com
(510) 882-0527 - Cell
(510) 687-9393 - Fax
Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Amah/MutsunTribal Band
Irene Zwierlein, Chairperson
789 Canada Road
Woodside , CA 94062
amah_mutsun@yahoo.com
(650) 851-7747 - Home
(650) 851-7489 - Fax
Ohlone/Costanoan

Trina Marine Ruano Family
Ramona Garibay, Representative
16010 Halmar Lane
Lathrop , CA 95330
Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28
Hollister , CA 95024
ams@garlic.com
831-637-4238
Ohlone/Costanoan

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Kaiser Center Oakland Redevelopment project, Alameda County.

APPENDIX E.3

Exterior Façade Feasibility Analysis

Turner

Turner Construction Company
1625 Clay Street
Oakland, California 94612
phone: (510) 267-8100
fax: (510) 267-8118

November 20, 2008

Tomas Schoenberg
The Swig Company, LLC
220 Montgomery Street
San Francisco, CA 94104

Re: Kaiser Center- Mall Buildings Exterior Façade (Dolomite Panels) Feasibility Analysis

Dear Tomas,

Thank you for requesting Turner Construction Company to provide an analysis of the exterior façade of the two existing Mall Buildings at the Kaiser Center complex. Per your request, we have evaluated the feasibility of the intact salvaging (removal) of the Dolomite Precast Panels from the structure of the Mall Buildings, and then the potential preservation and reinstallation of these panels on a new structure at that location.

Scope
The scope of the study included a detailed review of the original 1958 Architectural and Structural Drawings and Specifications for both the Kaiser Center office tower and Mall Buildings prepared by Welton Becket & Associates, as well as a visual inspection of these buildings. Both the tower and Mall Buildings were reviewed due to the variation in panel thickness and attachment details given their different structural frames.

Findings
A review of the original construction documents for the Mall Buildings yielded two Architectural details and one Structural detail as the primary elements influencing our findings (please reference Architectural Detail “A” and Detail “B”, and Structural Detail “C” attached to this document). The key element is the 1 inch thick grout layer shown between the 3 inch thick precast panels and the buildings’ concrete frame, as referenced on the attached Details “A” and “B”. The grout bonds the panel to the concrete as if the panel were cast in place, thus effectively creating a unified section. While the Structural details do not show how the panels are to be attached, Detail “C” does show the same unified section for the panel and grout of 4 inches thick. From our visual inspection we did not see anything to suggest that the panels were installed other than the manner is shown in the drawings. It should be noted that none of these details reference any mechanical attachment for the precast panels that is common in current construction methods (the fastener shown in Detail “A” is for a vertical aluminum mullion interfacing between the panels and is not for the panels’ attachment to the building); please reference attached Details SK1A and SK1B as examples of typical precast attachment details.

It is important to note that in our experience renovating another high-rise building in Oakland of similar vintage with a similar precast system, the precast panels were actually used as the form surface for the shearwall concrete, thus casting the panels into the unified concrete frame. Separating the panels from the building’s concrete frame required extensive hand demolition of the panels utilizing chipping guns. It is possible that this method of attachment may have been used in certain areas of the Mall Building as well, and thus removal would have the same result as the grouted bonding of the panels stipulated in the original design.

Turner

Conclusion
Based upon our review of the design documents and our visual inspection, the attachment of these precast Dolomite panels to the Mall Buildings' concrete frame precludes their mechanical removal other than by destructive methods. Further, even attempting to remove the panels by careful hand demolition would most likely cause them to disintegrate due to the nature of their material composition and age. Therefore, it is our opinion that, irrespective of cost, it would be infeasible for the Dolomite precast exterior façade at the Mall Buildings to be salvaged in a manner that would allow their reuse on any new structure. In addition, while it may be possible to salvage some limited amounts of the Dolomite material from the panels, a reasonable approach to demolition of the structure would not yield any "clean" or consistent material for incorporation into the proposed new building façade.

We also consulted two other construction firms that specialize in precast panel manufacturing and installation, Walters & Wolf and Clark Pacific, who reviewed and commented on the pertinent design documents with respect to the Dolomite panels and their opinions and conclusions align with ours.

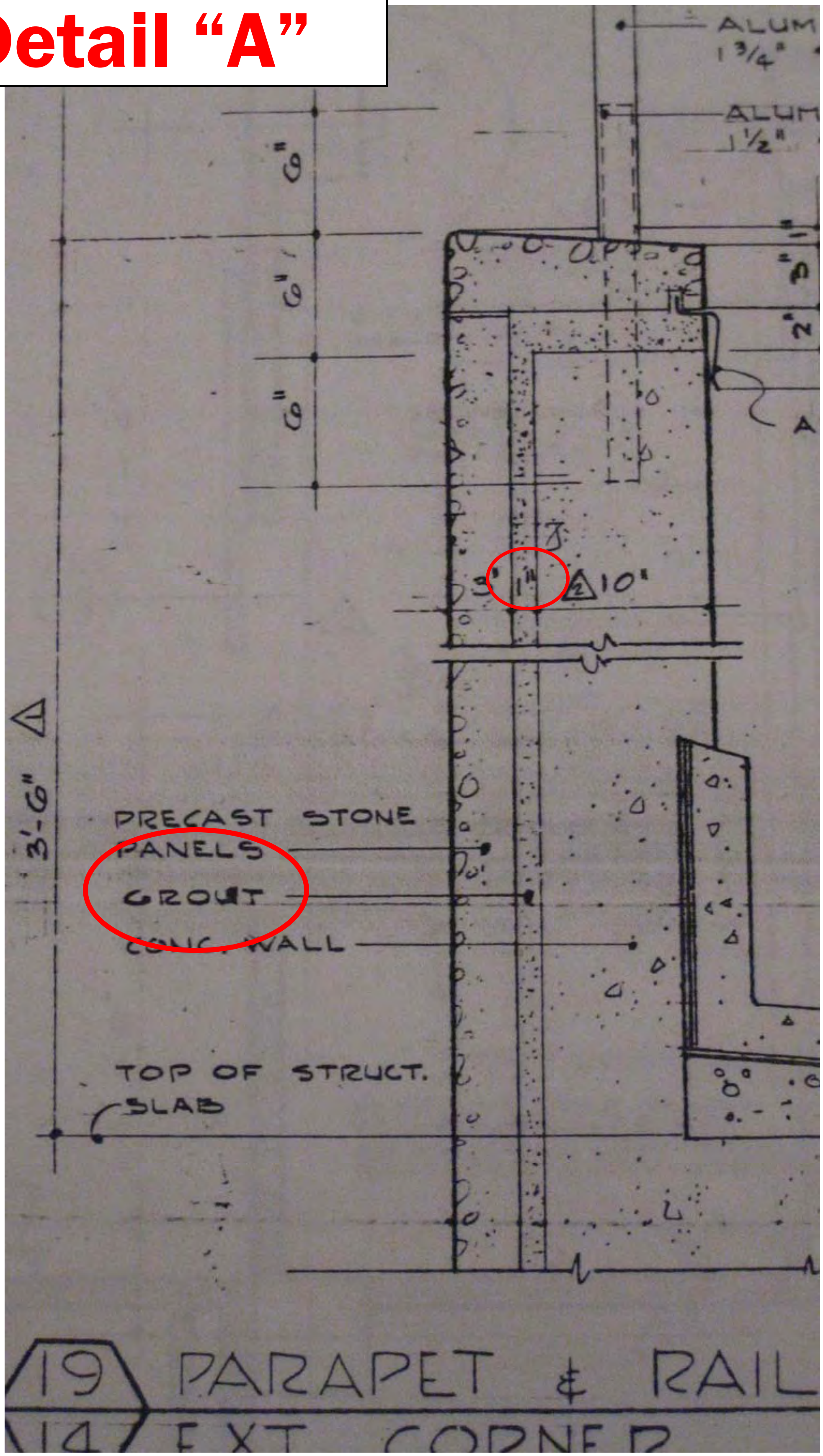
We welcome the opportunity to discuss this analysis with you or whomever else you feel is appropriate, and would be glad to answer any further questions you may have.

Sincerely,

Willy Mautner, AIA
Chief Estimator

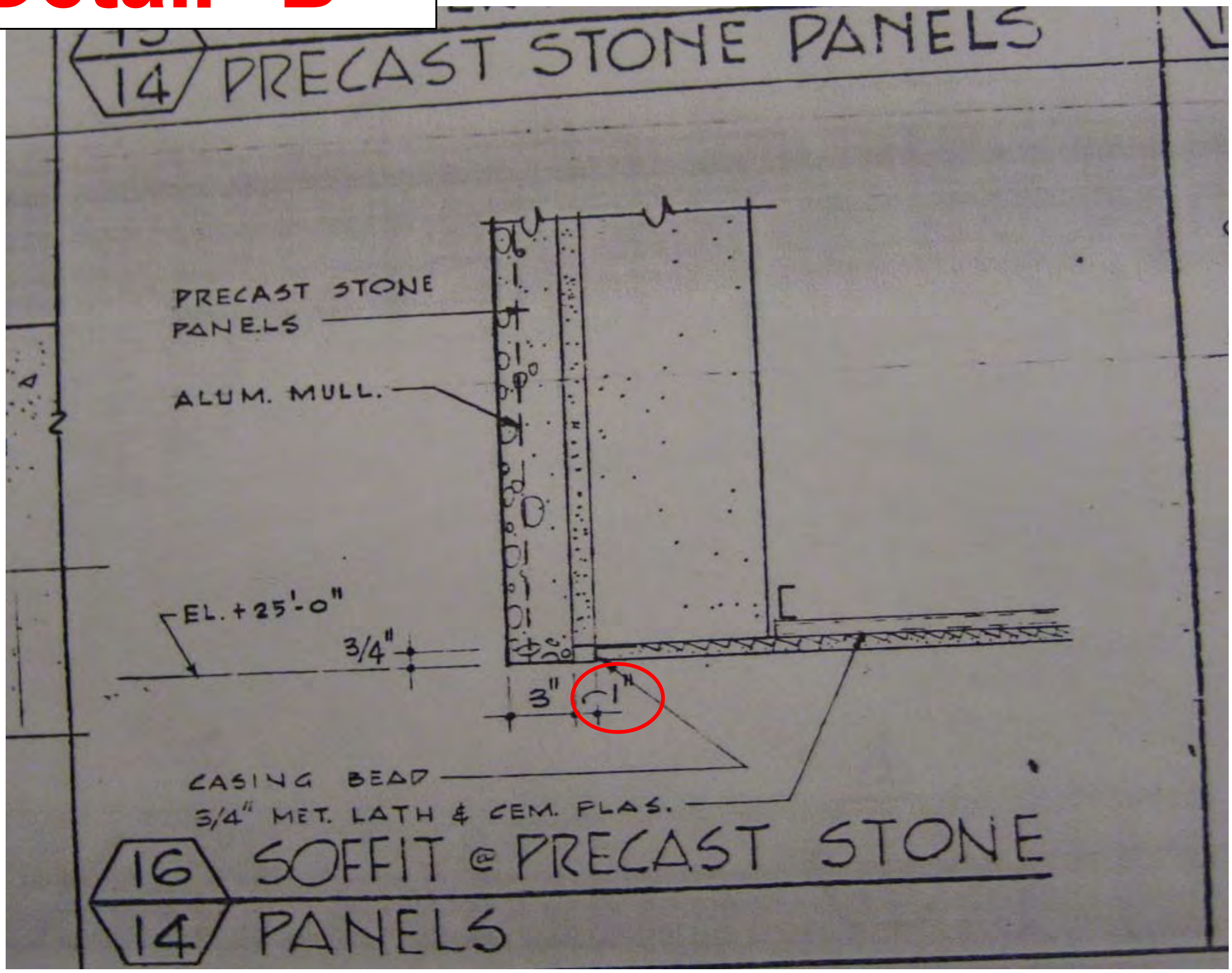
Cc: Deborah Boyer, The Swig Company, LLC
Scott Eastman, Turner Construction Company

Detail "A"



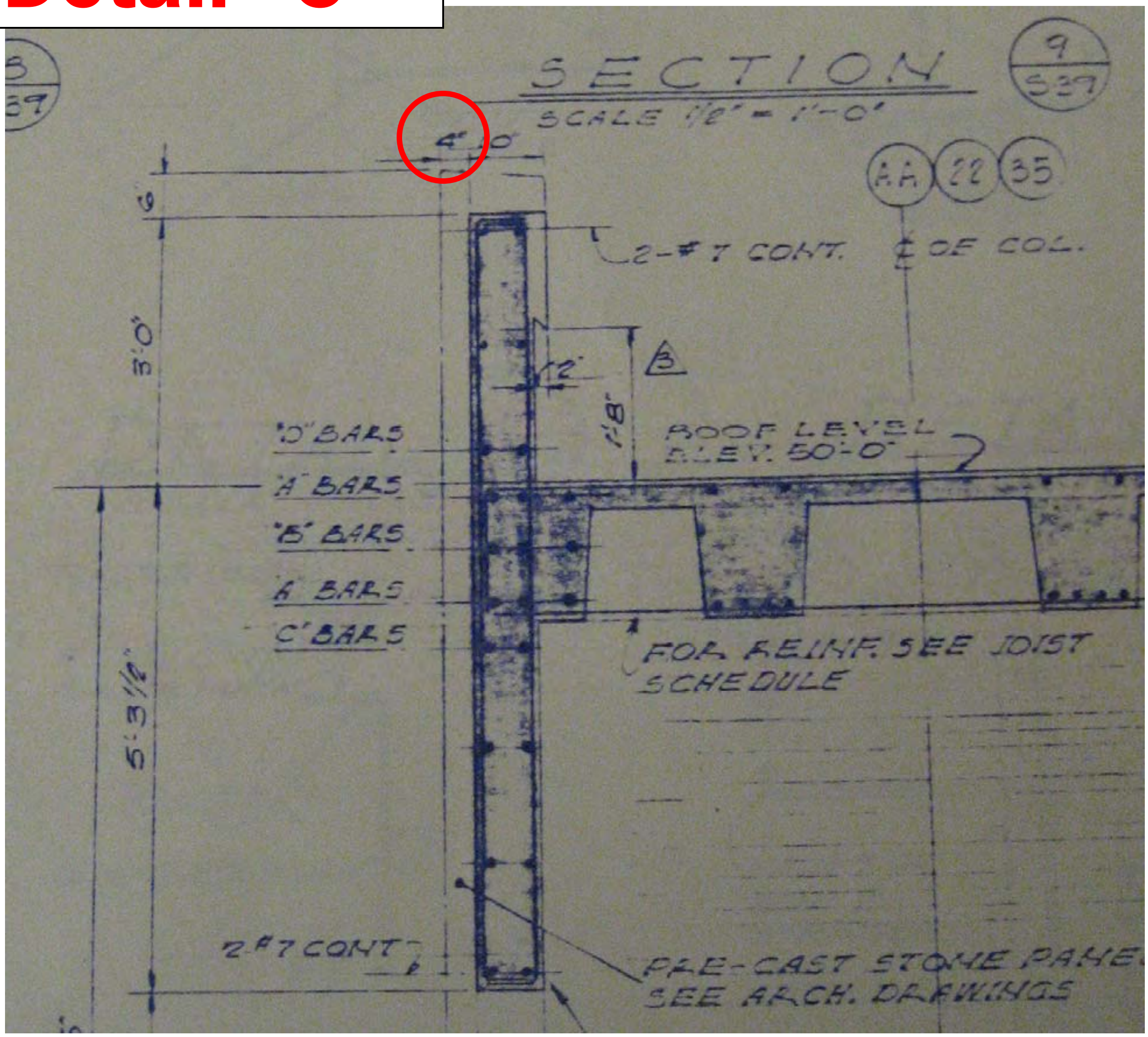
ALUM
1 3/4"
ALUM
1 1/2"
6"
6"
6"
3"
1"
2
10"
3'-6"
PRECAST STONE PANELS
GROUT
CONC. WALL
TOP OF STRUCT. SLAB
19
14
PARAPET & RAIL
EXT CORNER

Detail "B"



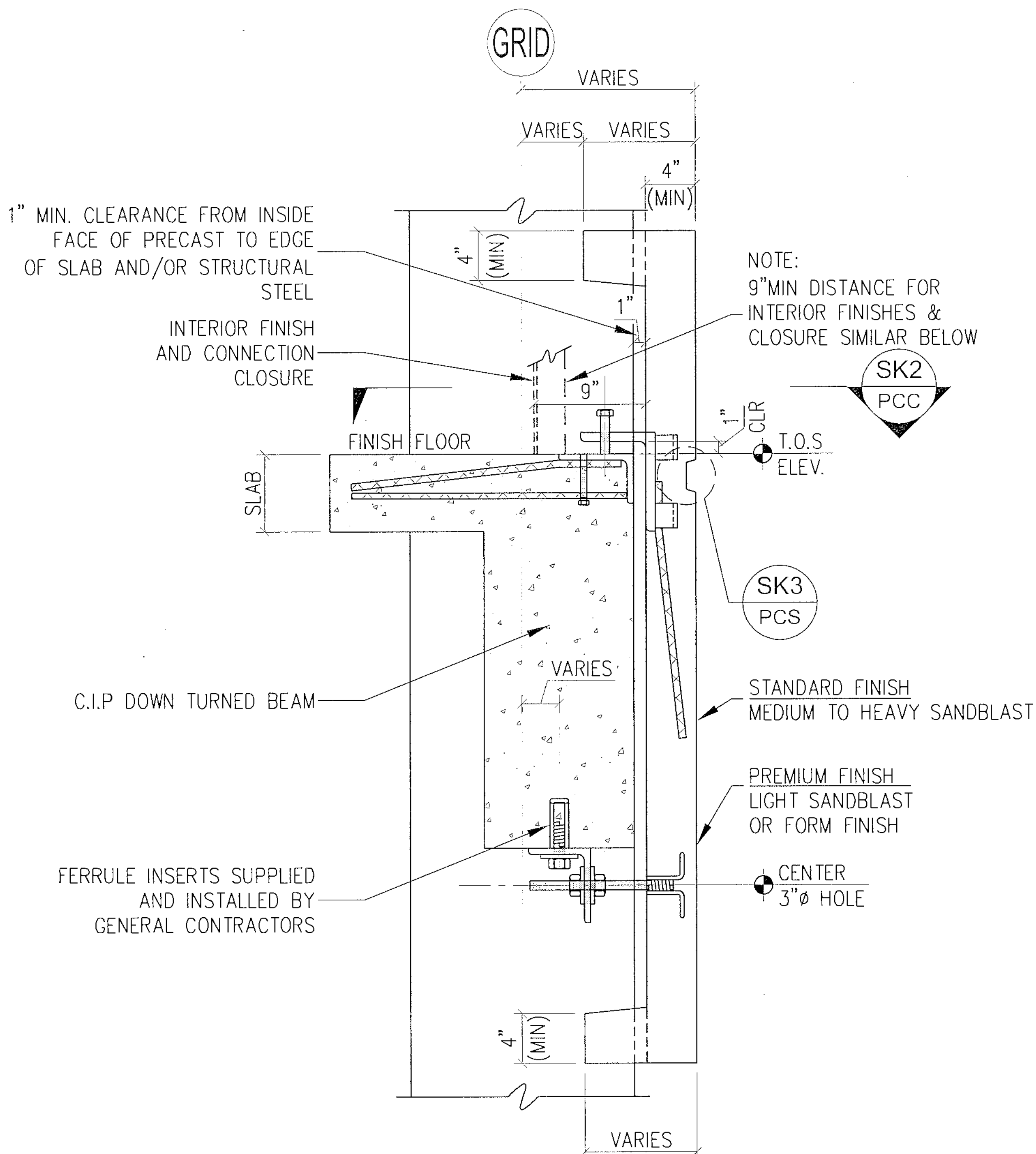
14 PRECAST STONE PANELS
PRECAST STONE PANELS
ALUM. MULL.
EL. +25'-0"
3/4"
3"
1"
CASING BEAD
3/4" MET. LATH & CEM. PLAS.
16
14
SOFFIT @ PRECAST STONE PANELS

Detail "C"



SECTION
SCALE 1/2" = 1'-0"
9
S37
AA
22
35
2-#7 CONT.
℄ OF COL.
3'-0"
"D" BARS
"A" BARS
"B" BARS
"A" BARS
"C" BARS
1'-8"
ROOF LEVEL
ELEV. 50'-0"
FOR REINF. SEE JOIST
SCHEDULE
5'-3 1/2"
2-#7 CONT.
PRE-CAST STONE PANEL
SEE ARCH. DRAWINGS

CLARK PACIFIC 1980 SOUTH RIVER ROAD W SACRAMENTO, CA 95691 TEL: (916) 371-0305 FAX: (916) 372-0323 13592 SLOVER AVENUE FONTANA, CA 92337 TEL: (909) 823-1433 FAX: (909) 823-1361	PROJECT CONTRACTOR TYPICAL PRE-CAST SECTION AT C.I.P STRUCTURE	JOB SHEET PCC-SK1 DATE 3/15/07 BY TA CHECK DW



SK1 A

TYPICAL PRECAST PANEL CONNECTIONS

SCALE: 1" = 1'-0"

(FLOOR SECTION-C.I.P STRUCTURE)

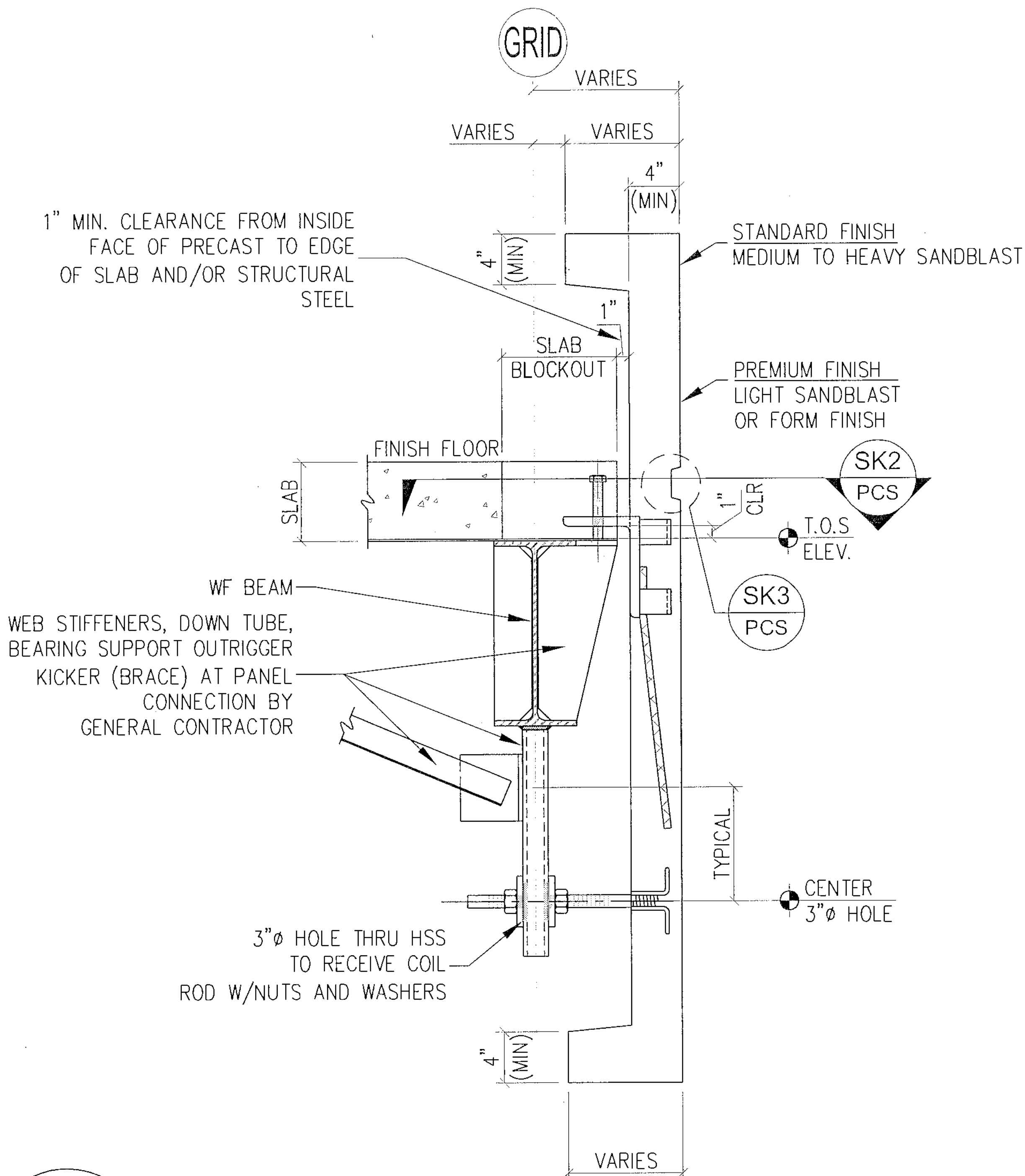
S:\By Employee\tony arroyo\WEBSITE.dwg, 3/16/2007 3:46:01 PM

CLARK PACIFIC

1980 SOUTH RIVER ROAD W SACRAMENTO, CA 95691 TEL: (916) 371-0305 FAX: (916) 372-0323

13592 SLOVER AVENUE FONTANA, CA 92337 TEL: (909) 823-1433 FAX: (909) 823-1361

PROJECT	JOB
CONTRACTOR	SHEET PCS-SK1
TYPICAL PRE-CAST SECTION AT STEEL STRUCTURE	DATE 3/15/07
	BY TA CHECK DW



SK1

TYPICAL PRECAST PANEL CONNECTIONS

SCALE: 1" = 1'-0"

(FLOOR SECTION)

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APPENDIX F

Noise Data

Noise Appendix

Table NA-2

Traffic Noise Level Estimates

Model Version 12/28/2006

%

15m= 49 FEET 7.7688005

ROAD SEGMENT #1: Harrison Street north of Grand Avenue

	TOTAL # VEHICLES	Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	1,471	97.0	1,427	2.0	29	1.0	15	25	40	25	40	25	40	61.6	56.4	61.1	65.0	20	63.8	63.2
Existing+Project	1,769	97.0	1,716	2.0	35	1.0	18	25	40	25	40	25	40	62.4	57.2	61.9	65.8	20	64.6	64.0
Near Term AM	1,771	97.0	1,718	2.0	35	1.0	18	25	40	25	40	25	40	62.5	57.2	61.9	65.8	20	64.6	64.0
Near Term+Project	2,069	97.0	2,007	2.0	41	1.0	21	25	40	25	40	25	40	63.1	57.9	62.6	66.5	20	65.3	64.6
Future	2,801	97.0	2,717	2.0	56	1.0	28	25	40	25	40	25	40	64.4	59.2	63.9	67.8	20	66.6	65.9
Future+Project	3,099	97.0	3,006	2.0	62	1.0	31	25	40	25	40	25	40	64.9	59.7	64.3	68.3	20	67.0	66.4

ROAD SEGMENT #2: Harrison Street south of Grand Avenue

	TOTAL # VEHICLES	Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	2,016	97.0	1,956	2.0	40	1.0	20	25	40	25	40	25	40	63.0	57.8	62.4	66.4	20	65.1	64.5
Existing+Project	2,314	97.0	2,245	2.0	46	1.0	23	25	40	25	40	25	40	63.6	58.4	63.0	67.0	20	65.7	65.1
Near Term AM	2,411	97.0	2,339	2.0	48	1.0	24	25	40	25	40	25	40	63.8	58.6	63.2	67.2	20	65.9	65.3
Near Term+Project	2,709	97.0	2,628	2.0	54	1.0	27	25	40	25	40	25	40	64.3	59.1	63.7	67.7	20	66.4	65.8
Future	3,581	97.0	3,474	2.0	72	1.0	36	25	40	25	40	25	40	65.5	60.3	64.9	68.9	20	67.6	67.0
Future+Project	3,879	97.0	3,763	2.0	78	1.0	39	25	40	25	40	25	40	65.9	60.7	65.3	69.2	20	68.0	67.4

ROAD SEGMENT #3: Grand Avenue east of Harrison Street

	TOTAL # VEHICLES	Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
Existing AM	1,355	97.0	1,314	2.0	27	1.0	14	25	40	25	40	25	40	61.3	56.1	60.7	64.7	20	63.4	62.8
Existing+Project	1,355	97.0	1,314	2.0	27	1.0	14	25	40	25	40	25	40	61.3	56.1	60.7	64.7	20	63.4	62.8
Near Term AM	1,647	97.0	1,598	2.0	33	1.0	16	25	40	25	40	25	40	62.1	56.9	61.6	65.5	20	64.3	63.6
Near Term+Project	1,647	97.0	1,598	2.0	33	1.0	16	25	40	25	40	25	40	62.1	56.9	61.6	65.5	20	64.3	63.6
Future	2,286	97.0	2,217	2.0	46	1.0	23	25	40	25	40	25	40	63.6	58.4	63.0	66.9	20	65.7	65.1
Future+Project	2,286	97.0	2,217	2.0	46	1.0	23	25	40	25	40	25	40	63.6	58.4	63.0	66.9	20	65.7	65.1

ROAD SEGMENT #4: Grand Avenue west of Harrison Street

	TOTAL # VEHICLES	Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	888	97.0	861	2.0	18	1.0	9	25	40	25	40	25	40	59.5	54.2	58.9	62.8	20	61.6	61.0
Existing+Project	888	97.0	861	2.0	18	1.0	9	25	40	25	40	25	40	59.5	54.2	58.9	62.8	20	61.6	61.0
Near Term AM	1,143	97.0	1,109	2.0	23	1.0	11	25	40	25	40	25	40	60.5	55.3	60.0	63.9	20	62.7	62.1
Near Term+Project	1,143	97.0	1,109	2.0	23	1.0	11	25	40	25	40	25	40	60.5	55.3	60.0	63.9	20	62.7	62.1
Future	1,866	97.0	1,810	2.0	37	1.0	19	25	40	25	40	25	40	62.7	57.5	62.1	66.1	20	64.8	64.2
Future+Project	1,866	97.0	1,810	2.0	37	1.0	19	25	40	25	40	25	40	62.7	57.5	62.1	66.1	20	64.8	64.2

ROAD SEGMENT #5: Harrison Street north of 21st Street

	TOTAL # VEHICLES	Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	2,046	97.0	1,985	2.0	41	1.0	20	25	40	25	40	25	40	63.1	57.9	62.5	66.5	20	65.2	64.6
Existing+Project	2,344	97.0	2,274	2.0	47	1.0	23	25	40	25	40	25	40	63.7	58.5	63.1	67.1	20	65.8	65.2
Near Term AM	2,407	97.0	2,335	2.0	48	1.0	24	25	40	25	40	25	40	63.8	58.6	63.2	67.2	20	65.9	65.3
Near Term+Project	2,705	97.0	2,624	2.0	54	1.0	27	25	40	25	40	25	40	64.3	59.1	63.7	67.7	20	66.4	65.8
Future	2,769	97.0	2,686	2.0	55	1.0	28	25	40	25	40	25	40	64.4	59.2	63.8	67.8	20	66.5	65.9
Future+Project	3,067	97.0	2,975	2.0	61	1.0	31	25	40	25	40	25	40	64.8	59.6	64.3	68.2	20	67.0	66.3

ROAD SEGMENT #6: Harrison Street south of 21st Street

	TOTAL # VEHICLES	Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	1,846	97.0	1,791	2.0	37	1.0	18	25	40	25	40	25	40	62.6	57.4	62.1	66.0	20	64.8	64.1
Existing+Project	2,027	97.0	1,966	2.0	41	1.0	20	25	40	25	40	25	40	63.0	57.8	62.5	66.4	20	65.2	64.5
Near Term AM	2,172	97.0	2,107	2.0	43	1.0	22	25	40	25	40	25	40	63.3	58.1	62.8	66.7	20	65.5	64.8
Near Term+Project	2,353	97.0	2,282	2.0	47	1.0	24	25	40	25	40	25	40	63.7	58.5	63.1	67.1	20	65.8	65.2

Future	2,498	97.0	2,423	2.0	50	1.0	25	25	40	25	40	25	40	63.9	58.7	63.4	67.3	20	66.1	65.5
Future+Project	2,679	97.0	2,599	2.0	54	1.0	27	25	40	25	40	25	40	64.2	59.0	63.7	67.6	20	66.4	65.8

ROAD SEGMENT #7: 21st Street east of Harrison Street

	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
Existing AM	0	97.0	0	2.0	0	1.0	0	25	40	25	40	25	40	#NUM!	#NUM!	#NUM!	#NUM!	20	#NUM!	#NUM!
Existing+Project	0	97.0	0	2.0	0	1.0	0	25	40	25	40	25	40	#NUM!	#NUM!	#NUM!	#NUM!	20	#NUM!	#NUM!
Near Term AM	0	97.0	0	2.0	0	1.0	0	25	40	25	40	25	40	#NUM!	#NUM!	#NUM!	#NUM!	20	#NUM!	#NUM!
Near Term+Project	0	97.0	0	2.0	0	1.0	0	25	40	25	40	25	40	#NUM!	#NUM!	#NUM!	#NUM!	20	#NUM!	#NUM!
Future	0	97.0	0	2.0	0	1.0	0	25	40	25	40	25	40	#NUM!	#NUM!	#NUM!	#NUM!	20	#NUM!	#NUM!
Future+Project	0	97.0	0	2.0	0	1.0	0	25	40	25	40	25	40	#NUM!	#NUM!	#NUM!	#NUM!	20	#NUM!	#NUM!

ROAD SEGMENT #8: 21st Street west of Harrison Street

	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	432	97.0	419	2.0	9	1.0	4	25	40	25	40	25	40	56.3	51.1	55.8	59.7	20	58.5	57.8
Existing+Project	911	97.0	884	2.0	18	1.0	9	25	40	25	40	25	40	59.6	54.4	59.0	62.9	20	61.7	61.1
Near Term AM	509	97.0	494	2.0	10	1.0	5	25	40	25	40	25	40	57.0	51.8	56.5	60.4	20	59.2	58.5
Near Term+Project	988	97.0	958	2.0	20	1.0	10	25	40	25	40	25	40	59.9	54.7	59.3	63.3	20	62.0	61.4
Future	585	97.0	567	2.0	12	1.0	6	25	40	25	40	25	40	57.6	52.4	57.1	61.0	20	59.8	59.1
Future+Project	1,064	97.0	1,032	2.0	21	1.0	11	25	40	25	40	25	40	60.2	55.0	59.7	63.6	20	62.4	61.7

ROAD SEGMENT #9: Webster Street north of 21st Street

	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	470	97.0	456	2.0	9	1.0	5	25	40	25	40	25	40	56.7	51.5	56.1	60.1	20	58.8	58.2
Existing+Project	609	97.0	591	2.0	12	1.0	6	25	40	25	40	25	40	57.8	52.6	57.2	61.2	20	59.9	59.3
Near Term AM	584	97.0	566	2.0	12	1.0	6	25	40	25	40	25	40	57.6	52.4	57.1	61.0	20	59.8	59.1
Near Term+Project	723	97.0	701	2.0	14	1.0	7	25	40	25	40	25	40	58.6	53.4	58.0	61.9	20	60.7	60.1
Future	697	97.0	676	2.0	14	1.0	7	25	40	25	40	25	40	58.4	53.2	57.8	61.8	20	60.5	59.9
Future+Project	836	97.0	811	2.0	17	1.0	8	25	40	25	40	25	40	59.2	54.0	58.6	62.6	20	61.3	60.7

ROAD SEGMENT #10: Webster Street south of 21st Street

	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	407	97.0	395	2.0	8	1.0	4	25	40	25	40	25	40	56.1	50.9	55.5	59.4	20	58.2	57.6
Existing+Project	418	97.0	405	2.0	8	1.0	4	25	40	25	40	25	40	56.2	51.0	55.6	59.6	20	58.3	57.7
Near Term AM	506	97.0	491	2.0	10	1.0	5	25	40	25	40	25	40	57.0	51.8	56.4	60.4	20	59.1	58.5
Near Term+Project	517	97.0	501	2.0	10	1.0	5	25	40	25	40	25	40	57.1	51.9	56.5	60.5	20	59.2	58.6
Future	603	97.0	585	2.0	12	1.0	6	25	40	25	40	25	40	57.8	52.6	57.2	61.2	20	59.9	59.3
Future+Project	614	97.0	596	2.0	12	1.0	6	25	40	25	40	25	40	57.8	52.6	57.3	61.2	20	60.0	59.4

ROAD SEGMENT #11: 21st Street east of Webster Street

	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
Existing AM	358	97.0	347	2.0	7	1.0	4	25	40	25	40	25	40	55.5	50.3	54.9	58.9	20	57.6	57.0
Existing+Project	1,023	97.0	992	2.0	20	1.0	10	25	40	25	40	25	40	60.1	54.9	59.5	63.4	20	62.2	61.6
Near Term AM	445	97.0	432	2.0	9	1.0	4	25	40	25	40	25	40	56.5	51.2	55.9	59.8	20	58.6	58.0
Near Term+Project	1,110	97.0	1,077	2.0	22	1.0	11	25	40	25	40	25	40	60.4	55.2	59.9	63.8	20	62.6	61.9
Future	531	97.0	515	2.0	11	1.0	5	25	40	25	40	25	40	57.2	52.0	56.7	60.6	20	59.4	58.7
Future+Project	1,196	97.0	1,160	2.0	24	1.0	12	25	40	25	40	25	40	60.7	55.5	60.2	64.1	20	62.9	62.3

ROAD SEGMENT #12: 21st Street west of Webster Street

	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	263	97.0	255	2.0	5	1.0	3	25	40	25	40	25	40	54.2	49.0	53.6	57.6	20	56.3	55.7
Existing+Project	778	97.0	755	2.0	16	1.0	8	25	40	25	40	25	40	58.9	53.7	58.3	62.3	20	61.0	60.4
Near Term AM	327	97.0	317	2.0	7	1.0	3	25	40	25	40	25	40	55.1	49.9	54.5	58.5	20	57.2	56.6
Near Term+Project	842	97.0	817	2.0	17	1.0	8	25	40	25	40	25	40	59.2	54.0	58.7	62.6	20	61.4	60.7
Future	391	97.0	379	2.0	8	1.0	4	25	40	25	40	25	40	55.9	50.7	55.3	59.3	20	58.0	57.4
Future+Project	906	97.0	879	2.0	18	1.0	9	25	40	25	40	25	40	59.5	54.3	59.0	62.9	20	61.7	61.0

ROAD SEGMENT #13: Franklin Street north of 20th Street

ROAD SEGMENT #13: Franklin Street north of 20th Street	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	245	97.0	238	2.0	5	1.0	2	25	40	25	40	25	40	53.9	48.7	53.3	57.2	20	56.0	55.4
Existing+Project	477	97.0	463	2.0	10	1.0	5	25	40	25	40	25	40	56.8	51.5	56.2	60.1	20	58.9	58.3
Near Term AM	305	97.0	296	2.0	6	1.0	3	25	40	25	40	25	40	54.8	49.6	54.2	58.2	20	56.9	56.3
Near Term+Project	537	97.0	521	2.0	11	1.0	5	25	40	25	40	25	40	57.3	52.1	56.7	60.7	20	59.4	58.8
Future	363	97.0	352	2.0	7	1.0	4	25	40	25	40	25	40	55.6	50.4	55.0	58.9	20	57.7	57.1
Future+Project	595	97.0	577	2.0	12	1.0	6	25	40	25	40	25	40	57.7	52.5	57.1	61.1	20	59.8	59.2

ROAD SEGMENT #14: Franklin Street south of 20th Street	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	255	97.0	247	2.0	5	1.0	3	25	40	25	40	25	40	54.0	48.8	53.5	57.4	20	56.2	55.5
Existing+Project	463	97.0	449	2.0	9	1.0	5	25	40	25	40	25	40	56.6	51.4	56.1	60.0	20	58.8	58.1
Near Term AM	316	97.0	307	2.0	6	1.0	3	25	40	25	40	25	40	55.0	49.8	54.4	58.3	20	57.1	56.5
Near Term+Project	524	97.0	508	2.0	10	1.0	5	25	40	25	40	25	40	57.2	52.0	56.6	60.5	20	59.3	58.7
Future	379	97.0	368	2.0	8	1.0	4	25	40	25	40	25	40	55.8	50.5	55.2	59.1	20	57.9	57.3
Future+Project	587	97.0	569	2.0	12	1.0	6	25	40	25	40	25	40	57.7	52.4	57.1	61.0	20	59.8	59.2

ROAD SEGMENT #15: 20th Street east of Franklin Street	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	(15 meters from roadway center)	Roadway Center (m.)	Level (dBA) 3 dBA Atten	Level (dBA) 4.5 dBA Atten
Existing AM	571	97.0	554	2.0	11	1.0	6	25	40	25	40	25	40	57.5	52.3	57.0	60.9	20	59.7	59.0
Existing+Project	623	97.0	604	2.0	12	1.0	6	25	40	25	40	25	40	57.9	52.7	57.3	61.3	20	60.0	59.4
Near Term AM	709	97.0	688	2.0	14	1.0	7	25	40	25	40	25	40	58.5	53.3	57.9	61.9	20	60.6	60.0
Near Term+Project	761	97.0	738	2.0	15	1.0	8	25	40	25	40	25	40	58.8	53.6	58.2	62.2	20	60.9	60.3
Future	846	97.0	821	2.0	17	1.0	8	25	40	25	40	25	40	59.2	54.0	58.7	62.6	20	61.4	60.8
Future+Project	898	97.0	871	2.0	18	1.0	9	25	40	25	40	25	40	59.5	54.3	58.9	62.9	20	61.6	61.0

ROAD SEGMENT #16: 20th Street west of Franklin Street	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	Medium Truck %	MT	Heavy Truck %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	calveno factors Auto	MT	HT	Calculated dBA (15 meters from roadway center)	Receptor Distance from Roadway Center (m.)	Adjusted Level (dBA) 3 dBA Atten	Adjusted Level (dBA) 4.5 dBA Atten
Existing AM	475	97.0	461	2.0	10	1.0	5	25	40	25	40	25	40	56.7	51.5	56.2	60.1	20	58.9	58.2
Existing+Project	551	97.0	534	2.0	11	1.0	6	25	40	25	40	25	40	57.4	52.2	56.8	60.8	20	59.5	58.9
Near Term AM	590	97.0	572	2.0	12	1.0	6	25	40	25	40	25	40	57.7	52.5	57.1	61.1	20	59.8	59.2
Near Term+Project	666	97.0	646	2.0	13	1.0	7	25	40	25	40	25	40	58.2	53.0	57.6	61.6	20	60.3	59.7
Future	704	97.0	683	2.0	14	1.0	7	25	40	25	40	25	40	58.4	53.2	57.9	61.8	20	60.6	60.0
Future+Project	780	97.0	757	2.0	16	1.0	8	25	40	25	40	25	40	58.9	53.7	58.3	62.3	20	61.0	60.4

APPENDIX G

Traffic Data

Appendix G Contents:

APPENDIX G.1

Intersection Turning Movement Counts

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-001 HARRISON-STANLEY-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

	HARRISON ST. Southbound						Westbound						HARRISON ST. Northbound						STANLEY PL. Eastbound						I-580 OFF RAMP Southeastbound								
Start Time	Left	Thru	Right	Hard Right	Peds	App. Total	Left	Thru	Bear Right	Right	Peds	App. Total	Left	Bear Left	Thru	Right	Peds	App. Total	Hard Left	Left	Thru	Right	Peds	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	124	0	0	0	124	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	7	0	0	43	0	0	43	1	174	175
07:15	0	144	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	67	0	0	67	0	212	212
07:30	0	164	0	0	0	164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	64	0	0	64	1	229	230
07:45	0	208	0	0	0	208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	6	0	0	92	0	0	92	2	306	308
Total	0	640	0	0	0	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	4	15	0	0	266	0	0	266	4	921	925
08:00	0	206	0	0	0	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	96	0	0	96	0	305	305
08:15	0	239	0	0	0	239	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	6	0	0	99	0	0	99	1	344	345
08:30	0	219	0	0	0	219	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	91	0	0	91	1	311	312
08:45	0	203	0	0	0	203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1	0	0	105	0	0	105	3	309	312
Total	0	867	0	0	0	867	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	5	11	0	0	391	0	0	391	5	1269	1274
*** BREAK ***																																	
16:00	0	158	0	0	0	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	5	0	0	63	0	0	63	3	226	229
16:15	0	139	0	0	0	139	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	0	0	52	0	0	52	5	196	201
16:30	0	127	0	0	0	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	0	61	0	0	61	2	189	191
16:45	0	136	0	0	0	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	4	0	0	60	0	0	60	1	200	201
Total	0	560	0	0	0	560	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	11	15	0	0	236	0	0	236	11	811	822
17:00	0	158	0	0	0	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6	3	0	0	58	0	0	58	6	219	225
17:15	0	147	0	0	0	147	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	3	0	0	54	0	0	54	2	204	206
17:30	0	135	0	0	0	135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	1	0	0	56	0	0	56	4	192	196
17:45	0	134	0	0	0	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	77	0	0	77	3	211	214
Total	0	574	0	0	0	574	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	15	7	0	0	245	0	0	245	15	826	841
Grand Total	0	2641	0	0	0	2641	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	35	48	0	0	1138	0	0	1138	35	3827	3862
Apprch %	0	100	0	0			0	0	0	0			0	0	0	0			0	0	0	100			0	0	100	0					
Total %	0	69	0	0		69	0	0	0	0		0	0	0	0	0		0	0	0	0	1.3		1.3	0	0	29.7	0		29.7	0.9	99.1	

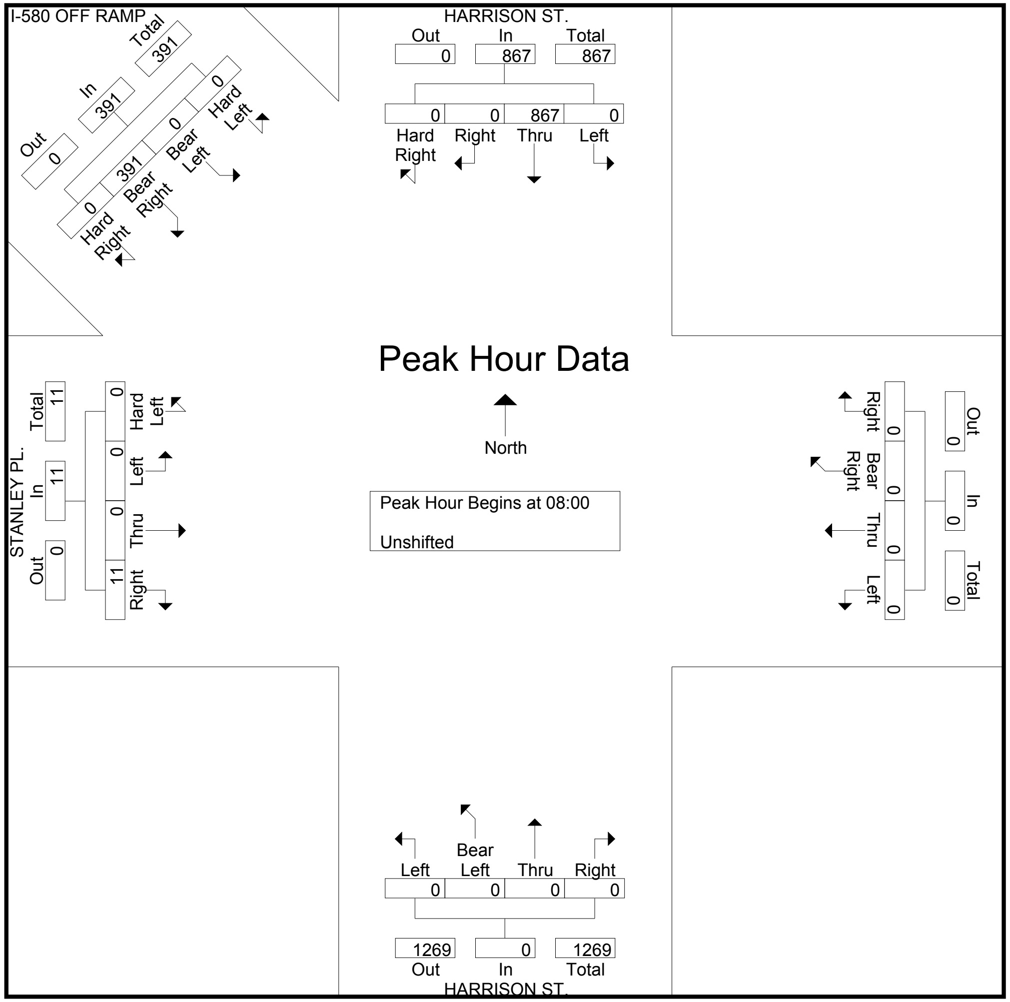
	HARRISON ST. Southbound					Westbound					HARRISON ST. Northbound					STANLEY PL. Eastbound					I-580 OFF RAMP Southeastbound					
Start Time	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	206	0	0	206	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	96	0	96	305
08:15	0	**239**	0	0	**239**	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**	**6**	0	0	99	0	99	**344**
08:30	0	219	0	0	219	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	91	0	91	311
08:45	0	203	0	0	203	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	**105**	0	**105**	309
Total Volume	0	867	0	0	867	0	0	0	0	0	0	0	0	0	0	0	0	0	11	11	0	0	391	0	391	1269
% App. Total	0	100	0	0		0	0	0	0		0	0	0	0		0	0	0	100		0	0	100	0		
PHF	.000	.907	.000	.000	.907	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.458	.458	.000	.000	.931	.000	.931	.922

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-001 HARRISON-STANLEY-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

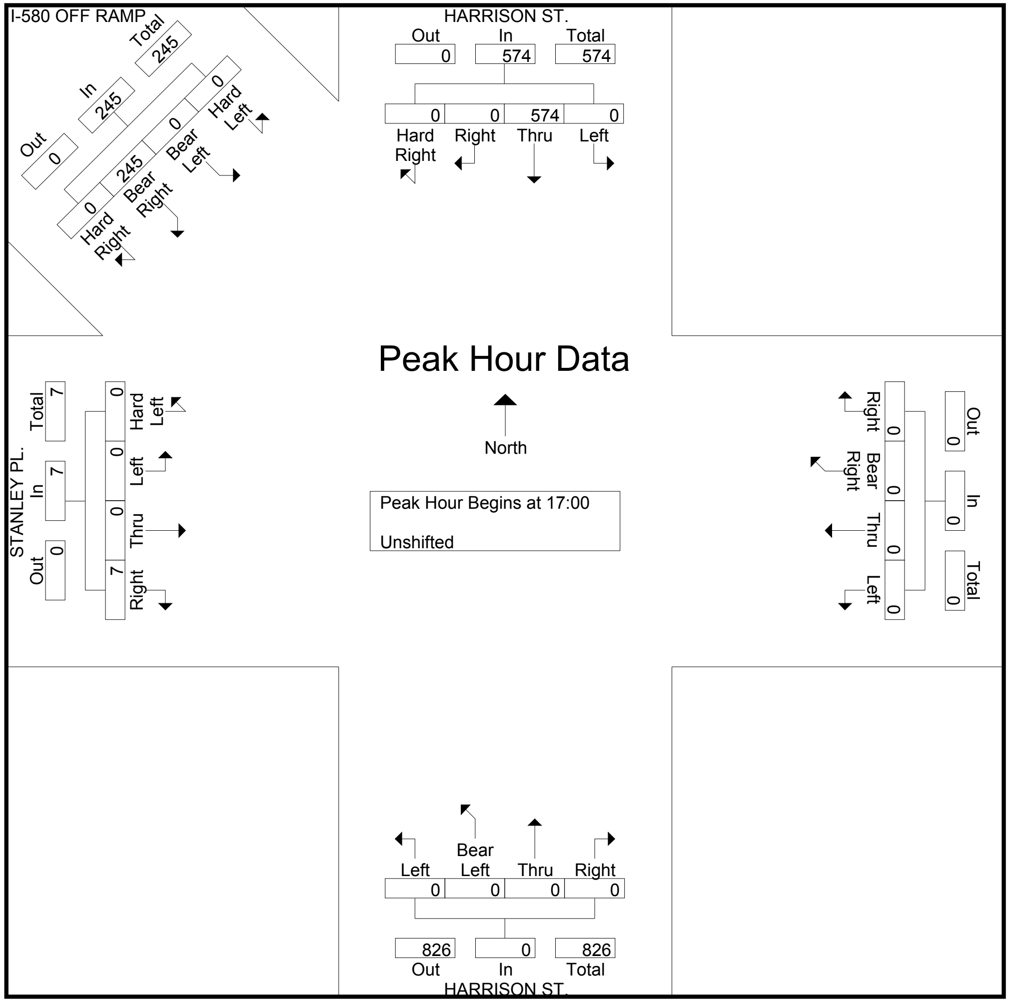
17:00	0	**158**	0	0	**158**	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**3**	0	0	58	0	58	**219**
17:15	0	147	0	0	147	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	54	0	54	204
17:30	0	135	0	0	135	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	56	0	56	192
17:45	0	134	0	0	134	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**77**	0	**77**	211
Total Volume	0	574	0	0	574	0	0	0	0	0	0	0	0	0	0	0	0	0	7	7	0	0	245	0	245	826
% App. Total	0	100	0	0		0	0	0	0		0	0	0	0		0	0	0	100		0	0	100	0		
PHF	.000	.908	.000	.000	.908	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.583	.583	.000	.000	.795	.000	.795	.943

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-001 HARRISON-STANLEY-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



File Name: P:\Projects\08-7694\PPD\5-OAKLAND-PERRY-F.ppd
Start Date: 11/19/2008
Start Time: 7:15:00 AM
Site Code: 00000000
Comment 1: OAKLAND
Comment 2:
Comment 3:
Comment 4:

	OAKLAND AVE. Southbound					EB 580 ON RAMP Southwestbound					PERRY PL. Westbound					OAKLAND AVE. Northbound					EB 580 OFF RAMP Eastbound				
Start Time	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds	Left	Thru	Bear Right	Right	Peds	Left	Bear Left	Thru	Right	Peds
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	126	57	5	1	60	0	14	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	167	73	4	1	102	1	19	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	188	75	4	2	95	1	19	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	208	93	5	0	97	0	36	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	232	95	10	3	92	0	37	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	193	82	4	1	99	2	40	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	179	62	9	4	85	1	38	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	171	61	7	2	82	0	35	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	173	140	16	2	112	2	49	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	201	139	13	0	111	2	48	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	205	132	14	1	107	1	61	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	221	150	19	2	125	1	56	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	257	149	14	2	154	0	60	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	214	134	24	2	127	1	62	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	223	116	15	2	137	1	76	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	178	119	17	0	139	4	68	0	0

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-003 HARRISON-27TH-F
Site Code : 00000000
Start Date : 08/07/2008

Groups Printed- Unshifted

	HARRISON ST. Southbound						BAY PL. Westbound						HARRISON ST. Northbound						24TH ST. Northeastbound						27TH ST. Eastbound								
Start Time	Left	Thru	Bear Right	Right	Peds	App. Total	Left	Bear Left	Thru	Right	Peds	App. Total	Hard Left	Left	Thru	Right	Peds	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	Peds	App. Total	Left	Thru	Right	Hard Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	13	95	24	17	6	149	2	1	14	18	5	35	1	16	38	2	2	57	0	0	0	0	3	0	7	12	5	2	5	26	21	267	288
07:15	22	118	22	14	10	176	7	2	16	25	4	50	0	26	24	5	6	55	0	0	0	0	6	0	6	5	8	4	7	23	33	304	337
07:30	8	132	19	17	7	176	3	0	25	15	7	43	2	38	42	2	9	84	0	0	0	0	3	0	6	17	16	1	5	40	31	343	374
07:45	15	177	25	15	11	232	15	1	26	21	4	63	3	43	48	5	4	99	0	0	0	0	10	0	8	12	9	2	19	31	48	425	473
Total	58	522	90	63	34	733	27	4	81	79	20	191	6	123	152	14	21	295	0	0	0	0	22	0	27	46	38	9	36	120	133	1339	1472
08:00	15	182	22	21	8	240	9	3	25	27	15	64	5	40	55	7	7	107	0	0	0	0	4	0	8	18	12	3	11	41	45	452	497
08:15	14	222	24	15	8	275	6	5	25	27	14	63	4	49	48	6	7	107	0	0	0	0	12	0	12	21	18	2	19	53	60	498	558
08:30	27	224	14	17	10	282	6	4	46	30	9	86	2	62	87	4	1	155	0	0	0	0	5	0	5	19	15	4	5	43	30	566	596
08:45	26	170	21	27	10	244	17	1	32	30	16	80	1	49	71	5	2	126	0	0	0	0	4	0	7	36	18	8	7	69	39	519	558
Total	82	798	81	80	36	1041	38	13	128	114	54	293	12	200	261	22	17	495	0	0	0	0	25	0	32	94	63	17	42	206	174	2035	2209
*** BREAK ***																																	
16:00	31	75	4	19	9	129	11	2	37	28	8	78	2	55	159	11	11	227	0	0	0	0	3	0	34	43	19	1	4	97	35	531	566
16:15	33	70	6	11	17	120	7	4	35	21	19	67	3	60	142	16	12	221	0	0	0	0	6	0	26	56	21	1	8	104	62	512	574
16:30	27	80	10	11	8	128	8	3	29	34	15	74	0	60	171	15	10	246	0	0	0	0	6	0	32	66	21	2	11	121	50	569	619
16:45	28	80	2	7	4	117	9	2	29	41	19	81	2	63	204	20	9	289	0	0	0	0	8	0	28	64	17	2	6	111	46	598	644
Total	119	305	22	48	38	494	35	11	130	124	61	300	7	238	676	62	42	983	0	0	0	0	23	0	120	229	78	6	29	433	193	2210	2403
17:00	37	105	4	18	6	164	7	2	27	40	18	76	1	70	216	19	7	306	0	0	0	0	10	0	32	53	24	4	15	113	56	659	715
17:15	28	92	5	15	22	140	16	5	35	32	27	88	0	68	210	31	10	309	0	0	0	0	8	0	38	76	23	3	13	140	80	677	757
17:30	51	96	1	17	12	165	13	1	56	38	24	108	2	75	218	20	14	315	0	0	0	0	12	0	33	52	15	1	16	101	78	689	767
17:45	42	101	7	11	12	161	12	0	37	45	23	94	0	57	207	15	9	279	0	0	0	0	6	0	19	69	11	0	7	99	57	633	690
Total	158	394	17	61	52	630	48	8	155	155	92	366	3	270	851	85	40	1209	0	0	0	0	36	0	122	250	73	8	51	453	271	2658	2929
Grand Total	417	2019	210	252	160	2898	148	36	494	472	227	1150	28	831	1940	183	120	2982	0	0	0	0	106	0	301	619	252	40	158	1212	771	8242	9013
Apprch %	14.4	69.7	7.2	8.7			12.9	3.1	43	41			0.9	27.9	65.1	6.1			0	0	0	0			24.8	51.1	20.8	3.3					
Total %	5.1	24.5	2.5	3.1		35.2	1.8	0.4	6	5.7		14	0.3	10.1	23.5	2.2		36.2	0	0	0	0		0	3.7	7.5	3.1	0.5		14.7	8.6	91.4	

	HARRISON ST. Southbound					BAY PL. Westbound					HARRISON ST. Northbound					24TH ST. Northeastbound					27TH ST. Eastbound					
Start Time	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	15	182	22	21	240	9	3	25	27	64	**5**	40	55	**7**	107	0	0	0	0	0	8	18	12	3	41	452
08:15	14	222	**24**	15	275	6	**5**	25	27	63	4	49	48	6	107	0	0	0	0	0	**12**	21	**18**	2	53	498
08:30	**27**	**224**	14	17	**282**	6	4	**46**	**30**	**86**	2	**62**	**87**	4	**155**	0	0	0	0	0	5	19	15	4	43	**566**
08:45	26	170	21	**27**	244	**17**	1	32	30	80	1	49	71	5	126	0	0	0	0	0	7	**36**	18	**8**	**69**	519
Total Volume	82	798	81	80	1041	38	13	128	114	293	12	200	261	22	495	0	0	0	0	0	32	94	63	17	206	2035
% App. Total	7.9	76.7	7.8	7.7		13	4.4	43.7	38.9		2.4	40.4	52.7	4.4		0	0	0	0		15.5	45.6	30.6	8.3		
PHF	.759	.891	.844	.741	.923	.559	.650	.696	.950	.852	.600	.806	.750	.786	.798	.000	.000	.000	.000	.000	.667	.653	.875	.531	.746	.899

All Traffic Data

(916) 771-8700
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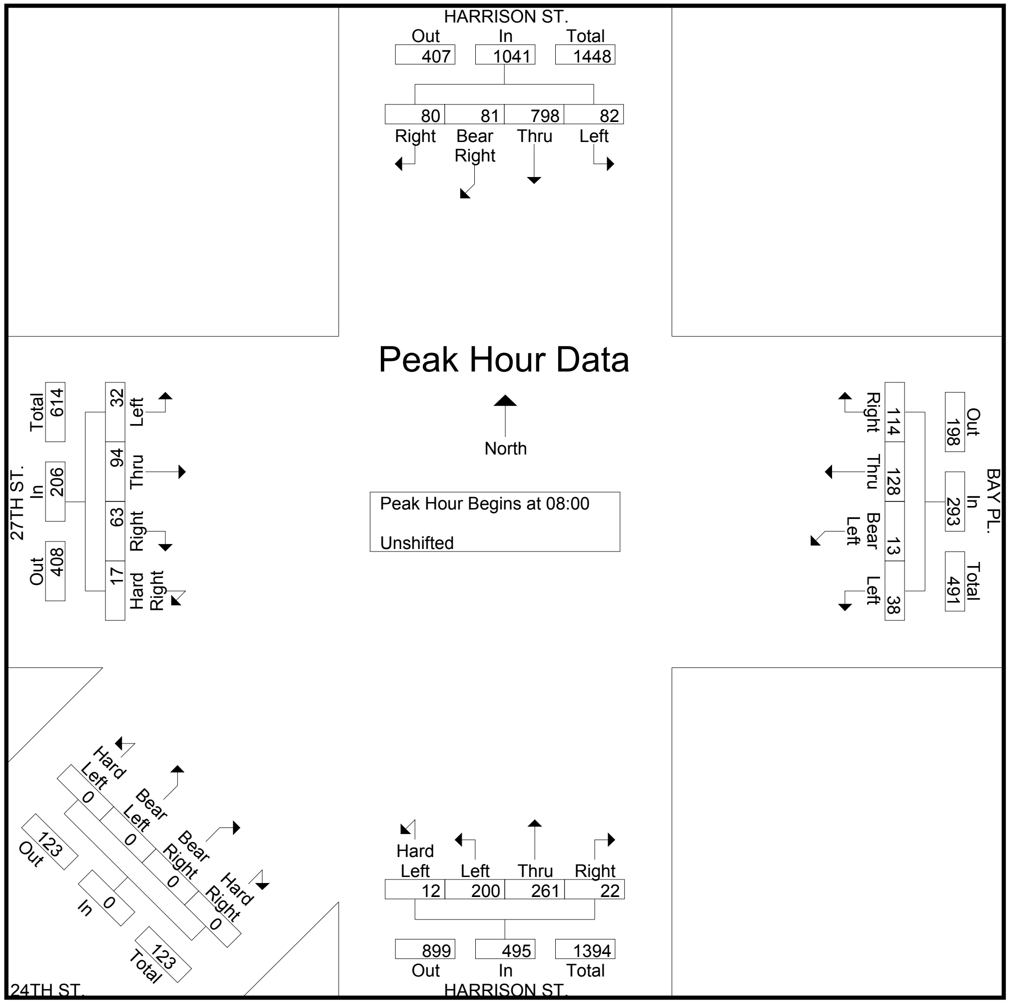
OAKLAND

File Name : 08-7458-003 HARRISON-27TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

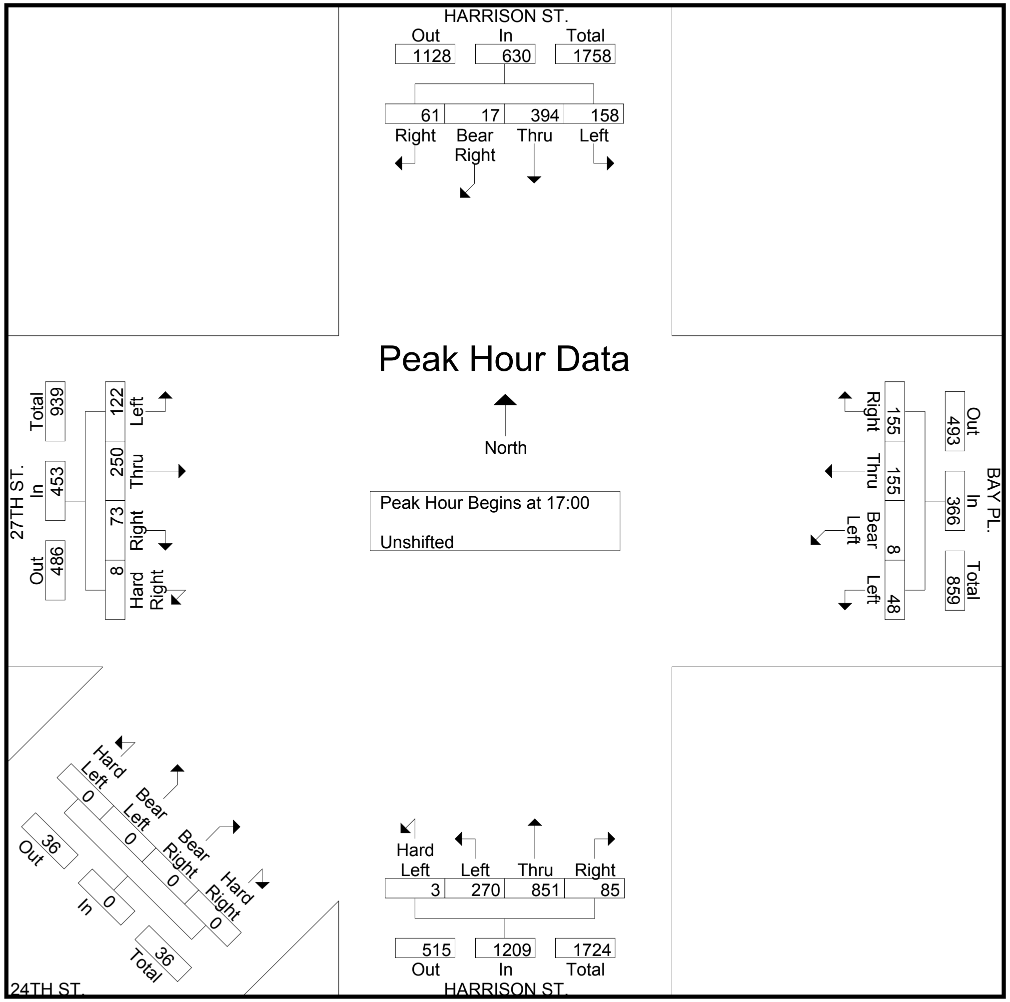
17:00	37	**105**	4	**18**	164	7	2	27	40	76	1	70	216	19	306	0	0	0	0	0	32	53	**24**	**4**	113	659
17:15	28	92	5	15	140	**16**	**5**	35	32	88	0	68	210	**31**	309	0	0	0	0	0	**38**	**76**	23	3	**140**	677
17:30	**51**	96	1	17	**165**	13	1	**56**	38	**108**	**2**	**75**	**218**	20	**315**	0	0	0	0	0	33	52	15	1	101	**689**
17:45	42	101	**7**	11	161	12	0	37	**45**	94	0	57	207	15	279	0	0	0	0	0	19	69	11	0	99	633
Total Volume	158	394	17	61	630	48	8	155	155	366	3	270	851	85	1209	0	0	0	0	0	122	250	73	8	453	2658
% App. Total	25.1	62.5	2.7	9.7		13.1	2.2	42.3	42.3		0.2	22.3	70.4	7		0	0	0	0		26.9	55.2	16.1	1.8		
PHF	.775	.938	.607	.847	.955	.750	.400	.692	.861	.847	.375	.900	.976	.685	.960	.000	.000	.000	.000	.000	.803	.822	.760	.500	.809	.964

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-003 HARRISON-27TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



COMPARISON OF COUNTS USED FOR HARRISON-27TH PM ANALYSIS (gl, 5/18/09)

		27th Street onto...				Bay Place onto....				Harrison onto...				Harrison onto...				
		Harrison	Bay	Harrison	24th	Harrison	24th	27th	Harrison	24th	27th		Bay	Bay		24th	27th	
Count Date	Results	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR	SBL	SBT	SBR	SBR2	Totals
2008/11/20	LOS E	182	365	85	17	45	14	155	177	8	286	942	86	185	397	39	65	3048
PHF		0.94	0.94	0.94	0.94	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.93	0.93	0.93	0.93	
2008/08/07	LOS C	122	250	73	8	48	8	155	155	3	270	851	85	158	394	17	61	2658

Overall, the 11/20/08 count is 15% higher than the 8/7/08 count, when school was not in session and gas was more expensive.

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

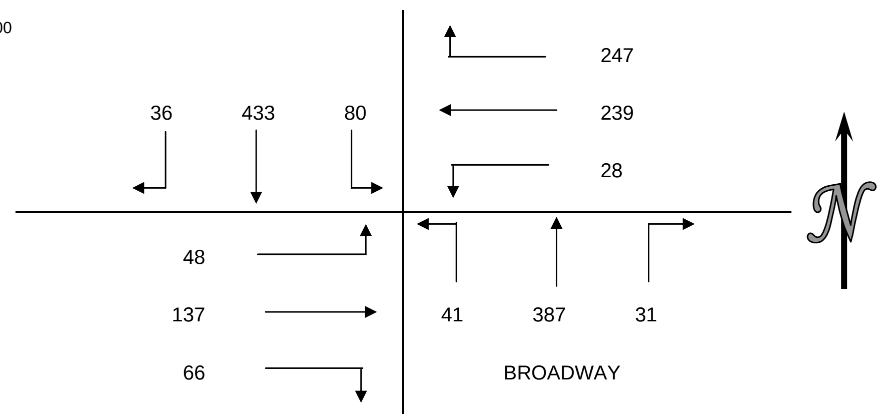
CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		TUESDAY OCTOBER 21, 2008
PERIOD"		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	BROADWAY
	E/W	27TH STREET
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	6	68	8	17	16	9	4	54	4	7	19	6	218
715-730	3	83	12	44	23	2	3	76	7	7	11	7	278
730-745	9	94	17	44	43	5	4	81	6	18	22	11	354
745-800	10	113	18	51	51	6	6	90	9	20	33	11	418
800-815	15	104	17	55	59	2	6	100	7	18	35	11	429
815-830	4	119	13	61	63	12	9	94	15	17	32	7	446
830-845	7	113	28	73	62	6	8	93	7	14	33	10	454
845-900	10	97	22	58	55	8	8	100	12	17	37	20	444
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	28	358	55	156	133	22	17	301	26	52	85	35	1268
715-815	37	394	64	194	176	15	19	347	29	63	101	40	1479
730-830	38	430	65	211	216	25	25	365	37	73	122	40	1647
745-845	36	449	76	240	235	26	29	377	38	69	133	39	1747
800-900	36	433	80	247	239	28	31	387	41	66	137	48	1773

PHF	0.6	0.909664	0.714286	0.84589	0.948413	0.583333	0.861111	0.9675	0.683333	0.916667	0.925676	0.6	

AM PEAK HOUR: 800-900



27TH STREET

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	3	2	4	3	12
715-730	0	12	5	5	22
730-745	0	6	6	8	20
745-800	0	10	8	14	32
800-815	1	13	20	7	41
815-830	0	15	7	9	31
830-845	0	14	6	18	38
845-900	1	16	6	21	44
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	3	30	23	30	86
715-815	1	41	39	34	115
730-830	1	44	41	38	124
745-845	1	52	41	48	142
800-900	2	58	39	55	154

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	1	2	2	5
715-730	0	0	0	4	4
730-745	0	3	9	3	15
745-800	0	3	10	5	18
800-815	0	3	3	5	11
815-830	1	3	6	10	20
830-845	0	5	8	4	17
845-900	0	6	6	8	20
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	0	7	21	14	42
715-815	0	9	22	17	48
730-830	1	12	28	23	64
745-845	1	14	27	24	66
800-900	1	17	23	27	68

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

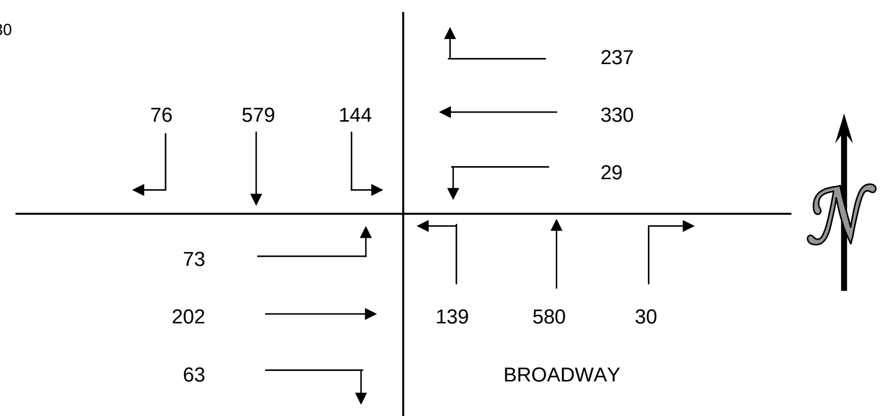
CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		TUESDAY OCTOBER 21, 2008
PERIOD"		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	BROADWAY
	E/W	27TH STREET
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	21	139	28	53	62	8	5	98	28	7	29	22	500
415-430	25	142	32	52	67	7	6	123	31	14	37	16	552
430-445	21	142	34	48	72	7	9	141	42	12	59	15	602
445-500	12	157	31	57	86	4	5	158	35	24	44	14	627
500-515	22	136	35	68	86	10	10	135	29	15	49	27	622
515-530	21	144	44	64	86	8	6	146	33	12	50	17	631
530-545	18	123	44	61	60	13	4	146	34	15	58	17	593
545-600	19	115	47	38	61	10	8	114	23	18	56	17	526
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	79	580	125	210	287	26	25	520	136	57	169	67	2281
415-515	80	577	132	225	311	28	30	557	137	65	189	72	2403
430-530	76	579	144	237	330	29	30	580	139	63	202	73	2482
445-545	73	560	154	250	318	35	25	585	131	66	201	75	2473
500-600	80	518	170	231	293	41	28	541	119	60	213	78	2372

PHF	0.863636	0.921975	0.818182	0.871324	0.959302	0.725	0.75	0.917722	0.827381	0.65625	0.855932	0.675926

AM PEAK HOUR: 430-530



27TH STREET

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	1	6	8	7	22
415-430	1	11	5	9	26
430-445	0	16	9	8	33
445-500	2	11	5	25	43
500-515	1	14	6	7	28
515-530	0	10	9	9	28
530-545	2	23	6	7	38
545-600	0	16	7	10	33
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	4	44	27	49	124
415-515	4	52	25	49	130
430-530	3	51	29	49	132
445-545	5	58	26	48	137
500-600	3	63	28	33	127

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	1	8	6	5	20
415-430	0	10	10	3	23
430-445	0	8	4	11	23
445-500	1	9	5	2	17
500-515	0	7	8	3	18
515-530	0	8	12	5	25
530-545	1	12	7	9	29
545-600	1	13	8	11	33
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	2	35	25	21	83
415-515	1	34	27	19	81
430-530	1	32	29	21	83
445-545	2	36	32	19	89
500-600	2	40	35	28	105

ALL TRAFFIC DATA, INC
(916)771-8700
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City of Oakland | Telegraph Ave & 27th Ave | Date: 05/22/2008

	Telegraph Ave Southbound				27th Ave Westbound				Telegraph Ave Northbound				27th Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	3	28	25	56	5	16	3	24	15	38	5	58	39	34	21	94	232
7:15	5	47	12	64	5	15	5	25	8	53	2	63	39	46	17	102	254
7:30	10	43	33	86	6	25	13	44	13	55	9	77	48	53	24	125	332
7:45	9	61	29	99	9	34	13	56	20	62	5	87	48	66	27	141	383
Total	27	179	99	305	25	90	34	149	56	208	21	285	174	199	89	462	1201
8:00	14	67	32	113	5	38	18	61	17	70	4	91	54	66	31	151	416
8:15	10	71	21	102	11	61	23	95	16	84	7	107	70	72	28	170	474
8:30	10	80	23	113	11	43	24	78	18	76	6	100	78	88	29	195	486
8:45	5	59	37	101	10	66	26	102	18	75	2	95	91	76	26	193	491
Total	39	277	113	429	37	208	91	336	69	305	19	393	293	302	114	709	1867
16:00	18	102	82	202	15	102	22	139	44	97	7	148	44	42	25	111	600
16:15	17	92	60	169	14	101	19	134	47	94	11	152	47	53	26	126	581
16:30	19	90	81	190	12	105	25	142	33	93	9	135	42	76	28	146	613
16:45	20	105	69	194	11	98	34	143	42	94	6	142	39	75	28	142	621
Total	74	389	292	755	52	406	100	558	166	378	33	577	172	246	107	525	2415
17:00	26	94	81	201	17	129	23	169	40	92	14	146	53	93	29	175	691
17:15	31	95	76	202	10	122	23	155	36	116	11	163	45	82	27	154	674
17:30	35	92	68	195	17	106	18	141	29	101	8	138	43	96	33	172	646
17:45	28	101	62	191	15	94	19	128	42	113	17	172	29	67	27	123	614
Total	120	382	287	789	59	451	83	593	147	422	50	619	170	338	116	624	2625
Grand Total	260	1227	791	2278	173	1155	308	1636	438	1313	123	1874	809	1085	426	2320	8108
Apprch%	####	53.9%	34.7%		10.6%	70.6%	18.8%		23.4%	70.1%	6.6%		34.9%	46.8%	18.4%		
Total %	3.2%	15.1%	9.8%	28.1%	2.1%	14.2%	3.8%	20.2%	5.4%	16.2%	1.5%	23.1%	10.0%	13.4%	5.3%	28.6%	

City of Oakland | Telegraph Ave & 27th Ave | Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Telegraph Ave Southbound				27th Ave Westbound				Telegraph Ave Northbound				27th Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	14	67	32	113	5	38	18	61	17	70	4	91	54	66	31	151	416
815	10	71	21	102	11	61	23	95	16	84	7	107	70	72	28	170	474
830	10	80	23	113	11	43	24	78	18	76	6	100	78	88	29	195	486
845	5	59	37	101	10	66	26	102	18	75	2	95	91	76	26	193	491
Total Volume	39	277	113	429	37	208	91	336	69	305	19	393	293	302	114	709	1867
% App Total.	9.1%	64.6%	26.3%		11.0%	61.9%	27.1%		17.6%	77.6%	4.8%		41.3%	42.6%	16.1%		
PHF	0.949				0.824				0.918				0.909				

PM Peak Hr Begins at 445 PM

	Telegraph Ave Southbound				27th Ave Westbound				Telegraph Ave Northbound				27th Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	20	105	69	194	11	98	34	143	42	94	6	142	39	75	28	142	621
500	26	94	81	201	17	129	23	169	40	92	14	146	53	93	29	175	691
515	31	95	76	202	10	122	23	155	36	116	11	163	45	82	27	154	674
530	35	92	68	195	17	106	18	141	29	101	8	138	43	96	33	172	646
Total Volume	112	386	294	792	55	455	98	608	147	403	39	589	180	346	117	643	2632
% App Total.	####	48.7%	37.1%		9.0%	74.8%	16.1%		25.0%	68.4%	6.6%		28.0%	53.8%	18.2%		
PHF	0.980				0.899				0.903				0.919				

ALL TRAFFIC DATA, INC

(916)771-8700
FAX 786-2879

City of Oakland | Northgate Ave (NB)/27th St & I-980 EB On-Ramp | Date: 05/22/2008

	Northgate Ave (NB)/27th St Southbound				I-980 EB On-Ramp Westbound				Northgate Ave (NB)/27th St Northbound				I-980 EB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	0	0	0	0	18	41	59	0	32	1	33	18	91	0	109	201
7:15	0	0	0	0	0	13	24	37	1	29	2	32	11	106	0	117	186
7:30	0	0	0	0	0	26	47	73	0	42	4	46	19	118	0	137	256
7:45	0	0	0	0	0	23	66	89	0	52	6	58	19	135	0	154	301
Total	0	0	0	0	0	80	178	258	1	155	13	169	67	450	0	517	944
8:00	0	0	0	0	0	25	53	78	1	54	3	58	36	145	0	181	317
8:15	0	0	0	0	0	30	60	90	2	62	5	69	37	172	0	209	368
8:30	0	0	0	0	0	35	48	83	1	49	9	59	24	187	0	211	353
8:45	0	0	0	0	0	37	83	120	0	54	4	58	35	198	0	233	411
Total	0	0	0	0	0	127	244	371	4	219	21	244	132	702	0	834	1449
16:00	0	0	0	0	0	40	202	242	7	182	9	198	73	112	0	185	625
16:15	0	0	0	0	0	53	207	260	1	178	7	186	52	121	0	173	619
16:30	0	0	0	0	0	44	192	236	3	186	14	203	53	128	0	181	620
16:45	0	0	0	0	0	59	196	255	7	171	16	194	57	127	0	184	633
Total	0	0	0	0	0	196	797	993	18	717	46	781	235	488	0	723	2497
17:00	0	0	0	0	0	62	201	263	5	156	19	180	54	156	0	210	653
17:15	0	0	0	0	0	56	188	244	3	169	14	186	47	150	0	197	627
17:30	0	0	0	0	0	37	176	213	6	130	19	155	43	151	0	194	562
17:45	0	0	0	0	0	47	153	200	2	142	22	166	46	108	0	154	520
Total	0	0	0	0	0	202	718	920	16	597	74	687	190	565	0	755	2362
Grand Total	0	0	0	0	0	605	1937	2542	39	1688	154	1881	624	2205	0	2829	7252
Apprch%	0.0%	0.0%	0.0%		0.0%	23.8%	76.2%		2.1%	89.7%	8.2%		22.1%	77.9%	0.0%		
Total %	0.0%	0.0%	0.0%	0.0%	0.0%	8.3%	26.7%	35.1%	0.5%	23.3%	2.1%	25.9%	8.6%	30.4%	0.0%	39.0%	

City of Oakland | Northgate Ave (NB)/27th St & I-980 EB On-Ramp | Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Northgate Ave (NB)/27th St Southbound				I-980 EB On-Ramp Westbound				Northgate Ave (NB)/27th St Northbound				I-980 EB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	0	0	0	0	25	53	78	1	54	3	58	36	145	0	181	317
815	0	0	0	0	0	30	60	90	2	62	5	69	37	172	0	209	368
830	0	0	0	0	0	35	48	83	1	49	9	59	24	187	0	211	353
845	0	0	0	0	0	37	83	120	0	54	4	58	35	198	0	233	411
Total Volume	0	0	0	0	0	127	244	371	4	219	21	244	132	702	0	834	1449
% App Total.	0.0%	0.0%	0.0%		0.0%	34.2%	65.8%		1.6%	89.8%	8.6%		15.8%	84.2%	0.0%		
PHF	0.000				0.773				0.884				0.895				

PM Peak Hr Begins at 430 PM

	Northgate Ave (NB)/27th St Southbound				I-980 EB On-Ramp Westbound				Northgate Ave (NB)/27th St Northbound				I-980 EB On-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
430	0	0	0	0	0	44	192	236	3	186	14	203	53	128	0	181	620
445	0	0	0	0	0	59	196	255	7	171	16	194	57	127	0	184	633
500	0	0	0	0	0	62	201	263	5	156	19	180	54	156	0	210	653
515	0	0	0	0	0	56	188	244	3	169	14	186	47	150	0	197	627
Total Volume	0	0	0	0	0	221	777	998	18	682	63	763	211	561	0	772	2533
% App Total.	0.0%	0.0%	0.0%		0.0%	22.1%	77.9%		2.4%	89.4%	8.3%		27.3%	72.7%	0.0%		
PHF	0.000				0.949				0.940				0.919				

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City of Oakland | Northgate Ave (SB)/27th St & I-980 WB Off-Ramp | Date: 05/22/2008

	Northgate Ave (SB)/27th St Southbound				I-980 WB Off-Ramp Westbound				Northgate Ave (SB)/27th St Northbound				I-980 WB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	79	140	53	272	0	10	0	10	0	0	0	0	0	26	3	29	311
7:15	86	168	62	316	2	16	0	18	0	0	0	0	0	28	3	31	365
7:30	96	168	59	323	2	24	0	26	0	0	0	0	0	43	5	48	397
7:45	105	177	63	345	4	18	0	22	0	0	0	0	0	48	7	55	422
Total	366	653	237	1256	8	68	0	76	0	0	0	0	0	145	18	163	1495
8:00	136	223	71	430	2	25	0	27	0	0	0	0	0	54	4	58	515
8:15	140	226	97	463	2	30	0	32	0	0	0	0	0	57	9	66	561
8:30	137	213	73	423	1	39	0	40	0	0	0	0	0	62	9	71	534
8:45	164	176	56	396	4	41	0	45	0	0	0	0	0	66	1	67	508
Total	577	838	297	1712	9	135	0	144	0	0	0	0	0	239	23	262	2118
16:00	79	68	50	197	6	42	0	48	0	0	0	0	0	95	7	102	347
16:15	85	54	58	197	2	49	0	51	0	0	0	0	0	91	9	100	348
16:30	83	67	44	194	5	37	0	42	0	0	0	0	0	96	4	100	336
16:45	71	77	45	193	2	56	0	58	0	0	0	0	0	99	8	107	358
Total	318	266	197	781	15	184	0	199	0	0	0	0	0	381	28	409	1389
17:00	78	59	47	184	2	61	0	63	0	0	0	0	0	111	6	117	364
17:15	93	57	31	181	2	55	0	57	0	0	0	0	0	109	10	119	357
17:30	98	49	49	196	4	37	0	41	0	0	0	0	0	104	9	113	350
17:45	84	52	36	172	2	47	0	49	0	0	0	0	0	90	11	101	322
Total	353	217	163	733	10	200	0	210	0	0	0	0	0	414	36	450	1393
Grand Total	1614	1974	894	4482	42	587	0	629	0	0	0	0	0	1179	105	1284	6395
Apprch%	####	44.0%	19.9%		6.7%	93.3%	0.0%		0.0%	0.0%	0.0%		0.0%	91.8%	8.2%		
Total %	####	30.9%	14.0%	70.1%	0.7%	9.2%	0.0%	9.8%	0.0%	0.0%	0.0%	0.0%	0.0%	18.4%	1.6%	20.1%	

City of Oakland | Northgate Ave (SB)/27th St & I-980 WB Off-Ramp | Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Northgate Ave (SB)/27th St Southbound				I-980 WB Off-Ramp Westbound				Northgate Ave (SB)/27th St Northbound				I-980 WB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	136	223	71	430	2	25	0	27	0	0	0	0	0	54	4	58	515
815	140	226	97	463	2	30	0	32	0	0	0	0	0	57	9	66	561
830	137	213	73	423	1	39	0	40	0	0	0	0	0	62	9	71	534
845	164	176	56	396	4	41	0	45	0	0	0	0	0	66	1	67	508
Total Volume	577	838	297	1712	9	135	0	144	0	0	0	0	0	239	23	262	2118
% App Total.	####	48.9%	17.3%		6.3%	93.8%	0.0%		0.0%	0.0%	0.0%		0.0%	91.2%	8.8%		
PHF	0.924				0.800				0.000				0.923				

PM Peak Hr Begins at 445 PM

	Northgate Ave (SB)/27th St Southbound				I-980 WB Off-Ramp Westbound				Northgate Ave (SB)/27th St Northbound				I-980 WB Off-Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	71	77	45	193	2	56	0	58	0	0	0	0	0	99	8	107	358
500	78	59	47	184	2	61	0	63	0	0	0	0	0	111	6	117	364
515	93	57	31	181	2	55	0	57	0	0	0	0	0	109	10	119	357
530	98	49	49	196	4	37	0	41	0	0	0	0	0	104	9	113	350
Total Volume	340	242	172	754	10	209	0	219	0	0	0	0	0	423	33	456	1429
% App Total.	####	32.1%	22.8%		4.6%	95.4%	0.0%		0.0%	0.0%	0.0%		0.0%	92.8%	7.2%		
PHF	0.962				0.869				0.000				0.958				

WILTEC

Phone: (626) 564-1944   Fax: (626) 564-0969

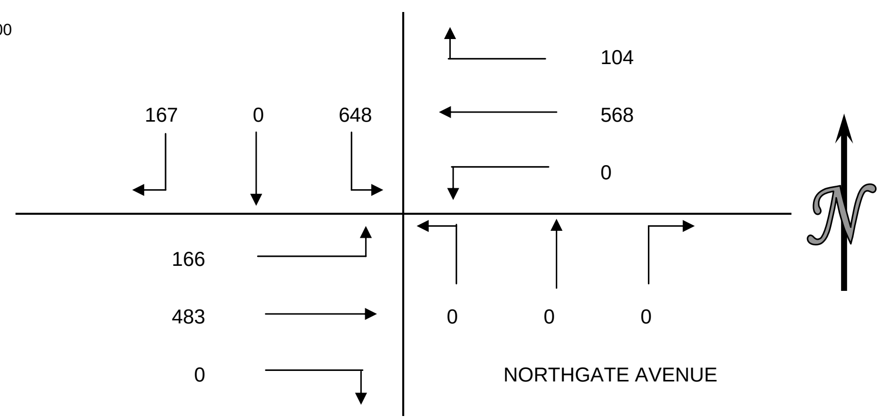
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		TUESDAY OCTOBER 21, 2008
PERIOD"		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	NORTHGATE AVENUE
	E/W	GRAND AVENUE
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	35	0	77	10	84	0	0	0	0	0	59	19	284
715-730	42	0	106	11	77	0	0	0	0	0	53	33	322
730-745	50	0	119	20	117	0	0	0	0	0	68	28	402
745-800	51	0	133	25	110	0	0	0	0	0	121	34	474
800-815	50	0	144	27	131	0	0	0	0	0	110	54	516
815-830	39	0	151	26	154	0	0	0	0	0	130	47	547
830-845	44	0	191	31	160	0	0	0	0	0	108	26	560
845-900	34	0	162	20	123	0	0	0	0	0	135	39	513
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	178	0	435	66	388	0	0	0	0	0	301	114	1482
715-815	193	0	502	83	435	0	0	0	0	0	352	149	1714
730-830	190	0	547	98	512	0	0	0	0	0	429	163	1939
745-845	184	0	619	109	555	0	0	0	0	0	469	161	2097
800-900	167	0	648	104	568	0	0	0	0	0	483	166	2136
PHF	0.835		0.848168	0.83871	0.8875						0.894444	0.768519	

AM PEAK HOUR: 800-900



GRAND AVENUE

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	3	1	0	1	5
715-730	4	0	0	1	5
730-745	5	2	0	5	12
745-800	2	1	0	10	13
800-815	6	0	0	7	13
815-830	7	1	0	7	15
830-845	12	1	0	2	15
845-900	7	2	0	2	11
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	14	4	0	17	35
715-815	17	3	0	23	43
730-830	20	4	0	29	53
745-845	27	3	0	26	56
800-900	32	4	0	18	54

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	1	0	0	0	1
715-730	0	1	0	3	4
730-745	3	0	0	3	6
745-800	1	0	0	2	3
800-815	2	0	0	0	2
815-830	2	0	0	9	11
830-845	4	1	0	5	10
845-900	7	1	0	4	12
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	5	1	0	8	14
715-815	6	1	0	8	15
730-830	8	0	0	14	22
745-845	9	1	0	16	26
800-900	15	2	0	18	35

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City of Oakland — Northgate Ave & West Grand Ave — Date: 05/22/2008

	Northgate Ave Southbound				West Grand Ave Westbound				Northgate Ave Northbound				West Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	92	0	42	134	0	51	13	64	0	0	0	0	17	57	0	74	272
7:15	97	0	52	149	0	99	13	112	0	0	1	1	17	61	0	78	340
7:30	114	0	42	156	0	80	21	101	1	0	1	2	20	66	0	86	345
7:45	122	0	38	160	0	129	23	152	0	0	1	1	21	81	0	102	415
Total	425	0	174	599	0	359	70	429	1	0	3	4	75	265	0	340	1372
8:00	156	0	40	196	0	105	22	127	0	0	0	0	30	81	0	111	434
8:15	179	0	47	226	0	139	30	169	0	0	1	1	32	94	0	126	522
8:30	165	0	42	207	0	133	16	149	0	0	0	0	25	117	0	142	498
8:45	147	0	39	186	0	119	16	135	1	0	0	1	33	108	0	141	463
Total	647	0	168	815	0	496	84	580	1	0	1	2	120	400	0	520	1917
16:00	44	0	18	62	2	110	69	181	0	0	2	2	51	93	0	144	389
16:15	32	0	21	53	0	127	86	213	0	0	0	0	57	95	0	152	418
16:30	44	0	21	65	0	124	91	215	0	1	0	1	79	115	0	194	475
16:45	55	0	26	81	0	122	91	213	0	0	1	1	54	117	0	171	466
Total	175	0	86	261	2	483	337	822	0	1	3	4	241	420	0	661	1748
17:00	27	1	18	46	0	136	90	226	0	0	0	0	57	123	0	180	452
17:15	32	0	24	56	0	146	94	240	0	0	0	0	44	130	1	175	471
17:30	27	0	19	46	0	138	97	235	0	0	0	0	41	132	0	173	454
17:45	31	0	23	54	0	135	58	193	0	0	0	0	46	121	0	167	414
Total	117	1	84	202	0	555	339	894	0	0	0	0	188	506	1	695	1791
Grand Total	1364	1	512	1877	2	1893	830	2725	2	1	7	10	624	1591	1	2216	6828
Apprch%	####	0.1%	27.3%		0.1%	69.5%	30.5%		20.0%	10.0%	70.0%		28.2%	71.8%	0.0%		
Total %	####	0.0%	7.5%	27.5%	0.0%	27.7%	12.2%	39.9%	0.0%	0.0%	0.1%	0.1%	9.1%	23.3%	0.0%	32.5%	

City of Oakland — Northgate Ave & West Grand Ave — Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Northgate Ave Southbound				West Grand Ave Westbound				Northgate Ave Northbound				West Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	156	0	40	196	0	105	22	127	0	0	0	0	30	81	0	111	434
815	179	0	47	226	0	139	30	169	0	0	1	1	32	94	0	126	522
830	165	0	42	207	0	133	16	149	0	0	0	0	25	117	0	142	498
845	147	0	39	186	0	119	16	135	1	0	0	1	33	108	0	141	463
Total Volume	647	0	168	815	0	496	84	580	1	0	1	2	120	400	0	520	1917
% App Total.	####	0.0%	20.6%		0.0%	85.5%	14.5%		50.0%	0.0%	50.0%		23.1%	76.9%	0.0%		
PHF	0.902				0.858				0.500				0.915				

PM Peak Hr Begins at 430 PM

	Northgate Ave Southbound				West Grand Ave Westbound				Northgate Ave Northbound				West Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
430	44	0	21	65	0	124	91	215	0	1	0	1	79	115	0	194	475
445	55	0	26	81	0	122	91	213	0	0	1	1	54	117	0	171	466
500	27	1	18	46	0	136	90	226	0	0	0	0	57	123	0	180	452
515	32	0	24	56	0	146	94	240	0	0	0	0	44	130	1	175	471
Total Volume	158	1	89	248	0	528	366	894	0	1	1	2	234	485	1	720	1864
% App Total.	####	0.4%	35.9%		0.0%	59.1%	40.9%		0.0%	50.0%	50.0%		32.5%	67.4%	0.1%		
PHF	0.765				0.931				0.500				0.928				

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City of Oakland — Telegraph Ave & West Grand Ave — Date: 05/22/2008

	Telegraph Ave Southbound				West Grand Ave Westbound				Telegraph Ave Northbound				West Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	8	33	9	50	3	38	7	48	12	29	3	44	16	74	37	127	269
7:15	9	47	10	66	8	78	14	100	36	41	4	81	17	99	42	158	405
7:30	9	53	10	72	7	63	9	79	31	49	9	89	24	121	45	190	430
7:45	9	66	17	92	11	86	18	115	54	53	7	114	23	118	69	210	531
Total	35	199	46	280	29	265	48	342	133	172	23	328	80	412	193	685	1635
8:00	21	74	21	116	13	81	10	104	37	57	4	98	13	169	80	262	580
8:15	18	82	12	112	13	107	18	138	52	52	6	110	30	171	64	265	625
8:30	17	68	14	99	15	81	8	104	37	51	6	94	27	172	89	288	585
8:45	17	76	18	111	17	87	19	123	44	57	10	111	22	147	70	239	584
Total	73	300	65	438	58	356	55	469	170	217	26	413	92	659	303	1054	2374
16:00	32	69	29	130	2	141	20	163	21	101	4	126	10	97	4	111	530
16:15	15	79	22	116	5	164	21	190	13	94	7	114	8	129	2	139	559
16:30	25	73	18	116	4	162	19	185	19	104	11	134	9	148	6	163	598
16:45	27	95	22	144	4	174	17	195	18	118	8	144	4	136	3	143	626
Total	99	316	91	506	15	641	77	733	71	417	30	518	31	510	15	556	2313
17:00	28	92	16	136	7	189	28	224	22	112	2	136	9	181	8	198	694
17:15	33	87	20	140	1	164	29	194	23	140	7	170	7	117	5	129	633
17:30	27	87	31	145	4	166	25	195	17	107	11	135	3	145	11	159	634
17:45	20	66	28	114	5	172	29	206	18	119	3	140	12	126	11	149	609
Total	108	332	95	535	17	691	111	819	80	478	23	581	31	569	35	635	2570
Grand Total	315	1147	297	1759	119	1953	291	2363	454	1284	102	1840	234	2150	546	2930	8892
Apprch%	####	65.2%	16.9%		5.0%	82.6%	12.3%		24.7%	69.8%	5.5%		8.0%	73.4%	18.6%		
Total %	3.5%	12.9%	3.3%	19.8%	1.3%	22.0%	3.3%	26.6%	5.1%	14.4%	1.1%	20.7%	2.6%	24.2%	6.1%	33.0%	

City of Oakland — Telegraph Ave & West Grand Ave — Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Telegraph Ave Southbound				West Grand Ave Westbound				Telegraph Ave Northbound				West Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	21	74	21	116	13	81	10	104	37	57	4	98	13	169	80	262	580
815	18	82	12	112	13	107	18	138	52	52	6	110	30	171	64	265	625
830	17	68	14	99	15	81	8	104	37	51	6	94	27	172	89	288	585
845	17	76	18	111	17	87	19	123	44	57	10	111	22	147	70	239	584
Total Volume	73	300	65	438	58	356	55	469	170	217	26	413	92	659	303	1054	2374
% App Total.	####	68.5%	14.8%		12.4%	75.9%	11.7%		41.2%	52.5%	6.3%		8.7%	62.5%	28.7%		
PHF	0.944				0.850				0.930				0.915				

PM Peak Hr Begins at 445 PM

	Telegraph Ave Southbound				West Grand Ave Westbound				Telegraph Ave Northbound				West Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	27	95	22	144	4	174	17	195	18	118	8	144	4	136	3	143	626
500	28	92	16	136	7	189	28	224	22	112	2	136	9	181	8	198	694
515	33	87	20	140	1	164	29	194	23	140	7	170	7	117	5	129	633
530	27	87	31	145	4	166	25	195	17	107	11	135	3	145	11	159	634
Total Volume	115	361	89	565	16	693	99	808	80	477	28	585	23	579	27	629	2587
% App Total.	####	63.9%	15.8%		2.0%	85.8%	12.3%		13.7%	81.5%	4.8%		3.7%	92.1%	4.3%		
PHF	0.974				0.902				0.860				0.794				

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

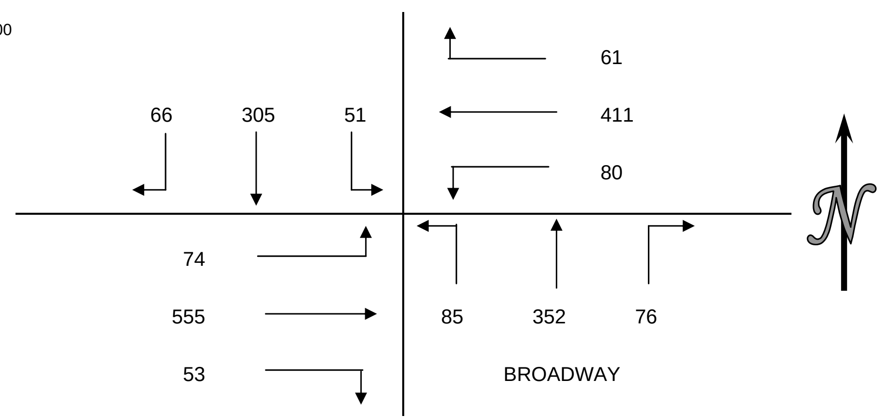
CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		TUESDAY OCTOBER 21, 2008
PERIOD"		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	BROADWAY
	E/W	GRAND AVENUE
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	11	21	7	4	81	11	10	49	20	5	72	11	302
715-730	12	33	5	7	89	13	17	58	13	7	69	11	334
730-745	14	41	6	9	97	15	14	73	17	18	94	13	411
745-800	12	55	8	6	97	24	12	97	24	15	109	20	479
800-815	17	72	23	17	100	24	10	93	23	9	140	12	540
815-830	20	74	10	13	114	21	17	83	14	17	151	26	560
830-845	13	87	9	14	102	21	20	96	14	9	133	16	534
845-900	16	72	9	17	95	14	29	80	34	18	131	20	535
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	49	150	26	26	364	63	53	277	74	45	344	55	1526
715-815	55	201	42	39	383	76	53	321	77	49	412	56	1764
730-830	63	242	47	45	408	84	53	346	78	59	494	71	1990
745-845	62	288	50	50	413	90	59	369	75	50	533	74	2113
800-900	66	305	51	61	411	80	76	352	85	53	555	74	2169

AM PEAK HOUR: 800-900

GRAND AVENUE



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	5	6	6	8	25
715-730	5	14	8	20	47
730-745	9	19	19	16	63
745-800	7	13	11	14	45
800-815	16	14	9	7	46
815-830	12	14	10	20	56
830-845	8	10	13	15	46
845-900	10	27	15	15	67
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	26	52	44	58	180
715-815	37	60	47	57	201
730-830	44	60	49	57	210
745-845	43	51	43	56	193
800-900	46	65	47	57	215

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	1	0	1	1	3
715-730	0	2	2	1	5
730-745	1	0	0	3	4
745-800	4	3	2	5	14
800-815	8	4	1	6	19
815-830	5	6	2	6	19
830-845	4	4	2	4	14
845-900	4	1	4	6	15
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	6	5	5	10	26
715-815	13	9	5	15	42
730-830	18	13	5	20	56
745-845	21	17	7	21	66
800-900	21	15	9	22	67

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

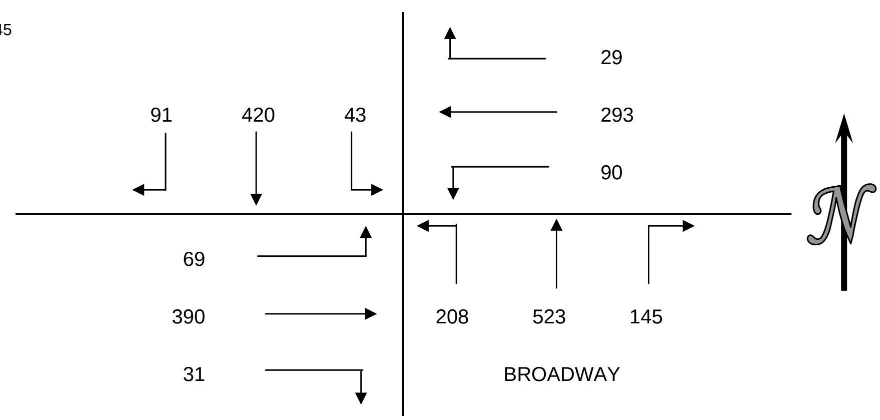
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		TUESDAY OCTOBER 21, 2008
PERIOD"		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	BROADWAY
	E/W	GRAND AVENUE
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	22	94	9	16	50	19	15	138	50	7	90	29	539
415-430	21	94	5	8	71	11	27	125	65	13	81	20	541
430-445	19	83	7	6	60	23	34	135	54	8	97	15	541
445-500	19	97	8	3	71	19	46	137	50	7	91	11	559
500-515	21	98	8	14	69	16	31	120	60	12	107	17	573
515-530	24	108	19	4	81	19	33	135	53	7	93	17	593
530-545	27	117	8	8	72	36	35	131	45	5	99	24	607
545-600	21	100	11	5	65	11	14	124	43	6	96	20	516
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	81	368	29	33	252	72	122	535	219	35	359	75	2180
415-515	80	372	28	31	271	69	138	517	229	40	376	63	2214
430-530	83	386	42	27	281	77	144	527	217	34	388	60	2266
445-545	91	420	43	29	293	90	145	523	208	31	390	69	2332
500-600	93	423	46	31	287	82	113	510	201	30	395	78	2289

AM PEAK HOUR: 445-545



GRAND AVENUE

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	7	28	17	6	58
415-430	9	26	12	12	59
430-445	5	40	18	6	69
445-500	8	44	22	9	83
500-515	7	37	37	7	88
515-530	5	15	6	5	31
530-545	7	45	16	14	82
545-600	4	11	9	6	30
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	29	138	69	33	269
415-515	29	147	89	34	299
430-530	25	136	83	27	271
445-545	27	141	81	35	284
500-600	23	108	68	32	231

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	4	5	3	4	16
415-430	5	6	3	7	21
430-445	4	9	3	5	21
445-500	4	10	2	4	20
500-515	4	8	5	6	23
515-530	4	16	5	3	28
530-545	3	18	9	4	34
545-600	3	31	6	4	44
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	17	30	11	20	78
415-515	17	33	13	22	85
430-530	16	43	15	18	92
445-545	15	52	21	17	105
500-600	14	73	25	17	129

All Traffic Data
(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-004 WEBSTER-GRAND-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

	WEB Southbound					GRAND DS Westbound					WEB Northbound					GRAND DS Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	4	11	2	6	17	10	29	2	7	41	0	0	0	4	0	1	21	23	6	45	23	103	126
07:15	3	10	2	10	15	10	37	0	10	47	0	0	0	1	0	0	27	24	7	51	28	113	141
07:30	8	13	4	14	25	21	76	0	6	97	0	0	0	4	0	2	58	39	14	99	38	221	259
07:45	2	30	5	43	37	20	81	1	20	102	0	0	0	5	0	0	64	69	23	133	91	272	363
Total	17	64	13	73	94	61	223	3	43	287	0	0	0	14	0	3	170	155	50	328	180	709	889
08:00	2	31	2	44	35	23	92	0	12	115	0	0	0	6	0	0	84	68	4	152	66	302	368
08:15	1	35	2	52	38	23	103	0	27	126	0	0	0	15	0	0	75	72	24	147	118	311	429
08:30	4	31	5	54	40	30	94	0	8	124	0	0	0	8	0	0	88	65	14	153	84	317	401
08:45	1	30	6	52	37	25	84	0	9	109	0	0	0	13	0	0	81	60	10	141	84	287	371
Total	8	127	15	202	150	101	373	0	56	474	0	0	0	42	0	0	328	265	52	593	352	1217	1569
*** BREAK ***																							
16:00	6	45	9	7	60	28	49	0	3	77	0	0	0	11	0	0	96	47	33	143	54	280	334
16:15	10	37	7	12	54	25	69	0	8	94	0	0	0	30	0	1	111	41	43	153	93	301	394
16:30	5	55	12	11	72	25	68	0	3	93	0	0	0	25	0	0	107	33	39	140	78	305	383
16:45	9	42	6	8	57	32	68	1	2	101	0	0	0	16	0	1	125	53	28	179	54	337	391
Total	30	179	34	38	243	110	254	1	16	365	0	0	0	82	0	2	439	174	143	615	279	1223	1502
17:00	12	44	18	6	74	25	70	0	6	95	0	0	0	24	0	3	144	47	71	194	107	363	470
17:15	21	49	20	3	90	23	91	2	4	116	0	0	0	10	0	1	142	41	44	184	61	390	451
17:30	18	51	5	4	74	27	88	0	3	115	0	0	0	16	0	1	142	35	45	178	68	367	435
17:45	11	48	12	9	71	25	70	0	2	95	0	0	0	23	0	0	142	40	53	182	87	348	435
Total	62	192	55	22	309	100	319	2	15	421	0	0	0	73	0	5	570	163	213	738	323	1468	1791
Grand Total	117	562	117	335	796	372	1169	6	130	1547	0	0	0	211	0	10	1507	757	458	2274	1134	4617	5751
Apprch %	14.7	70.6	14.7			24	75.6	0.4			0	0	0			0.4	66.3	33.3					
Total %	2.5	12.2	2.5		17.2	8.1	25.3	0.1		33.5	0	0	0		0	0.2	32.6	16.4		49.3	19.7	80.3	

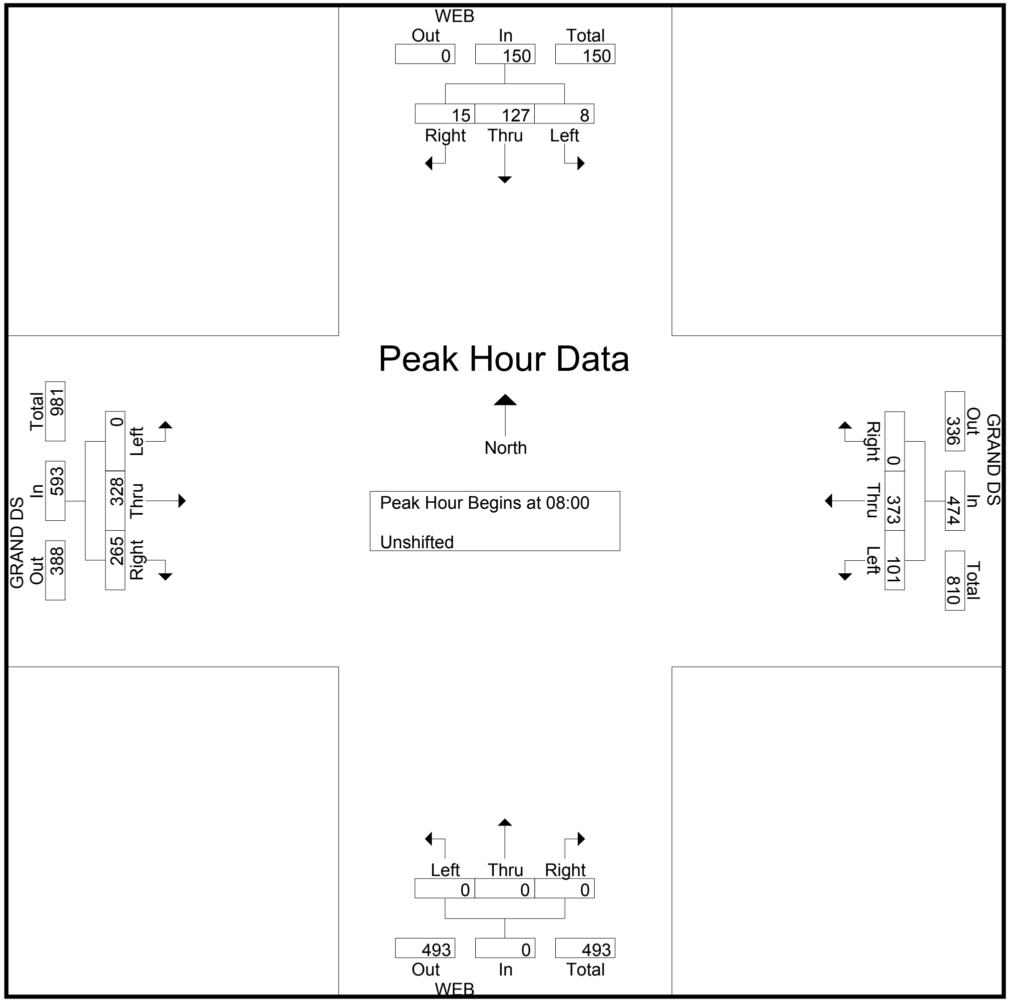
	WEB Southbound				GRAND DS Westbound				WEB Northbound				GRAND DS Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	2	31	2	35	23	92	0	115	0	0	0	0	0	84	68	152	302
08:15	1	**35**	2	38	23	**103**	0	**126**	0	0	0	0	0	75	**72**	147	311
08:30	**4**	31	5	**40**	**30**	94	0	124	0	0	0	0	0	**88**	65	**153**	**317**
08:45	1	30	**6**	37	25	84	0	109	0	0	0	0	0	81	60	141	287
Total Volume	8	127	15	150	101	373	0	474	0	0	0	0	0	328	265	593	1217
% App. Total	5.3	84.7	10		21.3	78.7	0		0	0	0		0	55.3	44.7		
PHF	.500	.907	.625	.938	.842	.905	.000	.940	.000	.000	.000	.000	.000	.932	.920	.969	.960

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-004 WEBSTER-GRAND-F
Site Code : 00000000
Start Date : 08/06/2008



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

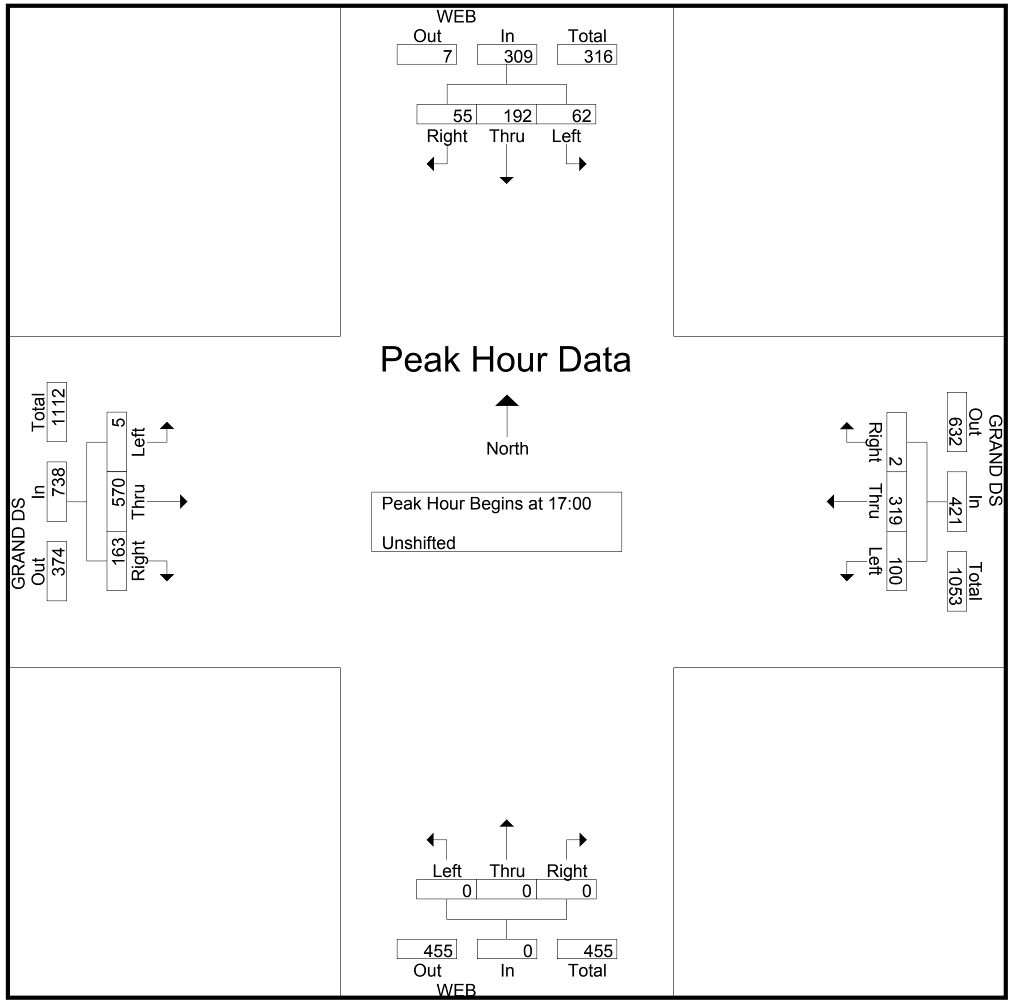
17:00	12	44	18	74	25	70	0	95	0	0	0	0	**3**	**144**	**47**	**194**	363
17:15	**21**	49	**20**	**90**	23	**91**	**2**	**116**	0	0	0	0	1	142	41	184	**390**
17:30	18	**51**	5	74	**27**	88	0	115	0	0	0	0	1	142	35	178	367
17:45	11	48	12	71	25	70	0	95	0	0	0	0	0	142	40	182	348
Total Volume	62	192	55	309	100	319	2	421	0	0	0	0	5	570	163	738	1468
% App. Total	20.1	62.1	17.8		23.8	75.8	0.5		0	0	0		0.7	77.2	22.1		
PHF	.738	.941	.688	.858	.926	.876	.250	.907	.000	.000	.000	.000	.417	.990	.867	.951	.941

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-004 WEBSTER-GRAND-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



ALL TRAFFIC DATA, INC
(916)771-8700
FAX 786-2879

City of Oakland — Harrison St & Grand Ave — Date: 5/22/2008

	Harrison St Southbound				Grand Ave Westbound				Harrison St Northbound				Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	1	82	10	93	37	50	8	95	8	74	40	122	5	26	6	37	347
7:15	1	107	17	125	47	63	2	112	15	83	35	133	2	22	11	35	405
7:30	1	126	25	152	61	95	4	160	26	124	43	193	10	29	11	50	555
7:45	0	157	19	176	81	96	7	184	22	133	58	213	9	31	25	65	638
Total	3	472	71	546	226	304	21	551	71	414	176	661	26	108	53	187	1945
8:00	7	146	12	165	81	105	24	210	25	142	73	240	16	39	15	70	685
8:15	7	138	24	169	97	145	49	291	25	180	70	275	18	29	13	60	795
8:30	14	142	21	177	86	119	21	226	31	175	89	295	10	27	12	49	747
8:45	11	130	18	159	76	84	16	176	28	165	58	251	7	19	10	36	622
Total	39	556	75	670	340	453	110	903	109	662	290	1061	51	114	50	215	2849
16:00	1	75	18	94	56	65	9	130	2	238	95	335	22	80	25	127	686
16:15	1	88	14	103	64	70	13	147	2	217	146	365	32	80	30	142	757
16:30	0	129	9	138	54	62	11	127	2	236	169	407	16	109	36	161	833
16:45	0	120	4	124	68	60	12	140	2	224	193	419	21	122	33	176	859
Total	2	412	45	459	242	257	45	544	8	915	603	1526	91	391	124	606	3135
17:00	1	132	10	143	71	65	11	147	3	290	196	489	30	135	27	192	971
17:15	0	126	25	151	71	64	8	143	4	274	206	484	45	147	22	214	992
17:30	1	126	11	138	69	70	5	144	0	280	112	392	18	134	28	180	854
17:45	1	124	16	141	68	69	9	146	2	258	119	379	23	139	25	187	853
Total	3	508	62	573	279	268	33	580	9	1102	633	1744	116	555	102	773	3670
Grand Total	47	1948	253	2248	1087	1282	209	2578	197	3093	1702	4992	284	1168	329	1781	11599
Apprch%	2.1%	86.7%	11.3%		42.2%	49.7%	8.1%		3.9%	62.0%	34.1%		15.9%	65.6%	18.5%		
Total %	0.4%	16.8%	2.2%	19.4%	9.4%	11.1%	1.8%	22.2%	1.7%	26.7%	14.7%	43.0%	2.4%	10.1%	2.8%	15.4%	

City of Oakland — Harrison St & Grand Ave — Date: 5/22/2008

AM Peak Hr Begins at 745 AM

	Harrison St Southbound				Grand Ave Westbound				Harrison St Northbound				Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
745	0	157	19	176	81	96	7	184	22	133	58	213	9	31	25	65	638
800	7	146	12	165	81	105	24	210	25	142	73	240	16	39	15	70	685
815	7	138	24	169	97	145	49	291	25	180	70	275	18	29	13	60	795
830	14	142	21	177	86	119	21	226	31	175	89	295	10	27	12	49	747
Total Volume	28	583	76	687	345	465	101	911	103	630	290	1023	53	126	65	244	2865
% App Total.	4.1%	84.9%	11.1%		37.9%	51.0%	11.1%		10.1%	61.6%	28.3%		21.7%	51.6%	26.6%		
PHF	0.970				0.783				0.867				0.871				

PM Peak Hr Begins at 445 PM

	Harrison St Southbound				Grand Ave Westbound				Harrison St Northbound				Grand Ave Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	0	120	4	124	68	60	12	140	2	224	193	419	21	122	33	176	859
500	1	132	10	143	71	65	11	147	3	290	196	489	30	135	27	192	971
515	0	126	25	151	71	64	8	143	4	274	206	484	45	147	22	214	992
530	1	126	11	138	69	70	5	144	0	280	112	392	18	134	28	180	854
Total Volume	2	504	50	556	279	259	36	574	9	1068	707	1784	114	538	110	762	3676
% App Total.	0.4%	90.6%	9.0%		48.6%	45.1%	6.3%		0.5%	59.9%	39.6%		15.0%	70.6%	14.4%		
PHF	0.921				0.976				0.912				0.890				

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-011 HARRISON-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

	HARRISON ST. Southbound					Westbound					HARRISON ST. Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	116	20	0	136	0	0	0	0	0	15	84	0	39	99	13	0	3	8	16	47	251	298
07:15	0	130	39	0	169	0	0	0	0	0	19	99	0	30	118	7	0	4	10	11	40	298	338
07:30	0	176	51	0	227	0	0	0	0	0	20	140	0	38	160	11	0	3	17	14	55	401	456
07:45	0	209	53	0	262	0	0	0	0	0	21	168	0	41	189	13	0	4	24	17	65	468	533
Total	0	631	163	0	794	0	0	0	0	0	75	491	0	148	566	44	0	14	59	58	207	1418	1625
08:00	0	216	60	0	276	0	0	0	0	0	17	196	0	60	213	13	0	9	12	22	72	511	583
08:15	0	238	62	0	300	0	0	0	0	0	21	193	0	43	214	10	0	6	19	16	62	530	592
08:30	0	250	73	0	323	0	0	0	0	0	21	210	0	59	231	15	0	8	23	23	82	577	659
08:45	0	221	71	0	292	0	0	0	0	0	25	206	0	56	231	12	0	9	18	21	74	544	618
Total	0	925	266	0	1191	0	0	0	0	0	84	805	0	218	889	50	0	32	72	82	290	2162	2452
*** BREAK ***																							
16:00	0	160	14	0	174	0	0	0	0	0	21	247	0	22	268	48	0	18	18	66	40	508	548
16:15	0	187	17	0	204	0	0	0	0	0	22	286	0	36	308	58	0	17	23	75	59	587	646
16:30	0	170	21	0	191	0	0	0	0	0	23	325	0	46	348	62	0	14	25	76	71	615	686
16:45	0	197	19	0	216	0	0	0	0	0	20	328	0	45	348	66	0	17	16	83	61	647	708
Total	0	714	71	0	785	0	0	0	0	0	86	1186	0	149	1272	234	0	66	82	300	231	2357	2588
17:00	0	212	17	0	229	0	0	0	0	0	19	324	0	37	343	72	0	21	15	93	52	665	717
17:15	0	182	18	0	200	0	0	0	0	0	11	281	0	40	292	65	0	19	18	84	58	576	634
17:30	0	179	14	0	193	0	0	0	0	0	14	283	0	55	297	70	0	15	12	85	67	575	642
17:45	0	200	23	0	223	0	0	0	0	0	13	322	0	79	335	76	0	19	15	95	94	653	747
Total	0	773	72	0	845	0	0	0	0	0	57	1210	0	211	1267	283	0	74	60	357	271	2469	2740
Grand Total	0	3043	572	0	3615	0	0	0	0	0	302	3692	0	726	3994	611	0	186	273	797	999	8406	9405
Apprch %	0	84.2	15.8			0	0	0			7.6	92.4	0			76.7	0	23.3					
Total %	0	36.2	6.8		43	0	0	0		0	3.6	43.9	0		47.5	7.3	0	2.2		9.5	10.6	89.4	

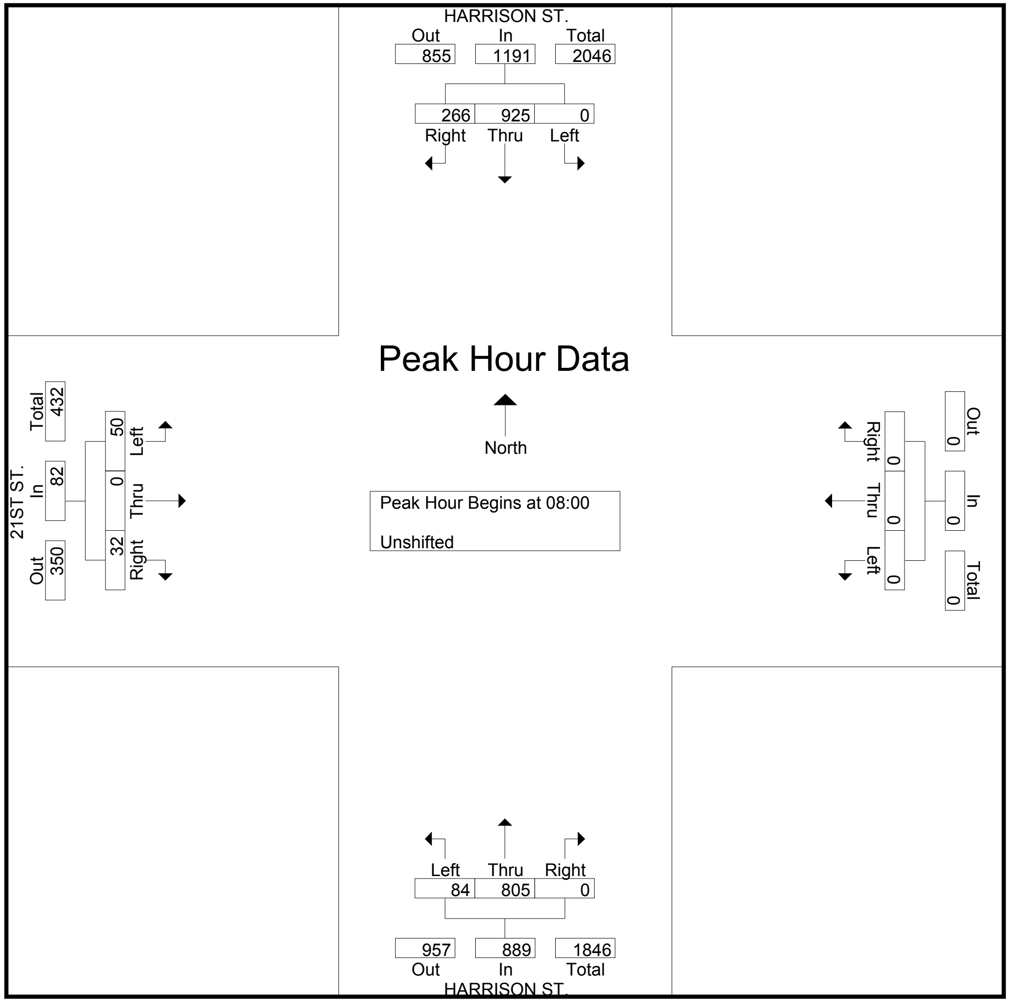
	HARRISON ST. Southbound				Westbound				HARRISON ST. Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	216	60	276	0	0	0	0	17	196	0	213	13	0	**9**	22	511
08:15	0	238	62	300	0	0	0	0	21	193	0	214	10	0	6	16	530
08:30	0	**250**	**73**	**323**	0	0	0	0	21	**210**	0	**231**	**15**	0	8	**23**	**577**
08:45	0	221	71	292	0	0	0	0	**25**	206	0	231	12	0	9	21	544
Total Volume	0	925	266	1191	0	0	0	0	84	805	0	889	50	0	32	82	2162
% App. Total	0	77.7	22.3		0	0	0		9.4	90.6	0		61	0	39		
PHF	.000	.925	.911	.922	.000	.000	.000	.000	.840	.958	.000	.962	.833	.000	.889	.891	.937

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-011 HARRISON-21ST-F
Site Code : 00000000
Start Date : 08/07/2008



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:15

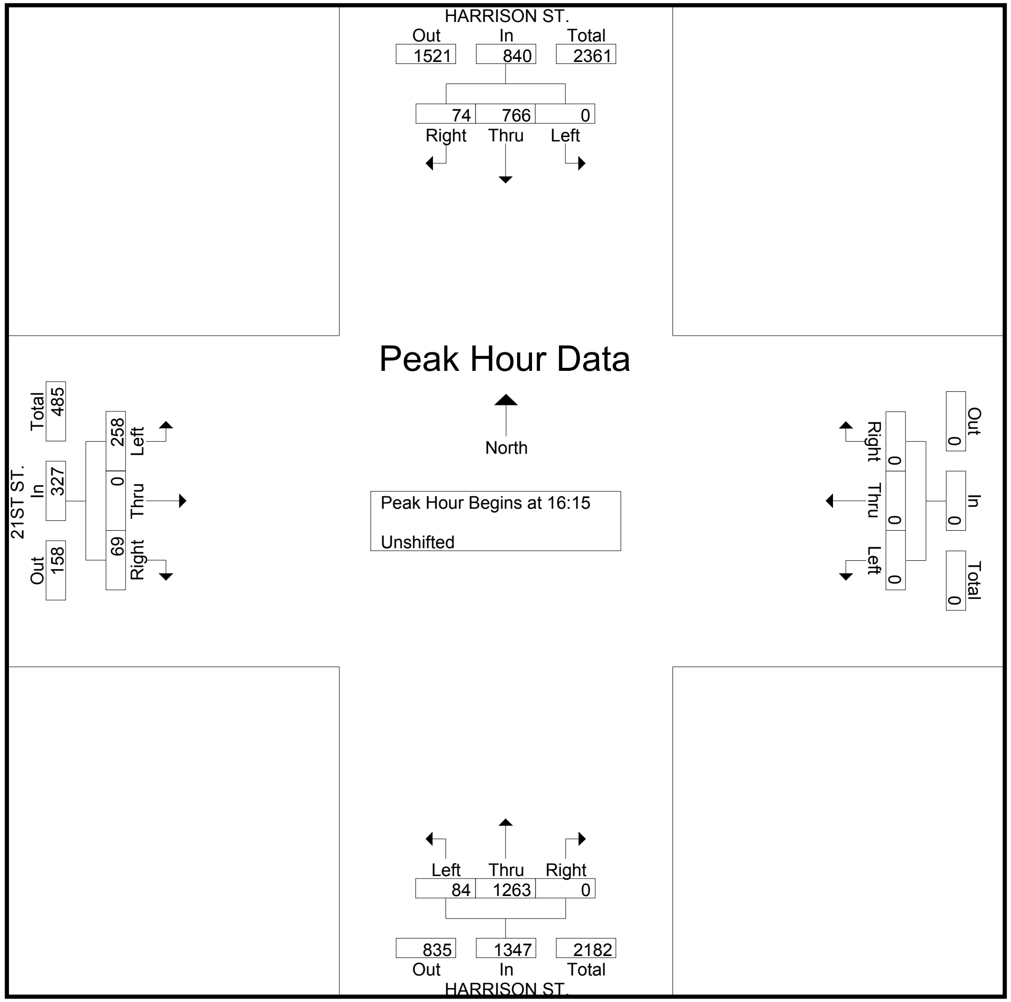
16:15	0	187	17	204	0	0	0	0	22	286	0	308	58	0	17	75	587
16:30	0	170	**21**	191	0	0	0	0	**23**	325	0	**348**	62	0	14	76	615
16:45	0	197	19	216	0	0	0	0	20	**328**	0	348	66	0	17	83	647
17:00	0	**212**	17	**229**	0	0	0	0	19	324	0	343	**72**	0	**21**	**93**	**665**
Total Volume	0	766	74	840	0	0	0	0	84	1263	0	1347	258	0	69	327	2514
% App. Total	0	91.2	8.8		0	0	0		6.2	93.8	0		78.9	0	21.1		
PHF	.000	.903	.881	.917	.000	.000	.000	.000	.913	.963	.000	.968	.896	.000	.821	.879	.945

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-011 HARRISON-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-009 EAST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

	Southbound					21ST ST. Westbound					GARAGE (EAST) Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	2	33	0	0	35	0	0	0	3	0	0	15	1	0	16	3	51	54
07:15	0	0	0	0	0	5	49	0	2	54	1	0	0	17	1	0	10	1	4	11	23	66	89
07:30	0	0	0	0	0	7	52	0	1	59	0	0	1	7	1	0	13	1	3	14	11	74	85
07:45	0	0	0	0	0	10	52	0	1	62	0	0	0	11	0	0	14	3	2	17	14	79	93
Total	0	0	0	0	0	24	186	0	4	210	1	0	1	38	2	0	52	6	9	58	51	270	321
08:00	0	0	0	0	0	22	58	0	1	80	0	0	1	13	1	0	22	8	3	30	17	111	128
08:15	0	0	0	0	0	14	60	0	0	74	0	0	0	10	0	0	14	2	0	16	10	90	100
08:30	0	0	0	0	0	23	79	0	0	102	1	0	0	9	1	0	24	8	0	32	9	135	144
08:45	0	0	0	0	0	26	66	0	0	92	0	0	0	17	0	0	21	11	0	32	17	124	141
Total	0	0	0	0	0	85	263	0	1	348	1	0	1	49	2	0	81	29	3	110	53	460	513
*** BREAK ***																							
16:00	0	0	0	0	0	1	32	0	0	33	2	0	4	11	6	0	40	1	0	41	11	80	91
16:15	0	0	0	0	0	1	39	0	0	40	1	0	7	16	8	0	43	3	1	46	17	94	111
16:30	0	0	0	0	0	4	39	0	0	43	3	0	1	22	4	0	51	4	0	55	22	102	124
16:45	0	0	0	0	0	2	38	0	1	40	3	0	3	14	6	0	59	2	1	61	16	107	123
Total	0	0	0	0	0	8	148	0	1	156	9	0	15	63	24	0	193	10	2	203	66	383	449
17:00	0	0	0	0	0	4	36	0	0	40	1	0	16	9	17	0	57	4	0	61	9	118	127
17:15	0	0	0	0	0	8	36	0	1	44	4	0	16	13	20	0	58	1	0	59	14	123	137
17:30	0	0	0	0	0	5	38	0	0	43	3	0	14	19	17	0	55	2	0	57	19	117	136
17:45	0	0	0	0	0	4	29	0	0	33	3	0	8	13	11	0	62	3	0	65	13	109	122
Total	0	0	0	0	0	21	139	0	1	160	11	0	54	54	65	0	232	10	0	242	55	467	522
Grand Total	0	0	0	0	0	138	736	0	7	874	22	0	71	204	93	0	558	55	14	613	225	1580	1805
Apprch %	0	0	0			15.8	84.2	0			23.7	0	76.3			0	91	9					
Total %	0	0	0		0	8.7	46.6	0		55.3	1.4	0	4.5		5.9	0	35.3	3.5		38.8	12.5	87.5	

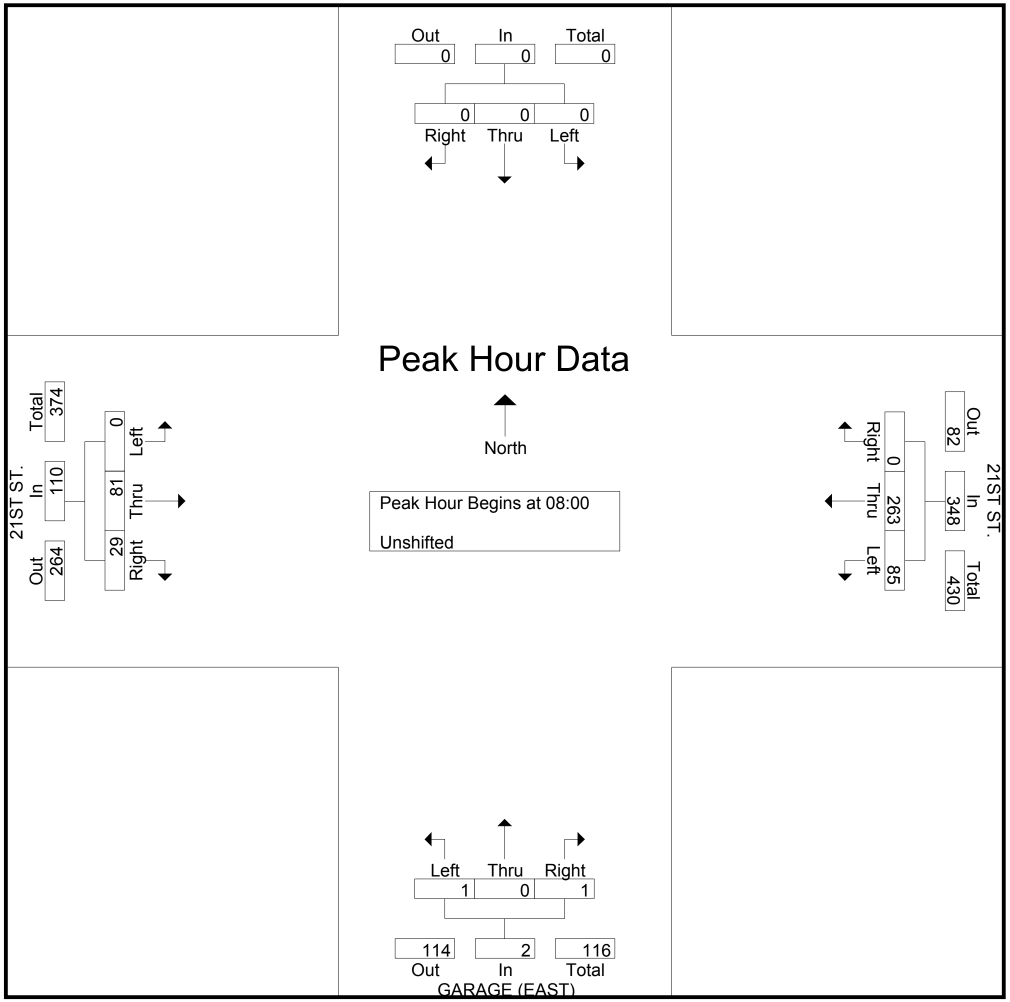
	Southbound				21ST ST. Westbound				GARAGE (EAST) Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	22	58	0	80	0	0	**1**	**1**	0	22	8	30	111
08:15	0	0	0	0	14	60	0	74	0	0	0	0	0	14	2	16	90
08:30	0	0	0	0	23	**79**	0	**102**	**1**	0	0	1	0	**24**	8	**32**	**135**
08:45	0	0	0	0	**26**	66	0	92	0	0	0	0	0	21	**11**	32	124
Total Volume	0	0	0	0	85	263	0	348	1	0	1	2	0	81	29	110	460
% App. Total	0	0	0		24.4	75.6	0		50	0	50		0	73.6	26.4		
PHF	.000	.000	.000	.000	.817	.832	.000	.853	.250	.000	.250	.500	.000	.844	.659	.859	.852

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-009 EAST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

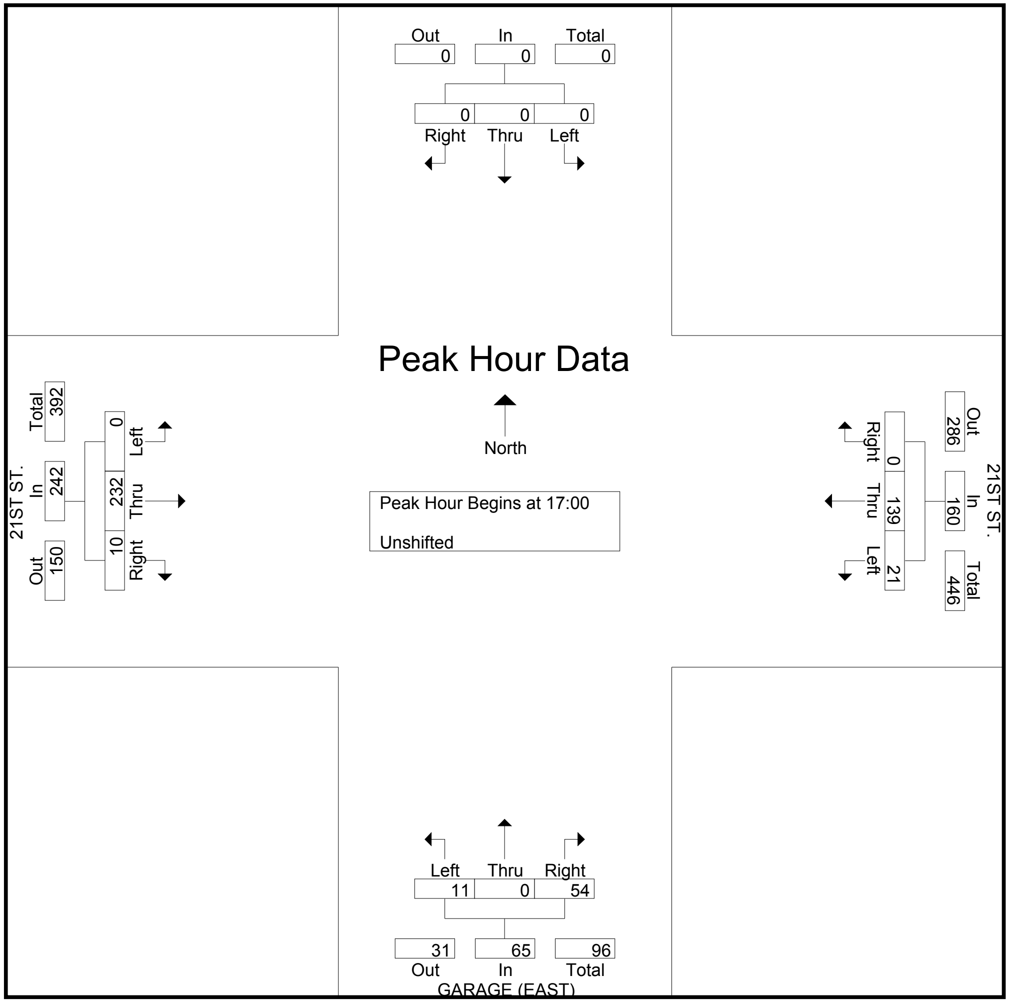
17:00	0	0	0	0	4	36	0	40	1	0	**16**	17	0	57	**4**	61	118
17:15	0	0	0	0	**8**	36	0	**44**	**4**	0	16	**20**	0	58	1	59	**123**
17:30	0	0	0	0	5	**38**	0	43	3	0	14	17	0	55	2	57	117
17:45	0	0	0	0	4	29	0	33	3	0	8	11	0	**62**	3	**65**	109
Total Volume	0	0	0	0	21	139	0	160	11	0	54	65	0	232	10	242	467
% App. Total	0	0	0		13.1	86.9	0		16.9	0	83.1		0	95.9	4.1		
PHF	.000	.000	.000	.000	.656	.914	.000	.909	.688	.000	.844	.813	.000	.935	.625	.931	.949

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-009 EAST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-008 WEST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

	Southbound					21ST ST. Westbound					GARAGE (WEST) Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	10	18	0	0	28	0	0	0	2	0	0	16	6	1	22	3	50	53
07:15	0	0	0	0	0	15	17	0	0	32	0	0	0	8	0	0	12	8	0	20	8	52	60
07:30	0	0	0	0	0	14	28	0	1	42	1	0	0	6	1	0	11	8	0	19	7	62	69
07:45	0	0	0	0	0	10	28	0	0	38	0	0	1	10	1	0	17	27	2	44	12	83	95
Total	0	0	0	0	0	49	91	0	1	140	1	0	1	26	2	0	56	49	3	105	30	247	277
08:00	0	0	0	0	0	29	20	0	1	49	0	0	0	7	0	0	31	26	1	57	9	106	115
08:15	0	0	0	0	0	22	27	0	0	49	1	0	0	6	1	0	17	26	1	43	7	93	100
08:30	0	0	0	0	0	24	38	0	1	62	0	0	1	9	1	0	20	18	0	38	10	101	111
08:45	0	0	0	0	0	27	31	0	2	58	1	0	1	10	2	0	25	30	2	55	14	115	129
Total	0	0	0	0	0	102	116	0	4	218	2	0	2	32	4	0	93	100	4	193	40	415	455
*** BREAK ***																							
16:00	0	0	0	0	0	1	23	0	0	24	3	0	6	5	9	0	34	1	1	35	6	68	74
16:15	0	0	0	0	0	2	28	0	0	30	4	0	10	15	14	0	30	1	0	31	15	75	90
16:30	0	0	0	0	0	6	27	0	0	33	6	0	3	13	9	0	41	1	0	42	13	84	97
16:45	0	0	0	0	0	3	22	0	1	25	7	0	9	8	16	0	42	2	0	44	9	85	94
Total	0	0	0	0	0	12	100	0	1	112	20	0	28	41	48	0	147	5	1	152	43	312	355
17:00	0	0	0	0	0	0	25	0	0	25	6	0	13	7	19	0	45	2	0	47	7	91	98
17:15	0	0	0	0	0	4	21	0	1	25	6	0	10	8	16	0	48	2	0	50	9	91	100
17:30	0	0	0	0	0	1	20	0	0	21	10	0	20	11	30	0	36	3	0	39	11	90	101
17:45	0	0	0	0	0	0	17	0	0	17	7	0	17	14	24	0	43	2	0	45	14	86	100
Total	0	0	0	0	0	5	83	0	1	88	29	0	60	40	89	0	172	9	0	181	41	358	399
Grand Total	0	0	0	0	0	168	390	0	7	558	52	0	91	139	143	0	468	163	8	631	154	1332	1486
Apprch %	0	0	0			30.1	69.9	0			36.4	0	63.6			0	74.2	25.8					
Total %	0	0	0		0	12.6	29.3	0		41.9	3.9	0	6.8		10.7	0	35.1	12.2		47.4	10.4	89.6	

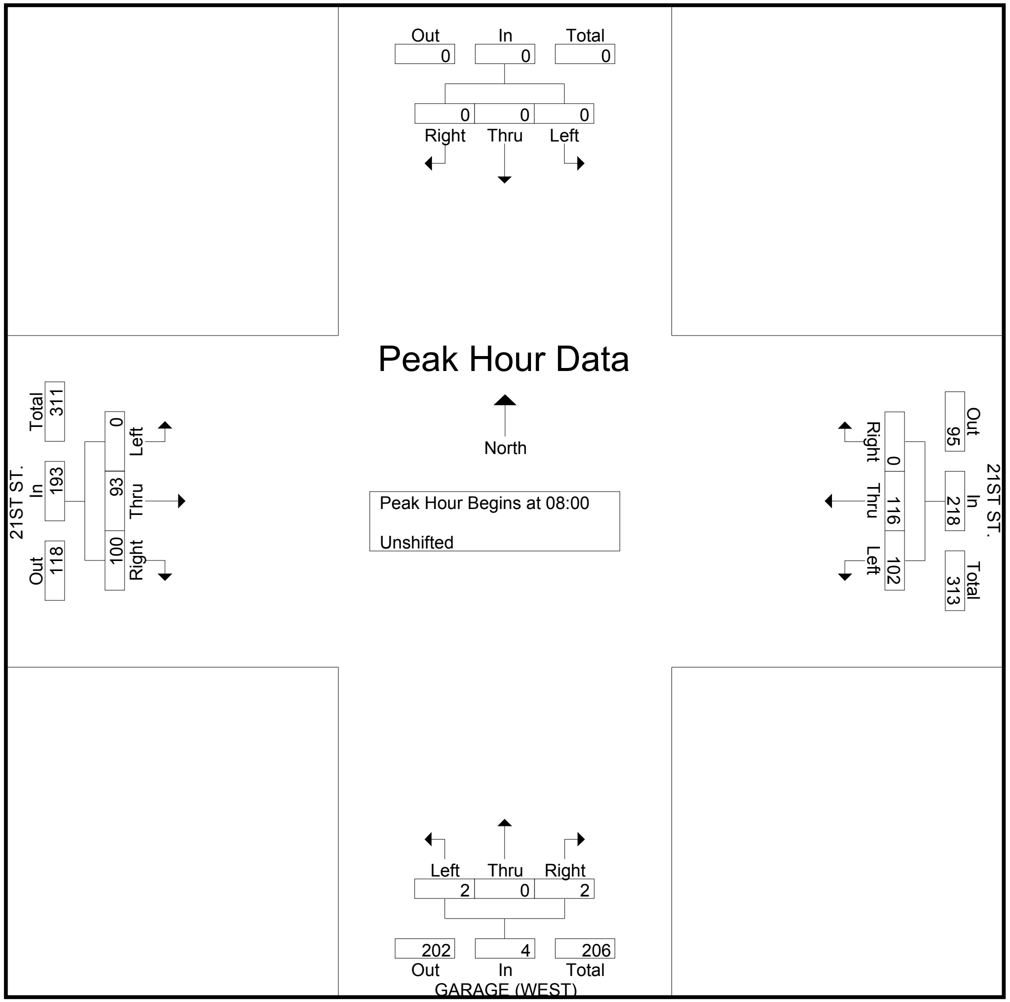
	Southbound				21ST ST. Westbound				GARAGE (WEST) Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	**29**	20	0	49	0	0	0	0	0	**31**	26	**57**	106
08:15	0	0	0	0	22	27	0	49	**1**	0	0	1	0	17	26	43	93
08:30	0	0	0	0	24	**38**	0	**62**	0	0	**1**	1	0	20	18	38	101
08:45	0	0	0	0	27	31	0	58	1	0	1	**2**	0	25	**30**	55	**115**
Total Volume	0	0	0	0	102	116	0	218	2	0	2	4	0	93	100	193	415
% App. Total	0	0	0		46.8	53.2	0		50	0	50		0	48.2	51.8		
PHF	.000	.000	.000	.000	.879	.763	.000	.879	.500	.000	.500	.500	.000	.750	.833	.846	.902

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-008 WEST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

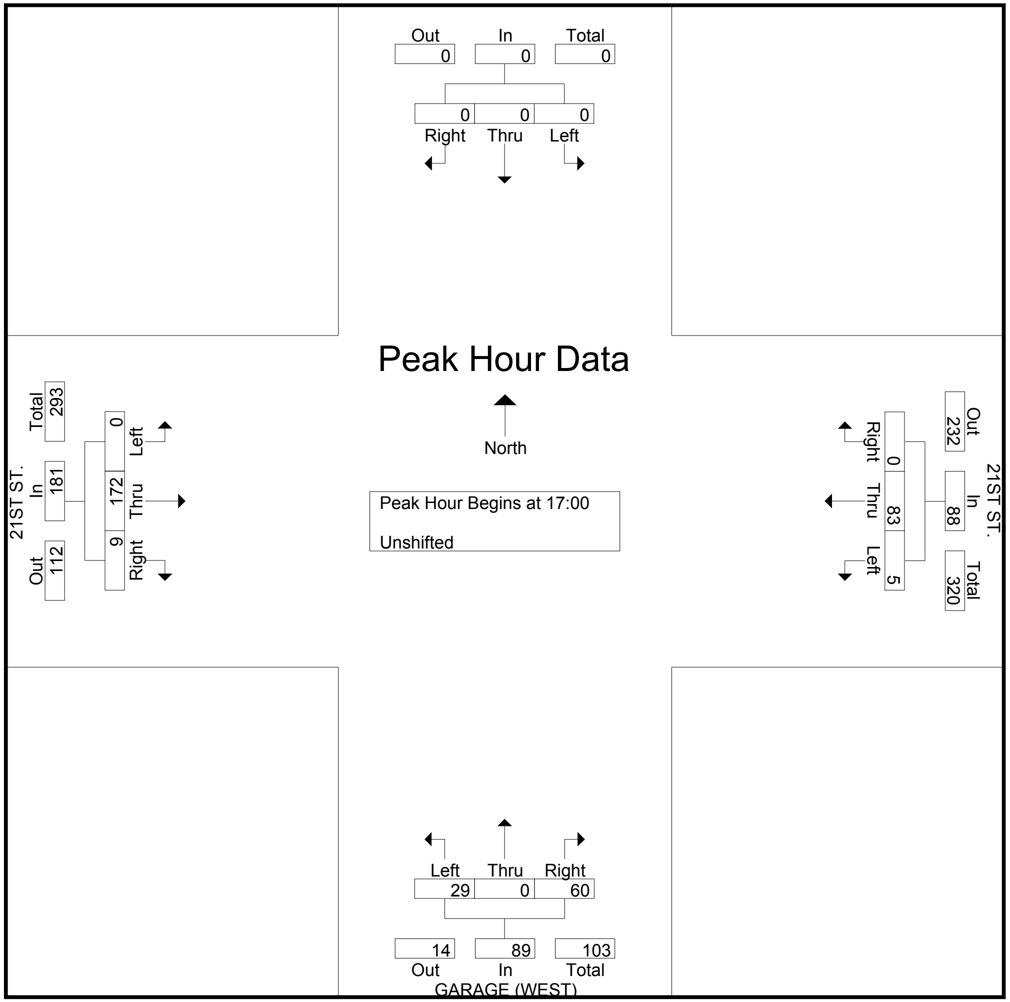
17:00	0	0	0	0	0	**25**	0	**25**	6	0	13	19	0	45	2	47	**91**
17:15	0	0	0	0	**4**	21	0	25	6	0	10	16	0	**48**	2	**50**	91
17:30	0	0	0	0	1	20	0	21	**10**	0	**20**	**30**	0	36	**3**	39	90
17:45	0	0	0	0	0	17	0	17	7	0	17	24	0	43	2	45	86
Total Volume	0	0	0	0	5	83	0	88	29	0	60	89	0	172	9	181	358
% App. Total	0	0	0		5.7	94.3	0		32.6	0	67.4		0	95	5		
PHF	.000	.000	.000	.000	.313	.830	.000	.880	.725	.000	.750	.742	.000	.896	.750	.905	.984

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-008 WEST GARAGE-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-010 INTERNAL-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

	Southbound					21ST ST. Westbound					INTERNAL DRIVEWAY Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	3	32	0	0	35	2	0	2	1	4	0	15	0	0	15	1	54	55
07:15	0	0	0	0	0	3	51	0	0	54	3	0	3	2	6	0	9	1	1	10	3	70	73
07:30	0	0	0	0	0	12	61	0	1	73	1	0	6	1	7	0	10	2	0	12	2	92	94
07:45	0	0	0	0	0	11	53	0	0	64	7	0	4	3	11	0	13	1	0	14	3	89	92
Total	0	0	0	0	0	29	197	0	1	226	13	0	15	7	28	0	47	4	1	51	9	305	314
08:00	0	0	0	0	0	8	69	0	0	77	7	0	4	5	11	0	20	2	1	22	6	110	116
08:15	0	0	0	0	0	13	68	0	0	81	5	0	2	2	7	0	13	2	1	15	3	103	106
08:30	0	0	0	0	0	8	94	0	0	102	7	0	4	5	11	0	22	2	2	24	7	137	144
08:45	0	0	0	0	0	9	88	0	0	97	5	0	5	3	10	0	20	2	0	22	3	129	132
Total	0	0	0	0	0	38	319	0	0	357	24	0	15	15	39	0	75	8	4	83	19	479	498
*** BREAK ***																							
16:00	0	0	0	0	0	3	30	0	0	33	5	0	28	5	33	0	42	2	0	44	5	110	115
16:15	0	0	0	0	0	4	32	0	0	36	8	0	25	8	33	0	50	0	0	50	8	119	127
16:30	0	0	0	0	0	3	37	0	1	40	6	0	23	12	29	0	51	2	0	53	13	122	135
16:45	0	0	0	0	0	2	35	0	0	37	6	0	24	8	30	0	58	3	0	61	8	128	136
Total	0	0	0	0	0	12	134	0	1	146	25	0	100	33	125	0	201	7	0	208	34	479	513
17:00	0	0	0	0	0	2	31	0	0	33	9	0	21	7	30	0	73	0	0	73	7	136	143
17:15	0	0	0	0	0	4	30	0	1	34	14	0	17	9	31	0	71	1	0	72	10	137	147
17:30	0	0	0	0	0	3	27	0	0	30	14	0	19	15	33	0	70	0	0	70	15	133	148
17:45	0	0	0	0	0	6	28	0	0	34	8	0	25	6	33	0	68	2	0	70	6	137	143
Total	0	0	0	0	0	15	116	0	1	131	45	0	82	37	127	0	282	3	0	285	38	543	581
Grand Total	0	0	0	0	0	94	766	0	3	860	107	0	212	92	319	0	605	22	5	627	100	1806	1906
Apprch %	0	0	0			10.9	89.1	0			33.5	0	66.5			0	96.5	3.5					
Total %	0	0	0		0	5.2	42.4	0		47.6	5.9	0	11.7		17.7	0	33.5	1.2		34.7	5.2	94.8	

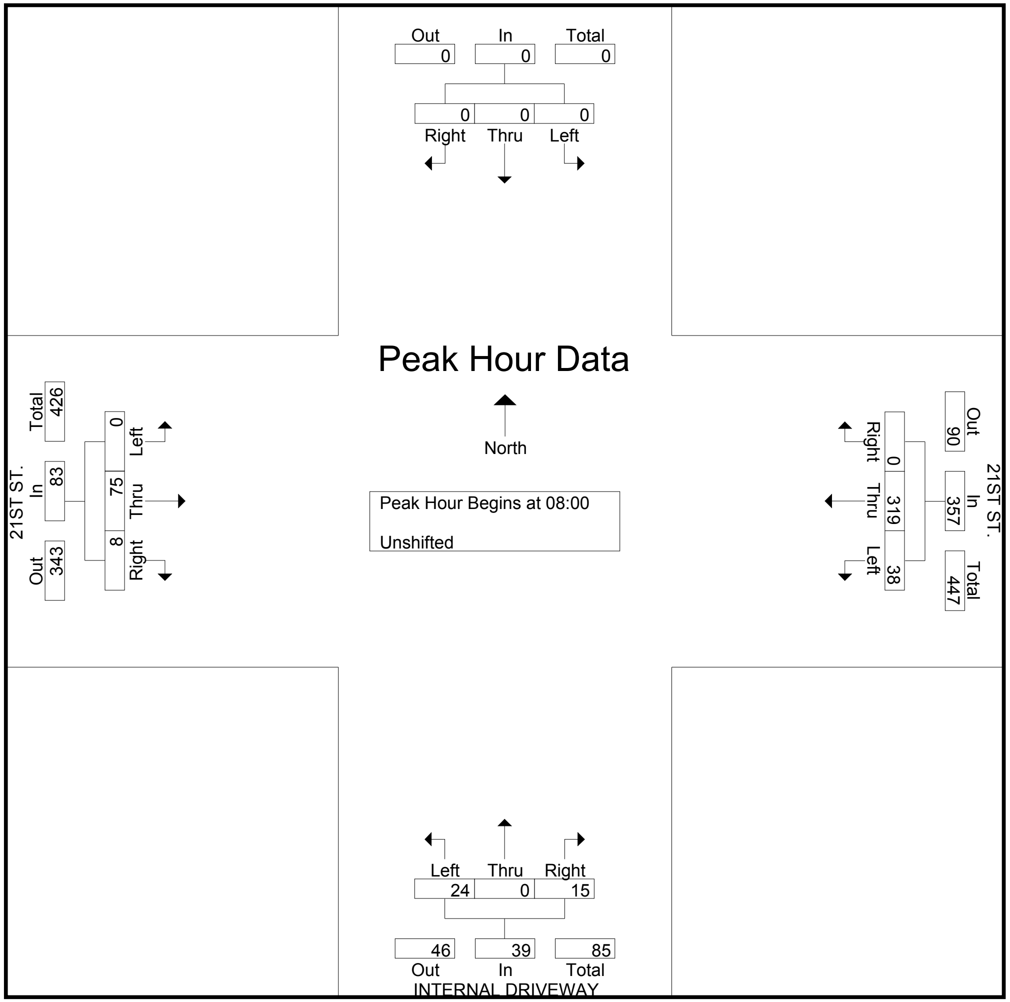
	Southbound				21ST ST. Westbound				INTERNAL DRIVEWAY Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	8	69	0	77	**7**	0	4	**11**	0	20	**2**	22	110
08:15	0	0	0	0	**13**	68	0	81	5	0	2	7	0	13	2	15	103
08:30	0	0	0	0	8	**94**	0	**102**	7	0	4	11	0	**22**	2	**24**	**137**
08:45	0	0	0	0	9	88	0	97	5	0	**5**	10	0	20	2	22	129
Total Volume	0	0	0	0	38	319	0	357	24	0	15	39	0	75	8	83	479
% App. Total	0	0	0		10.6	89.4	0		61.5	0	38.5		0	90.4	9.6		
PHF	.000	.000	.000	.000	.731	.848	.000	.875	.857	.000	.750	.886	.000	.852	1.000	.865	.874

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-010 INTERNAL-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

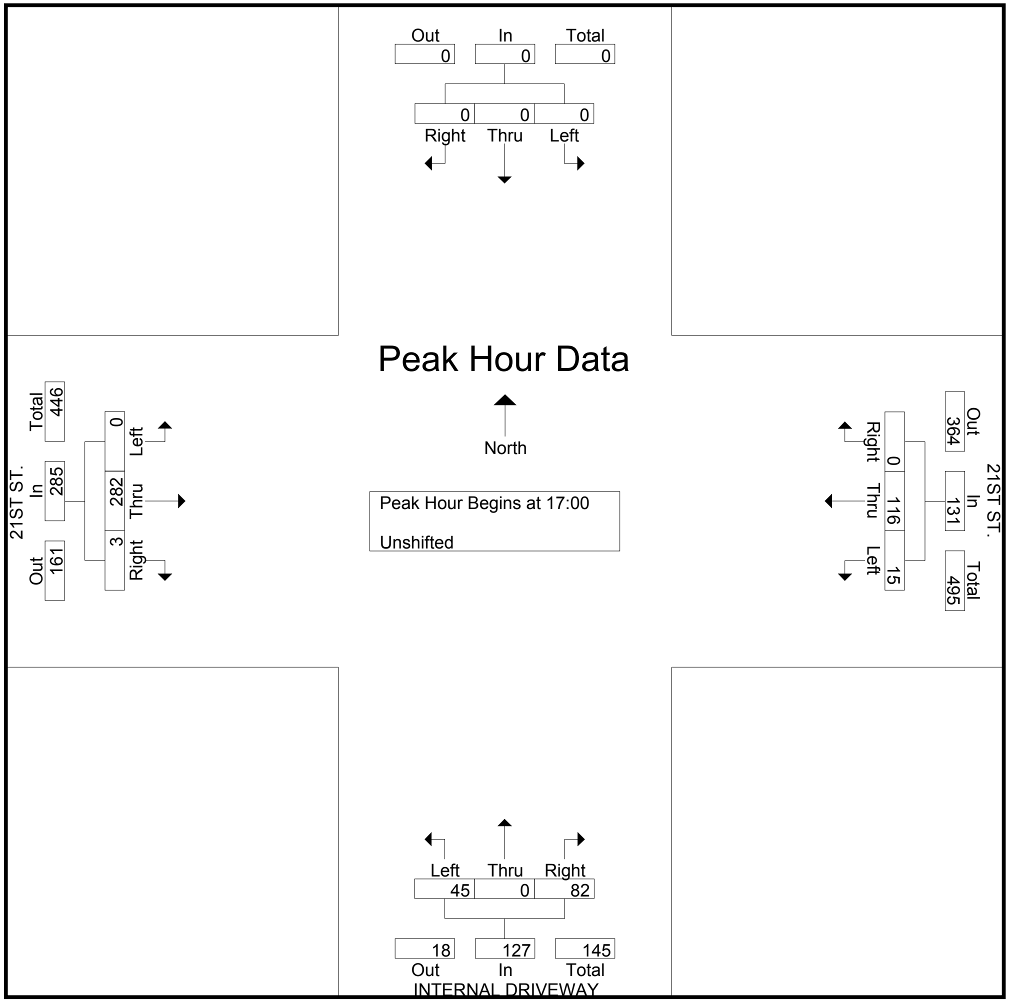
17:00	0	0	0	0	2	**31**	0	33	9	0	21	30	0	**73**	0	**73**	136
17:15	0	0	0	0	4	30	0	**34**	**14**	0	17	31	0	71	1	72	**137**
17:30	0	0	0	0	3	27	0	30	14	0	19	**33**	0	70	0	70	133
17:45	0	0	0	0	**6**	28	0	34	8	0	**25**	33	0	68	**2**	70	137
Total Volume	0	0	0	0	15	116	0	131	45	0	82	127	0	282	3	285	543
% App. Total	0	0	0		11.5	88.5	0		35.4	0	64.6		0	98.9	1.1		
PHF	.000	.000	.000	.000	.625	.935	.000	.963	.804	.000	.820	.962	.000	.966	.375	.976	.991

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-010 INTERNAL-21ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-007 WEBSTER-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

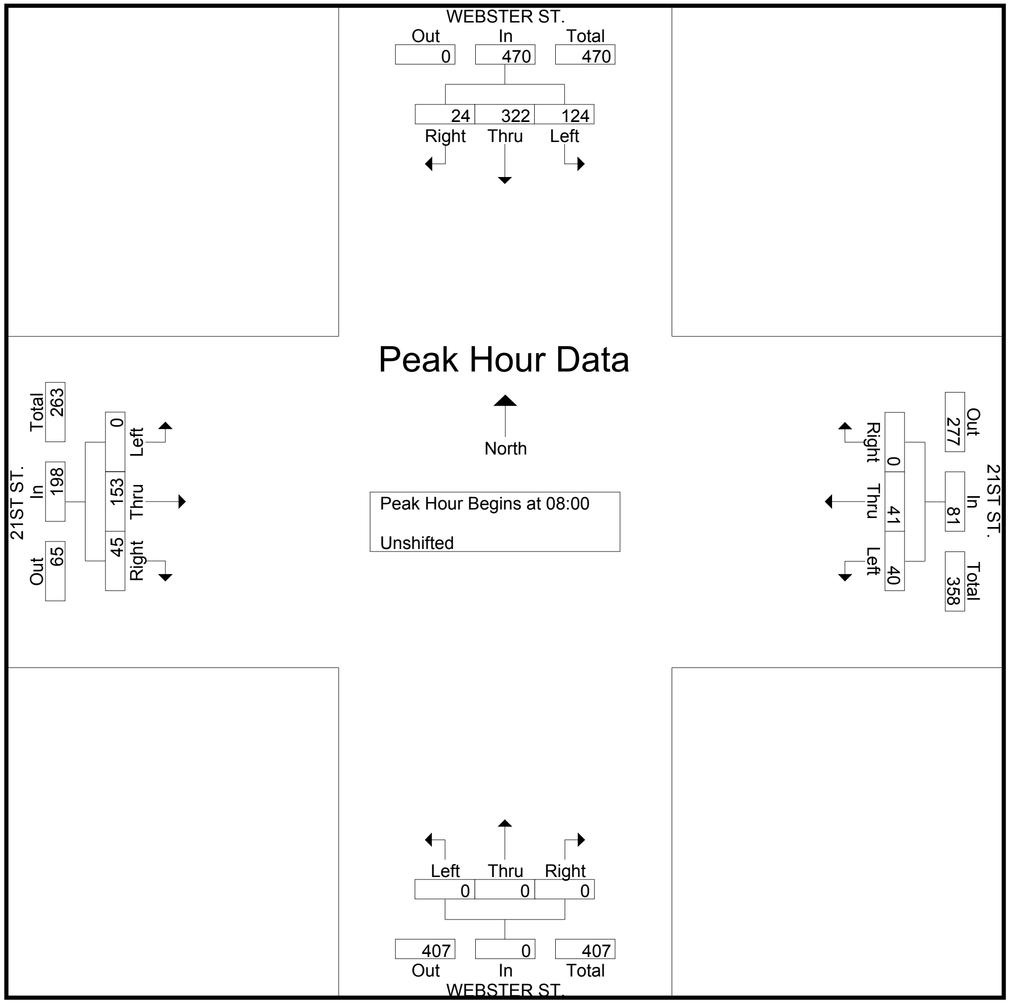
	WEBSTER ST. Southbound					21ST ST. Westbound					WEBSTER ST. Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	10	32	5	8	47	12	10	0	12	22	0	0	0	15	0	0	20	5	16	25	51	94	145
07:15	7	35	2	15	44	11	8	0	17	19	0	0	0	28	0	0	22	2	35	24	95	87	182
07:30	5	55	11	23	71	7	12	0	22	19	0	0	0	30	0	0	22	7	40	29	115	119	234
07:45	21	78	11	28	110	12	14	0	35	26	0	0	0	40	0	0	28	6	38	34	141	170	311
Total	43	200	29	74	272	42	44	0	86	86	0	0	0	113	0	0	92	20	129	112	402	470	872
08:00	30	80	7	38	117	11	11	0	29	22	0	0	0	34	0	0	44	6	53	50	154	189	343
08:15	34	77	3	23	114	8	11	0	27	19	0	0	0	32	0	0	32	13	52	45	134	178	312
08:30	33	89	8	22	130	8	7	0	53	15	0	0	0	39	0	0	34	12	65	46	179	191	370
08:45	27	76	6	22	109	13	12	0	37	25	0	0	0	42	0	0	43	14	43	57	144	191	335
Total	124	322	24	105	470	40	41	0	146	81	0	0	0	147	0	0	153	45	213	198	611	749	1360
*** BREAK ***																							
16:00	5	96	7	40	108	10	21	0	34	31	0	0	0	27	0	0	26	19	22	45	123	184	307
16:15	12	94	2	59	108	12	20	0	39	32	0	0	0	22	0	0	24	26	18	50	138	190	328
16:30	10	87	4	70	101	12	25	0	51	37	0	0	0	23	0	0	26	29	28	55	172	193	365
16:45	7	102	7	39	116	12	21	0	37	33	0	0	0	11	0	0	23	21	15	44	102	193	295
Total	34	379	20	208	433	46	87	0	161	133	0	0	0	83	0	0	99	95	83	194	535	760	1295
17:00	13	95	8	71	116	12	39	0	59	51	0	0	0	23	0	0	43	25	21	68	174	235	409
17:15	10	104	7	39	121	19	30	0	40	49	0	0	0	24	0	0	41	14	28	55	131	225	356
17:30	7	99	2	45	108	13	33	0	56	46	0	0	0	19	0	0	40	22	31	62	151	216	367
17:45	9	104	5	53	118	14	29	0	45	43	0	0	0	35	0	0	33	18	37	51	170	212	382
Total	39	402	22	208	463	58	131	0	200	189	0	0	0	101	0	0	157	79	117	236	626	888	1514
Grand Total	240	1303	95	595	1638	186	303	0	593	489	0	0	0	444	0	0	501	239	542	740	2174	2867	5041
Apprch %	14.7	79.5	5.8			38	62	0			0	0	0			0	67.7	32.3					
Total %	8.4	45.4	3.3		57.1	6.5	10.6	0		17.1	0	0	0		0	0	17.5	8.3		25.8	43.1	56.9	

	WEBSTER ST. Southbound				21ST ST. Westbound				WEBSTER ST. Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	30	80	7	117	11	11	0	22	0	0	0	0	0	**44**	6	50	189
08:15	**34**	77	3	114	8	11	0	19	0	0	0	0	0	32	13	45	178
08:30	33	**89**	**8**	**130**	8	7	0	15	0	0	0	0	0	34	12	46	**191**
08:45	27	76	6	109	**13**	**12**	0	**25**	0	0	0	0	0	43	**14**	**57**	191
Total Volume	124	322	24	470	40	41	0	81	0	0	0	0	0	153	45	198	749
% App. Total	26.4	68.5	5.1		49.4	50.6	0		0	0	0		0	77.3	22.7		
PHF	.912	.904	.750	.904	.769	.854	.000	.810	.000	.000	.000	.000	.000	.869	.804	.868	.980

All Traffic Data
(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-007 WEBSTER-21ST-F
Site Code : 00000000
Start Date : 08/06/2008



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

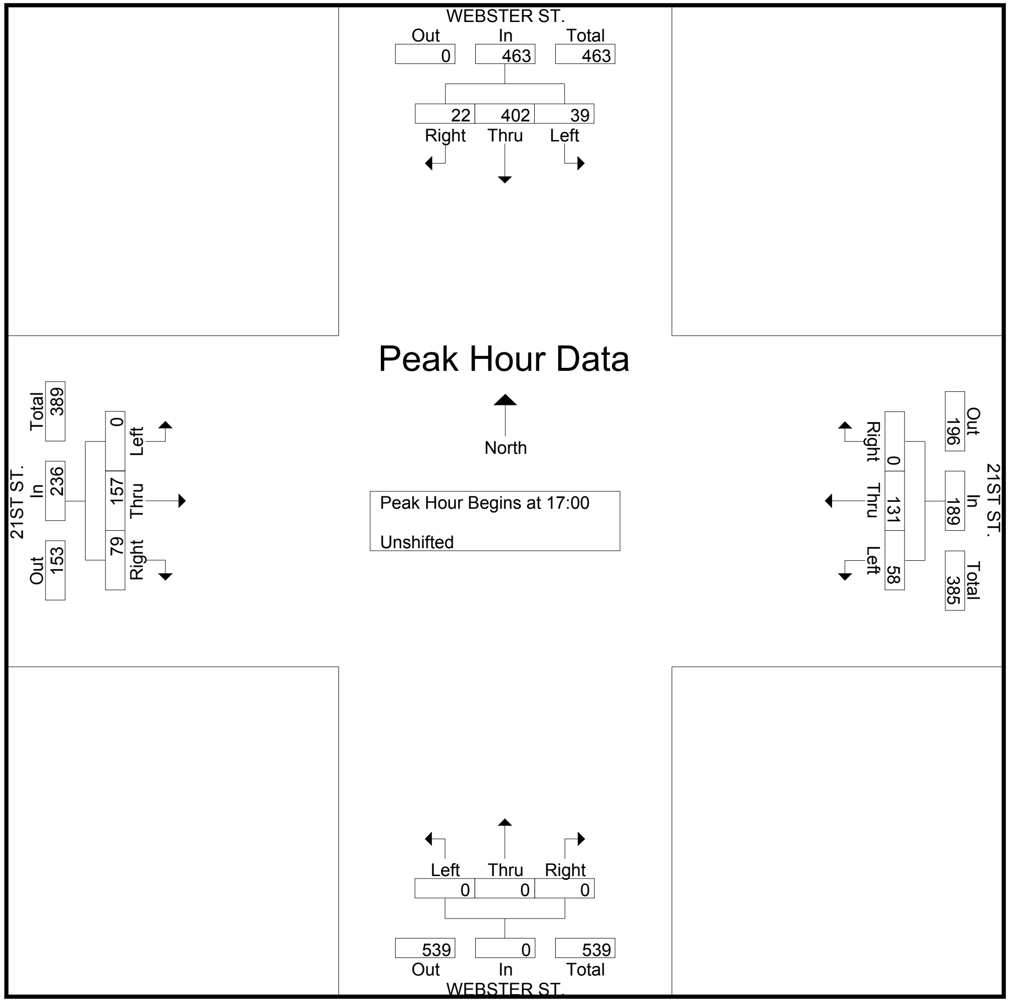
17:00	**13**	95	**8**	116	12	**39**	0	**51**	0	0	0	0	0	**43**	**25**	**68**	**235**
17:15	10	**104**	7	**121**	**19**	30	0	49	0	0	0	0	0	41	14	55	225
17:30	7	99	2	108	13	33	0	46	0	0	0	0	0	40	22	62	216
17:45	9	104	5	118	14	29	0	43	0	0	0	0	0	33	18	51	212
Total Volume	39	402	22	463	58	131	0	189	0	0	0	0	0	157	79	236	888
% App. Total	8.4	86.8	4.8		30.7	69.3	0		0	0	0		0	66.5	33.5		
PHF	.750	.966	.688	.957	.763	.840	.000	.926	.000	.000	.000	.000	.000	.913	.790	.868	.945

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-007 WEBSTER-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-006 FRANKLIN-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

	FRANKLIN ST. Southbound					21ST ST. Westbound					FRANKLIN ST. Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	36	0	0	5	7	28	12	0	11	8	22	19	1	15	0	31	16	117	47	164
07:15	0	0	0	31	0	0	4	4	47	8	2	27	10	20	39	1	17	0	15	18	113	65	178
07:30	0	0	0	42	0	0	14	8	60	22	0	38	10	23	48	2	18	0	42	20	167	90	257
07:45	0	0	0	45	0	0	12	10	69	22	1	32	14	44	47	3	22	0	42	25	200	94	294
Total	0	0	0	154	0	0	35	29	204	64	3	108	42	109	153	7	72	0	130	79	597	296	893
08:00	0	0	0	40	0	0	11	6	66	17	1	30	15	30	46	0	37	0	29	37	165	100	265
08:15	0	0	0	38	0	0	7	8	55	15	0	36	13	34	49	2	34	0	33	36	160	100	260
08:30	0	0	0	53	0	0	8	6	58	14	4	53	18	39	75	1	34	3	29	38	179	127	306
08:45	0	0	0	43	0	0	7	9	89	16	3	44	19	43	66	3	41	0	25	44	200	126	326
Total	0	0	0	174	0	0	33	29	268	62	8	163	65	146	236	6	146	3	116	155	704	453	1157
*** BREAK ***																							
16:00	0	0	0	28	0	0	10	16	65	26	4	64	24	66	92	1	20	0	24	21	183	139	322
16:15	0	0	0	30	0	0	16	7	66	23	3	54	33	52	90	5	16	0	23	21	171	134	305
16:30	0	0	0	46	0	0	15	12	72	27	3	56	22	67	81	4	29	0	49	33	234	141	375
16:45	0	0	0	40	0	0	18	11	50	29	5	64	24	55	93	2	23	0	49	25	194	147	341
Total	0	0	0	144	0	0	59	46	253	105	15	238	103	240	356	12	88	0	145	100	782	561	1343
17:00	0	0	0	44	0	0	25	18	51	43	5	62	40	62	107	3	27	0	47	30	204	180	384
17:15	0	0	0	43	0	0	19	19	48	38	5	66	33	50	104	2	21	0	33	23	174	165	339
17:30	0	0	0	38	0	0	22	12	41	34	2	71	37	32	110	2	25	1	37	28	148	172	320
17:45	0	0	0	25	0	0	21	13	25	34	4	65	30	31	99	4	18	0	25	22	106	155	261
Total	0	0	0	150	0	0	87	62	165	149	16	264	140	175	420	11	91	1	142	103	632	672	1304
Grand Total	0	0	0	622	0	0	214	166	890	380	42	773	350	670	1165	36	397	4	533	437	2715	1982	4697
Apprch %	0	0	0			0	56.3	43.7			3.6	66.4	30			8.2	90.8	0.9					
Total %	0	0	0		0	0	10.8	8.4		19.2	2.1	39	17.7		58.8	1.8	20	0.2		22	57.8	42.2	

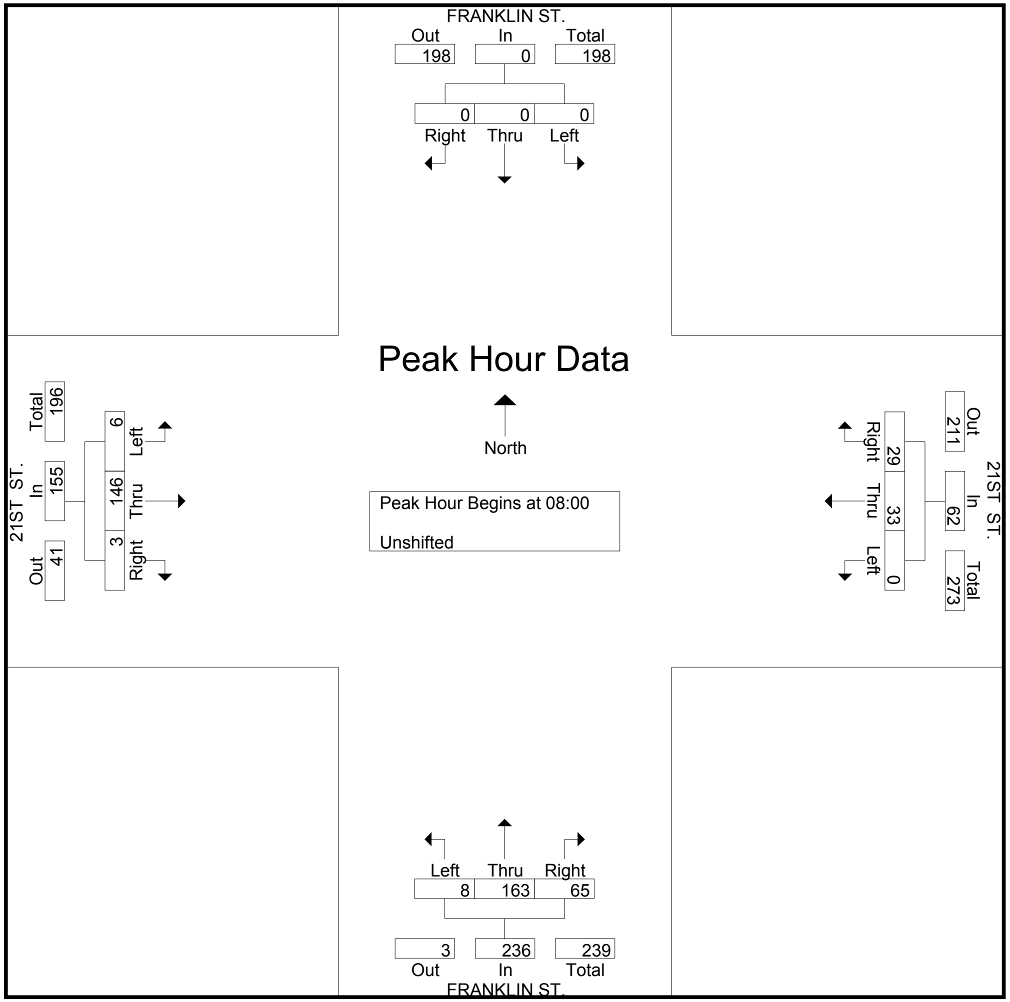
	FRANKLIN ST. Southbound				21ST ST. Westbound				FRANKLIN ST. Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	0	**11**	6	**17**	1	30	15	46	0	37	0	37	100
08:15	0	0	0	0	0	7	8	15	0	36	13	49	2	34	0	36	100
08:30	0	0	0	0	0	8	6	14	**4**	**53**	18	**75**	1	34	**3**	38	**127**
08:45	0	0	0	0	0	7	**9**	16	3	44	**19**	66	**3**	**41**	0	**44**	126
Total Volume	0	0	0	0	0	33	29	62	8	163	65	236	6	146	3	155	453
% App. Total	0	0	0		0	53.2	46.8		3.4	69.1	27.5		3.9	94.2	1.9		
PHF	.000	.000	.000	.000	.000	.750	.806	.912	.500	.769	.855	.787	.500	.890	.250	.881	.892

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-006 FRANKLIN-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

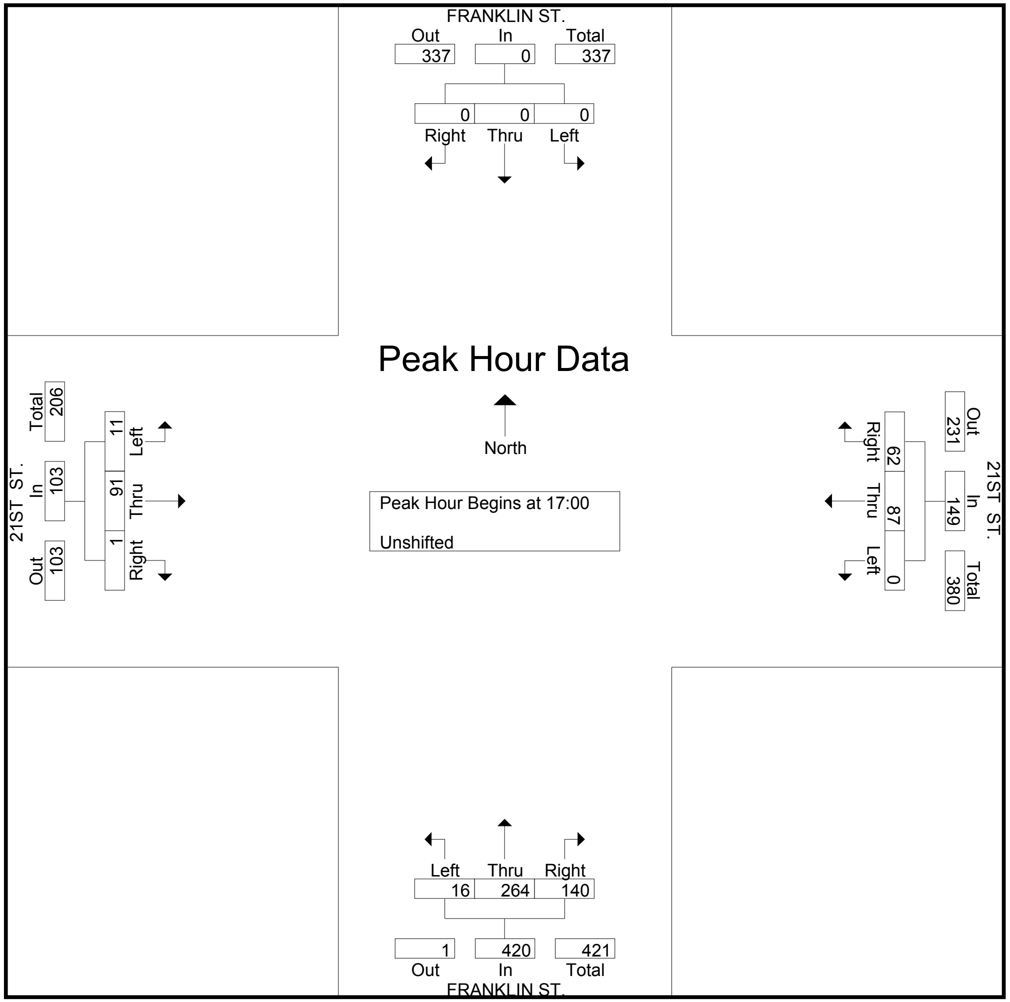
17:00	0	0	0	0	0	**25**	18	**43**	**5**	62	**40**	107	3	**27**	0	**30**	**180**
17:15	0	0	0	0	0	19	**19**	38	5	66	33	104	2	21	0	23	165
17:30	0	0	0	0	0	22	12	34	2	**71**	37	**110**	2	25	**1**	28	172
17:45	0	0	0	0	0	21	13	34	4	65	30	99	**4**	18	0	22	155
Total Volume	0	0	0	0	0	87	62	149	16	264	140	420	11	91	1	103	672
% App. Total	0	0	0		0	58.4	41.6		3.8	62.9	33.3		10.7	88.3	1		
PHF	.000	.000	.000	.000	.000	.870	.816	.866	.800	.930	.875	.955	.688	.843	.250	.858	.933

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-006 FRANKLIN-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-005 BROADWAY-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

	BROADWAY Southbound					21ST ST. Westbound					BROADWAY Northbound					21ST ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	5	24	0	3	29	1	0	4	11	5	0	21	2	12	23	0	8	2	3	10	29	67	96
07:15	5	34	0	13	39	2	0	3	14	5	0	39	3	20	42	1	8	1	6	10	53	96	149
07:30	7	44	0	8	51	4	0	10	7	14	0	40	5	21	45	2	10	2	5	14	41	124	165
07:45	7	58	0	12	65	4	0	10	9	14	0	56	5	15	61	3	12	4	11	19	47	159	206
Total	24	160	0	36	184	11	0	27	41	38	0	156	15	68	171	6	38	9	25	53	170	446	616
08:00	8	59	0	19	67	3	0	6	6	9	0	76	7	17	83	1	20	3	5	24	47	183	230
08:15	8	75	0	29	83	5	0	9	8	14	0	60	7	28	67	4	24	4	9	32	74	196	270
08:30	8	80	0	26	88	6	0	8	9	14	0	59	7	21	66	2	23	3	7	28	63	196	259
08:45	10	71	0	25	81	5	0	5	11	10	0	62	10	20	72	2	25	4	11	31	67	194	261
Total	34	285	0	99	319	19	0	28	34	47	0	257	31	86	288	9	92	14	32	115	251	769	1020
*** BREAK ***																							
16:00	3	72	0	28	75	8	0	5	8	13	0	70	8	24	78	10	12	2	7	24	67	190	257
16:15	2	65	0	27	67	10	0	8	6	18	0	82	8	6	90	7	11	2	12	20	51	195	246
16:30	7	73	0	19	80	6	0	10	14	16	0	76	12	12	88	6	14	4	3	24	48	208	256
16:45	7	82	0	26	89	10	0	9	16	19	0	79	9	26	88	5	8	2	7	15	75	211	286
Total	19	292	0	100	311	34	0	32	44	66	0	307	37	68	344	28	45	10	29	83	241	804	1045
17:00	7	92	0	40	99	14	0	16	23	30	0	97	7	22	104	3	11	4	17	18	102	251	353
17:15	5	93	0	26	98	10	0	12	1	22	0	92	8	17	100	3	7	5	7	15	51	235	286
17:30	7	91	0	17	98	13	0	9	18	22	0	119	10	25	129	1	10	4	11	15	71	264	335
17:45	6	92	0	13	98	12	0	12	7	24	0	115	10	17	125	4	8	4	10	16	47	263	310
Total	25	368	0	96	393	49	0	49	49	98	0	423	35	81	458	11	36	17	45	64	271	1013	1284
Grand Total	102	1105	0	331	1207	113	0	136	168	249	0	1143	118	303	1261	54	211	50	131	315	933	3032	3965
Apprch %	8.5	91.5	0			45.4	0	54.6			0	90.6	9.4			17.1	67	15.9					
Total %	3.4	36.4	0		39.8	3.7	0	4.5		8.2	0	37.7	3.9		41.6	1.8	7	1.6		10.4	23.5	76.5	

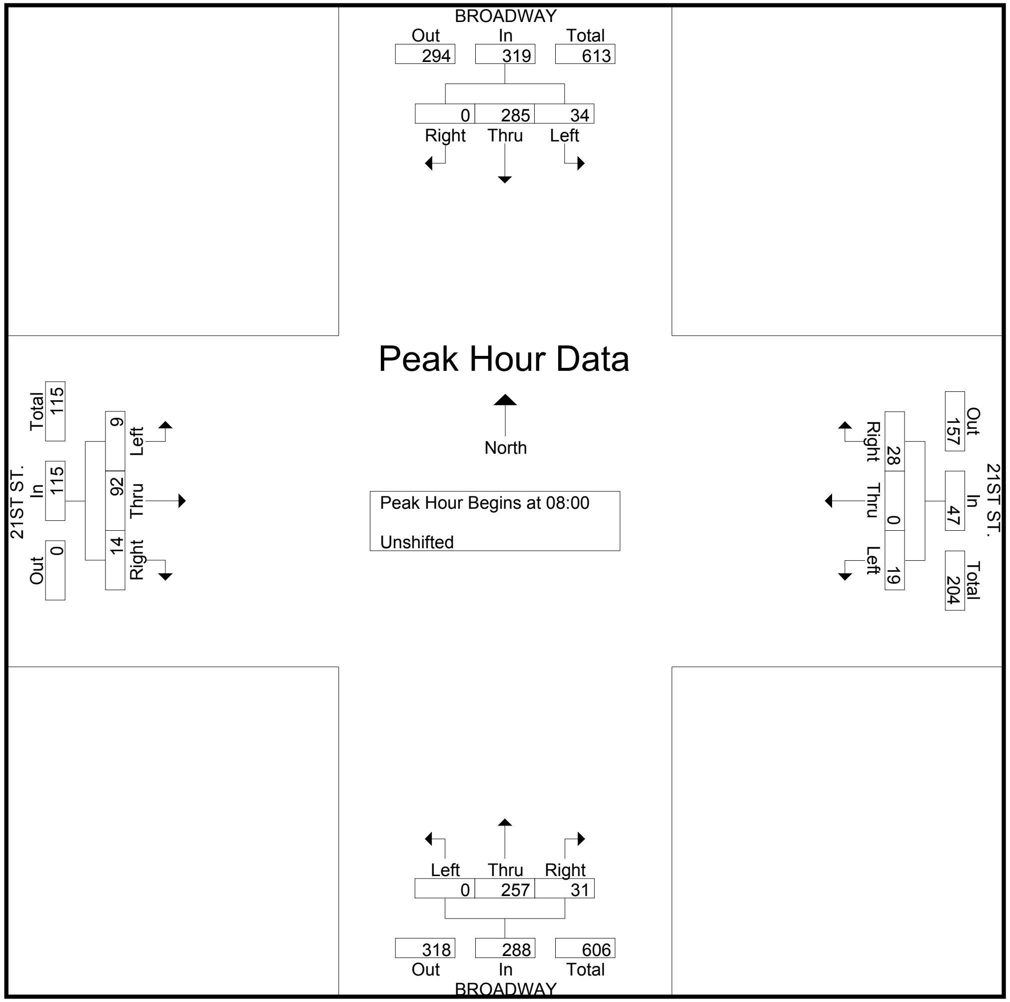
	BROADWAY Southbound				21ST ST. Westbound				BROADWAY Northbound				21ST ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	8	59	0	67	3	0	6	9	0	**76**	7	**83**	1	20	3	24	183
08:15	8	75	0	83	5	0	**9**	**14**	0	60	7	67	**4**	24	**4**	**32**	**196**
08:30	8	**80**	0	**88**	**6**	0	8	14	0	59	7	66	2	23	3	28	196
08:45	**10**	71	0	81	5	0	5	10	0	62	**10**	72	2	**25**	4	31	194
Total Volume	34	285	0	319	19	0	28	47	0	257	31	288	9	92	14	115	769
% App. Total	10.7	89.3	0		40.4	0	59.6		0	89.2	10.8		7.8	80	12.2		
PHF	.850	.891	.000	.906	.792	.000	.778	.839	.000	.845	.775	.867	.563	.920	.875	.898	.981

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-005 BROADWAY-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

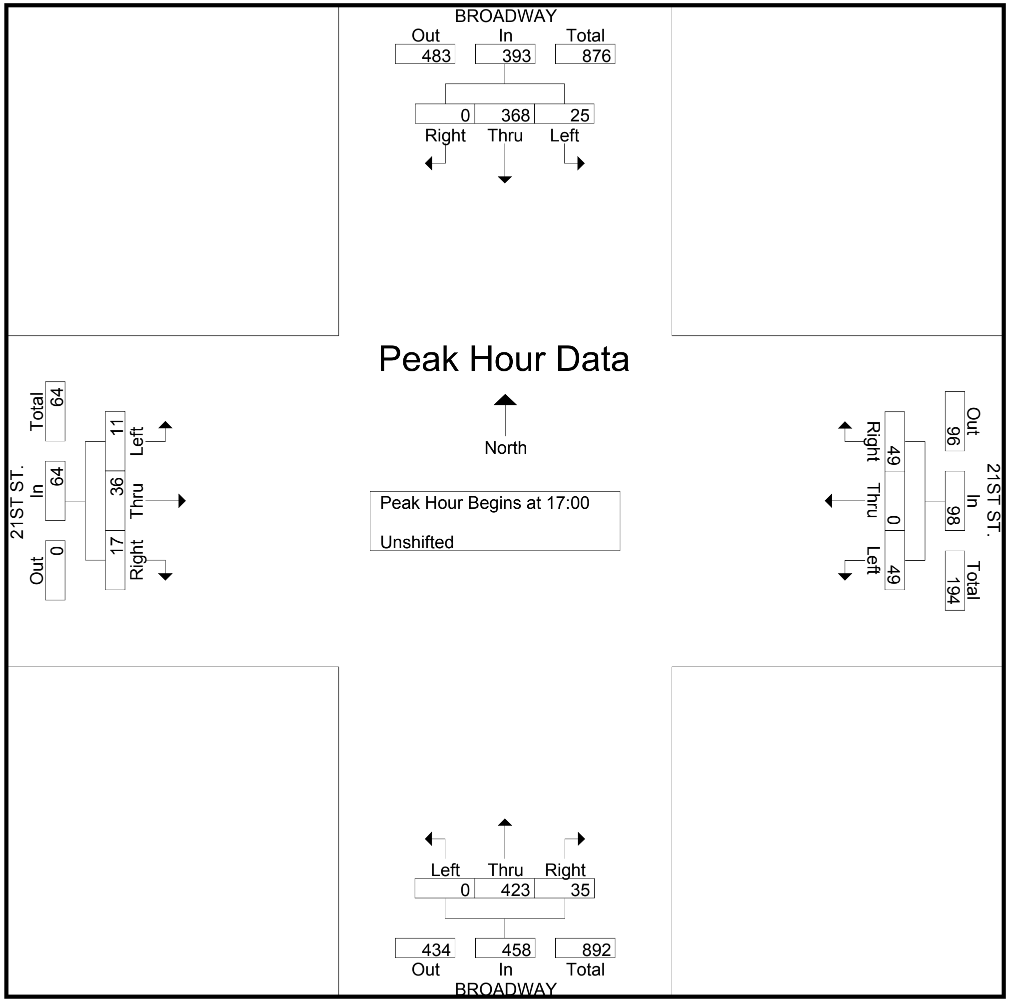
17:00	**7**	92	0	**99**	**14**	0	**16**	**30**	0	97	7	104	3	**11**	4	**18**	251
17:15	5	**93**	0	98	10	0	12	22	0	92	8	100	3	7	**5**	15	235
17:30	7	91	0	98	13	0	9	22	0	**119**	**10**	**129**	1	10	4	15	**264**
17:45	6	92	0	98	12	0	12	24	0	115	10	125	**4**	8	4	16	263
Total Volume	25	368	0	393	49	0	49	98	0	423	35	458	11	36	17	64	1013
% App. Total	6.4	93.6	0		50	0	50		0	92.4	7.6		17.2	56.2	26.6		
PHF	.893	.989	.000	.992	.875	.000	.766	.817	.000	.889	.875	.888	.688	.818	.850	.889	.959

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-005 BROADWAY-21ST-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



WILTEC
Phone: (626) 564-1944 Fax: (626) 564-0969

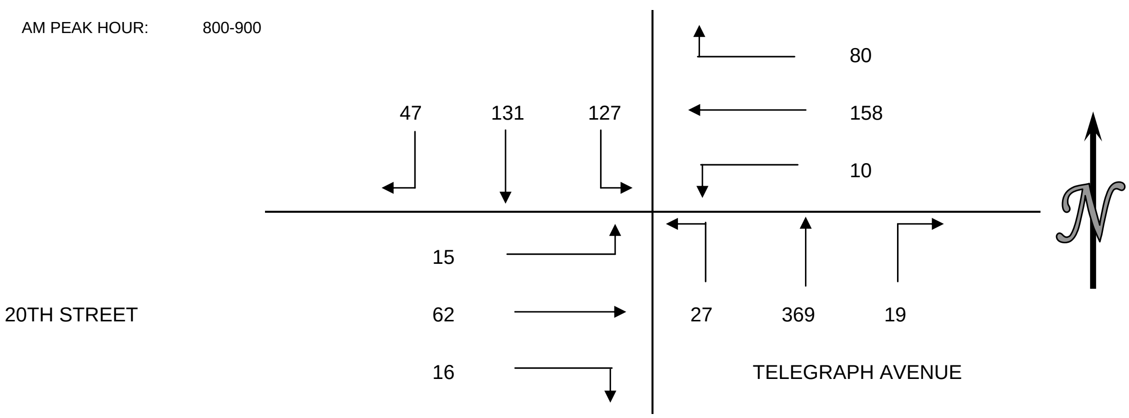
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
PROJECT: 1938 BROADWAY TRAFFIC COUNTS
DATE: WEDNESDAY OCTOBER 29, 2008
PERIOD" 7:00 AM TO 9:00 AM
INTERSECTION: N/S TELEGRAPH AVENUE
E/W 20TH STREET
CITY: OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	3	15	15	9	16	1	1	23	2	4	10	2	101
715-730	5	24	24	20	32	2	1	78	4	4	11	0	205
730-745	3	20	14	15	14	2	1	55	4	1	12	6	147
745-800	8	29	29	37	40	1	2	83	7	0	10	0	246
800-815	10	43	30	26	42	2	6	89	4	5	11	5	273
815-830	10	37	35	27	40	2	6	93	11	5	20	5	291
830-845	15	25	30	7	35	3	4	93	7	1	17	3	240
845-900	12	26	32	20	41	3	3	94	5	5	14	2	257
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	19	88	82	81	102	6	5	239	17	9	43	8	699
715-815	26	116	97	98	128	7	10	305	19	10	44	11	871
730-830	31	129	108	105	136	7	15	320	26	11	53	16	957
745-845	43	134	124	97	157	8	18	358	29	11	58	13	1050
800-900	47	131	127	80	158	10	19	369	27	16	62	15	1061

AM PEAK HOUR: 800-900



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	6	6	2	0	14
715-730	10	12	6	1	29
730-745	2	22	5	1	30
745-800	14	32	4	9	59
800-815	17	29	15	0	61
815-830	14	26	23	2	65
830-845	6	18	14	1	39
845-900	13	21	13	4	51
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	32	72	17	11	132
715-815	43	95	30	11	179
730-830	47	109	47	12	215
745-845	51	105	56	12	224
800-900	50	94	65	7	216

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	4	2	0	0	6
715-730	0	3	1	0	4
730-745	0	1	2	0	3
745-800	2	7	2	2	13
800-815	2	2	3	1	8
815-830	2	3	3	0	8
830-845	2	4	4	1	11
845-900	1	4	2	2	9
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	6	13	5	2	26
715-815	4	13	8	3	28
730-830	6	13	10	3	32
745-845	8	16	12	4	40
800-900	7	13	12	4	36

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

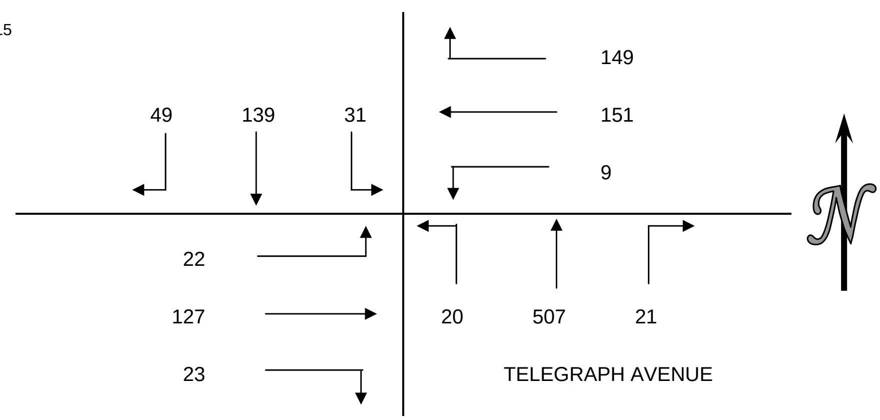
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		WEDNESDAY OCTOBER 29, 2008
PERIOD"		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	TELEGRAPH AVENUE
	E/W	20TH STREET
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	15	38	18	29	44	5	11	117	7	5	20	6	315
415-430	22	41	8	13	37	2	8	139	7	11	32	4	324
430-445	9	38	7	44	37	2	4	110	3	7	38	3	302
445-500	4	28	9	35	23	4	5	129	5	3	30	5	280
500-515	14	32	7	57	54	1	4	129	5	2	27	10	342
515-530	11	29	12	39	45	3	18	108	2	3	19	2	291
530-545	4	24	12	36	32	3	13	88	7	0	14	4	237
545-600	15	37	2	23	45	4	13	96	9	5	21	4	274
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	50	145	42	121	141	13	28	495	22	26	120	18	1221
415-515	49	139	31	149	151	9	21	507	20	23	127	22	1248
430-530	38	127	35	175	159	10	31	476	15	15	114	20	1215
445-545	33	113	40	167	154	11	40	454	19	8	90	21	1150
500-600	44	122	33	155	176	11	48	421	23	10	81	20	1144

AM PEAK HOUR: 415-515



20TH STREET

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	10	32	7	9	58
415-430	18	56	29	3	106
430-445	18	48	15	8	89
445-500	9	32	14	4	59
500-515	15	53	35	8	111
515-530	5	32	40	5	82
530-545	21	31	17	7	76
545-600	23	32	14	10	79
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	55	168	65	24	312
415-515	60	189	93	23	365
430-530	47	165	104	25	341
445-545	50	148	106	24	328
500-600	64	148	106	30	348

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	2	7	2	2	13
415-430	3	20	4	1	28
430-445	2	19	1	3	25
445-500	0	5	2	1	8
500-515	1	14	13	2	30
515-530	0	14	8	0	22
530-545	6	9	6	3	24
545-600	6	14	4	2	26
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	7	51	9	7	74
415-515	6	58	20	7	91
430-530	3	52	24	6	85
445-545	7	42	29	6	84
500-600	13	51	31	7	102

ALL TRAFFIC DATA, INC
(916)771-8700
FAX 786-2879

City of Oakland — Broadway & 20th St — Date: 05/22/2008

	Broadway Southbound				20th St Westbound				Broadway Northbound				20th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	6	35	2	43	6	18	13	37	5	52	6	63	0	13	7	20	163
7:15	3	40	8	51	4	14	18	36	5	53	9	67	1	20	13	34	188
7:30	7	51	12	70	3	34	16	53	10	63	10	83	3	17	7	27	233
7:45	10	69	9	88	6	31	23	60	9	83	13	105	2	27	11	40	293
Total	26	195	31	252	19	97	70	186	29	251	38	318	6	77	38	121	877
8:00	6	73	6	85	13	25	26	64	12	96	16	124	2	25	14	41	314
8:15	16	92	4	112	8	35	27	70	14	98	15	127	2	26	17	45	354
8:30	17	98	7	122	10	34	20	64	13	102	12	127	1	40	9	50	363
8:45	14	87	5	106	10	36	21	67	12	109	15	136	2	38	12	52	361
Total	53	350	22	425	41	130	94	265	51	405	58	514	7	129	52	188	1392
16:00	7	79	13	99	5	45	9	59	14	144	23	181	1	36	22	59	398
16:15	8	100	14	122	9	45	19	73	17	146	25	188	2	39	25	66	449
16:30	10	101	10	121	10	43	14	67	21	156	21	198	5	35	22	62	448
16:45	8	107	8	123	13	47	14	74	23	152	24	199	6	39	17	62	458
Total	33	387	45	465	37	180	56	273	75	598	93	766	14	149	86	249	1753
17:00	6	108	13	127	13	56	21	90	23	174	25	222	5	34	18	57	496
17:15	10	133	4	147	14	51	24	89	21	165	21	207	2	29	21	52	495
17:30	13	118	8	139	11	45	27	83	25	184	25	234	6	26	24	56	512
17:45	10	124	5	139	12	43	20	75	17	152	19	188	7	27	15	49	451
Total	39	483	30	552	50	195	92	337	86	675	90	851	20	116	78	214	1954
Grand Total	151	1415	128	1694	147	602	312	1061	241	1929	279	2449	47	471	254	772	5976
Apprch%	8.9%	83.5%	7.6%		13.9%	56.7%	29.4%		9.8%	78.8%	11.4%		6.1%	61.0%	32.9%		
Total %	2.5%	23.7%	2.1%	28.3%	2.5%	10.1%	5.2%	17.8%	4.0%	32.3%	4.7%	41.0%	0.8%	7.9%	4.3%	12.9%	

City of Oakland — Broadway & 20th St — Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Broadway Southbound				20th St Westbound				Broadway Northbound				20th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	6	73	6	85	13	25	26	64	12	96	16	124	2	25	14	41	314
815	16	92	4	112	8	35	27	70	14	98	15	127	2	26	17	45	354
830	17	98	7	122	10	34	20	64	13	102	12	127	1	40	9	50	363
845	14	87	5	106	10	36	21	67	12	109	15	136	2	38	12	52	361
Total Volume	53	350	22	425	41	130	94	265	51	405	58	514	7	129	52	188	1392
% App Total.	####	82.4%	5.2%		15.5%	49.1%	35.5%		9.9%	78.8%	11.3%		3.7%	68.6%	27.7%		
PHF	0.871				0.946				0.945				0.904				

PM Peak Hr Begins at 445 PM

	Broadway Southbound				20th St Westbound				Broadway Northbound				20th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	8	107	8	123	13	47	14	74	23	152	24	199	6	39	17	62	458
500	6	108	13	127	13	56	21	90	23	174	25	222	5	34	18	57	496
515	10	133	4	147	14	51	24	89	21	165	21	207	2	29	21	52	495
530	13	118	8	139	11	45	27	83	25	184	25	234	6	26	24	56	512
Total Volume	37	466	33	536	51	199	86	336	92	675	95	862	19	128	80	227	1961
% App Total.	6.9%	86.9%	6.2%		15.2%	59.2%	25.6%		10.7%	78.3%	11.0%		8.4%	56.4%	35.2%		
PHF	0.912				0.933				0.921				0.915				

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKALND

File Name : 08-7458-013 FRANKLIN-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

	FRANKLIN ST. Southbound					20TH ST. Westbound					FRANKLIN ST. Northbound					20TH ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	52	0	0	27	10	23	37	4	10	6	15	20	2	20	0	21	22	111	79	190
07:15	0	0	0	61	0	0	28	19	25	47	3	21	8	21	32	3	28	0	14	31	121	110	231
07:30	0	0	0	83	0	0	47	15	15	62	8	31	14	17	53	5	24	0	19	29	134	144	278
07:45	0	0	0	102	0	0	56	11	29	67	4	35	23	19	62	5	46	0	21	51	171	180	351
Total	0	0	0	298	0	0	158	55	92	213	19	97	51	72	167	15	118	0	75	133	537	513	1050
08:00	0	0	0	107	0	0	47	15	21	62	7	29	21	24	57	6	50	0	11	56	163	175	338
08:15	0	0	0	98	0	0	51	16	19	67	9	30	21	27	60	5	61	0	23	66	167	193	360
08:30	0	0	0	112	0	0	55	19	26	74	4	52	19	31	75	6	58	0	26	64	195	213	408
08:45	0	0	0	97	0	0	50	19	24	69	6	42	15	21	63	6	54	0	21	60	163	192	355
Total	0	0	0	414	0	0	203	69	90	272	26	153	76	103	255	23	223	0	81	246	688	773	1461
*** BREAK ***																							
16:00	0	0	0	92	0	0	66	18	33	84	10	60	29	39	99	10	33	0	18	43	182	226	408
16:15	0	0	0	102	0	0	61	14	21	75	9	60	40	24	109	7	57	0	19	64	166	248	414
16:30	0	0	0	112	0	0	53	8	29	61	11	62	47	26	120	11	58	0	12	69	179	250	429
16:45	0	0	0	96	0	0	70	20	35	90	15	64	46	19	125	11	60	0	24	71	174	286	460
Total	0	0	0	402	0	0	250	60	118	310	45	246	162	108	453	39	208	0	73	247	701	1010	1711
17:00	0	0	0	107	0	0	78	19	37	97	14	75	50	28	139	7	60	0	21	67	193	303	496
17:15	0	0	0	88	0	0	82	16	25	98	13	80	49	35	142	4	62	0	17	66	165	306	471
17:30	0	0	0	101	0	0	70	20	29	90	8	83	53	25	144	7	73	0	23	80	178	314	492
17:45	0	0	0	91	0	0	64	20	17	84	13	75	43	29	131	3	64	0	23	67	160	282	442
Total	0	0	0	387	0	0	294	75	108	369	48	313	195	117	556	21	259	0	84	280	696	1205	1901
Grand Total	0	0	0	1501	0	0	905	259	408	1164	138	809	484	400	1431	98	808	0	313	906	2622	3501	6123
Apprch %	0	0	0			0	77.7	22.3			9.6	56.5	33.8			10.8	89.2	0					
Total %	0	0	0		0	0	25.8	7.4		33.2	3.9	23.1	13.8		40.9	2.8	23.1	0		25.9	42.8	57.2	

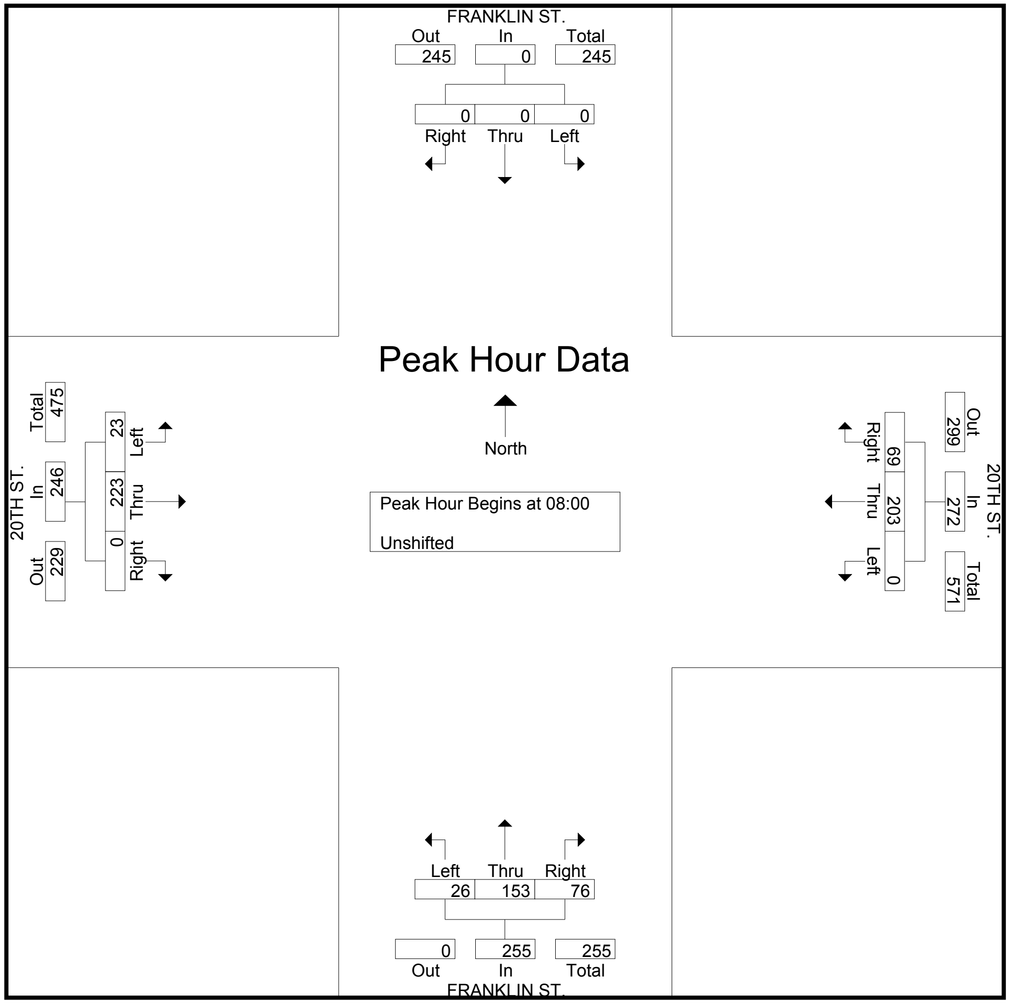
	FRANKLIN ST. Southbound				20TH ST. Westbound				FRANKLIN ST. Northbound				20TH ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	0	47	15	62	7	29	**21**	57	**6**	50	0	56	175
08:15	0	0	0	0	0	51	16	67	**9**	30	21	60	5	**61**	0	**66**	193
08:30	0	0	0	0	0	**55**	**19**	**74**	4	**52**	19	**75**	6	58	0	64	**213**
08:45	0	0	0	0	0	50	19	69	6	42	15	63	6	54	0	60	192
Total Volume	0	0	0	0	0	203	69	272	26	153	76	255	23	223	0	246	773
% App. Total	0	0	0		0	74.6	25.4		10.2	60	29.8		9.3	90.7	0		
PHF	.000	.000	.000	.000	.000	.923	.908	.919	.722	.736	.905	.850	.958	.914	.000	.932	.907

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKALND

File Name : 08-7458-013 FRANKLIN-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

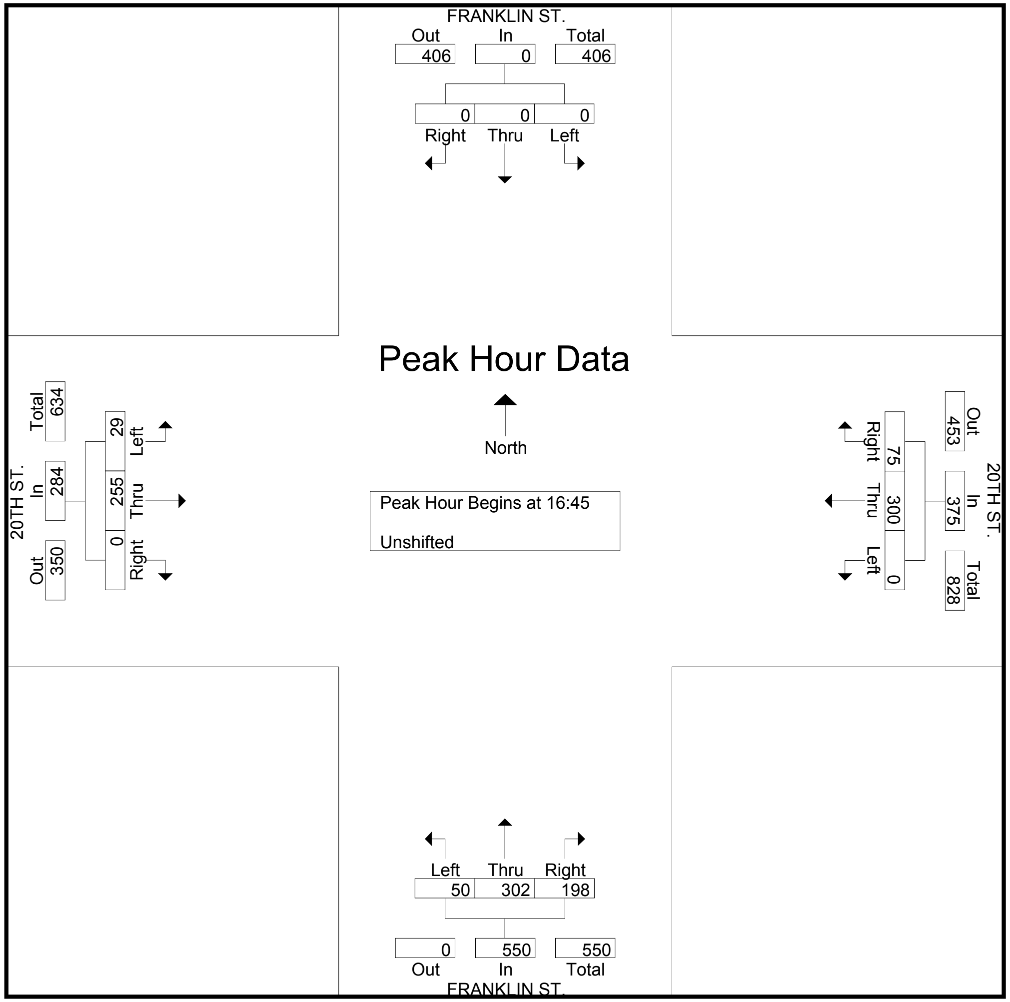
16:45	0	0	0	0	0	70	**20**	90	**15**	64	46	125	**11**	60	0	71	286
17:00	0	0	0	0	0	78	19	97	14	75	50	139	7	60	0	67	303
17:15	0	0	0	0	0	**82**	16	**98**	13	80	49	142	4	62	0	66	306
17:30	0	0	0	0	0	70	20	90	8	**83**	**53**	**144**	7	**73**	0	**80**	**314**
Total Volume	0	0	0	0	0	300	75	375	50	302	198	550	29	255	0	284	1209
% App. Total	0	0	0		0	80	20		9.1	54.9	36		10.2	89.8	0		
PHF	.000	.000	.000	.000	.000	.915	.938	.957	.833	.910	.934	.955	.659	.873	.000	.888	.963

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKALND

File Name : 08-7458-013 FRANKLIN-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-014 WEBSTER-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 1

Groups Printed- Unshifted

	WEBSTER ST. Southbound					20TH ST. Westbound					WEBSTER ST. Northbound					20TH ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	9	20	8	72	37	12	31	0	33	43	0	0	0	19	0	0	12	11	13	23	137	103	240
07:15	5	35	10	101	50	18	37	0	21	55	0	0	0	19	0	0	19	18	5	37	146	142	288
07:30	11	40	9	149	60	22	48	0	21	70	0	0	0	26	0	0	30	12	14	42	210	172	382
07:45	19	64	13	160	96	30	57	0	33	87	0	0	0	52	0	0	38	31	17	69	262	252	514
Total	44	159	40	482	243	82	173	0	108	255	0	0	0	116	0	0	99	72	49	171	755	669	1424
08:00	14	66	14	167	94	26	43	0	29	69	0	0	0	52	0	0	34	32	15	66	263	229	492
08:15	16	62	15	178	93	35	57	0	50	92	0	0	0	56	0	0	55	30	23	85	307	270	577
08:30	13	75	23	176	111	34	52	0	47	86	0	0	0	62	0	0	51	31	40	82	325	279	604
08:45	11	71	20	142	102	32	49	0	46	81	0	0	0	41	0	0	42	28	29	70	258	253	511
Total	54	274	72	663	400	127	201	0	172	328	0	0	0	211	0	0	182	121	107	303	1153	1031	2184
*** BREAK ***																							
16:00	11	105	15	151	131	17	73	0	61	90	0	0	0	61	0	0	40	24	24	64	297	285	582
16:15	14	98	19	100	131	24	51	0	41	75	0	0	0	35	0	0	64	31	24	95	200	301	501
16:30	17	98	16	153	131	20	45	0	53	65	0	0	0	48	0	0	77	32	33	109	287	305	592
16:45	18	93	19	102	130	21	68	0	20	89	0	0	0	28	0	0	64	31	25	95	175	314	489
Total	60	394	69	506	523	82	237	0	175	319	0	0	0	172	0	0	245	118	106	363	959	1205	2164
17:00	22	91	23	177	136	27	74	0	60	101	0	0	0	66	0	0	70	35	37	105	340	342	682
17:15	12	110	22	169	144	33	69	0	68	102	0	0	0	58	0	0	75	38	16	113	311	359	670
17:30	13	100	22	164	135	25	77	6	51	108	0	0	0	64	0	0	90	35	28	125	307	368	675
17:45	16	102	25	156	143	24	62	0	49	86	0	0	0	42	0	0	80	29	21	109	268	338	606
Total	63	403	92	666	558	109	282	6	228	397	0	0	0	230	0	0	315	137	102	452	1226	1407	2633
Grand Total	221	1230	273	2317	1724	400	893	6	683	1299	0	0	0	729	0	0	841	448	364	1289	4093	4312	8405
Apprch %	12.8	71.3	15.8			30.8	68.7	0.5			0	0	0			0	65.2	34.8					
Total %	5.1	28.5	6.3		40	9.3	20.7	0.1		30.1	0	0	0		0	0	19.5	10.4		29.9	48.7	51.3	

	WEBSTER ST. Southbound				20TH ST. Westbound				WEBSTER ST. Northbound				20TH ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	14	66	14	94	26	43	0	69	0	0	0	0	0	34	**32**	66	229
08:15	**16**	62	15	93	**35**	**57**	0	**92**	0	0	0	0	0	**55**	30	**85**	270
08:30	13	**75**	**23**	**111**	34	52	0	86	0	0	0	0	0	51	31	82	**279**
08:45	11	71	20	102	32	49	0	81	0	0	0	0	0	42	28	70	253
Total Volume	54	274	72	400	127	201	0	328	0	0	0	0	0	182	121	303	1031
% App. Total	13.5	68.5	18		38.7	61.3	0		0	0	0		0	60.1	39.9		
PHF	.844	.913	.783	.901	.907	.882	.000	.891	.000	.000	.000	.000	.000	.827	.945	.891	.924

All Traffic Data

(916) 771-8700
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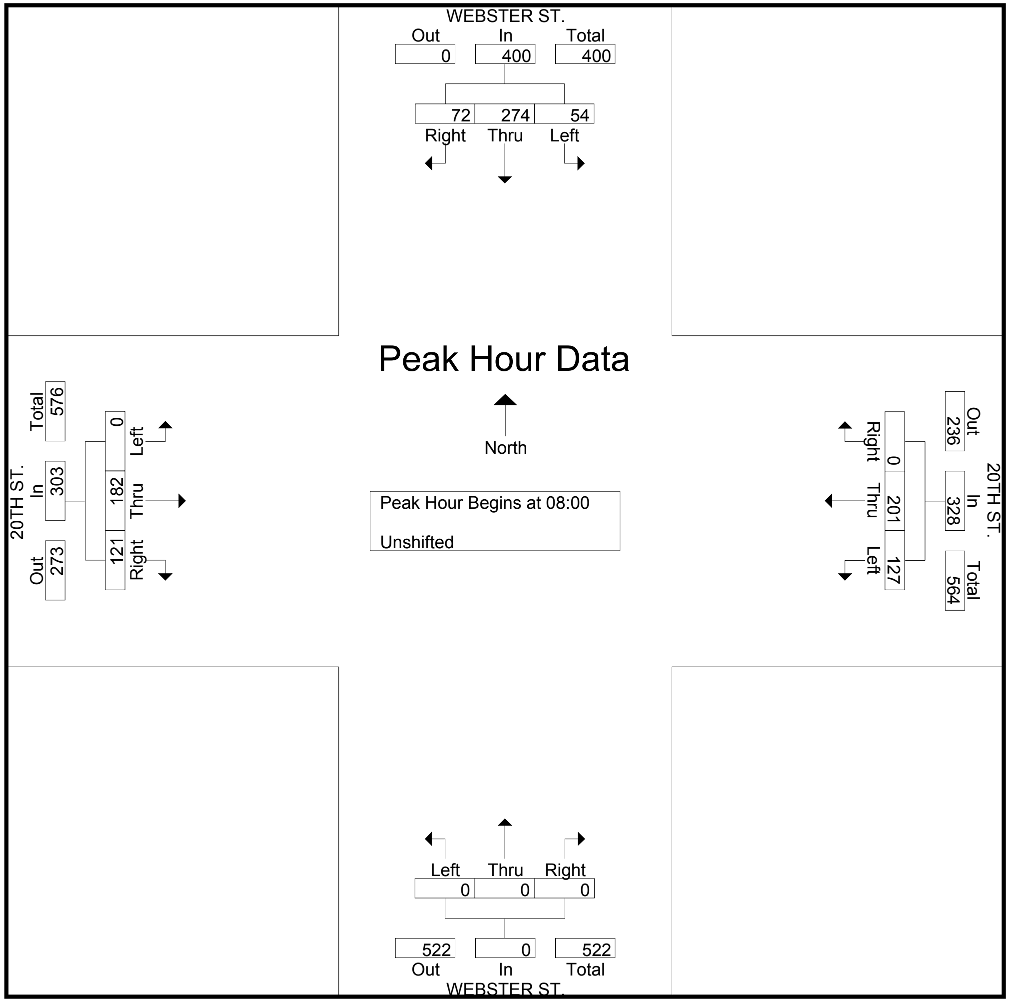
OAKLAND

File Name : 08-7458-014 WEBSTER-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

17:00	**22**	91	23	136	27	74	0	101	0	0	0	0	0	70	35	105	342
17:15	12	**110**	22	**144**	**33**	69	0	102	0	0	0	0	0	75	**38**	113	359
17:30	13	100	22	135	25	**77**	**6**	**108**	0	0	0	0	0	**90**	35	**125**	**368**
17:45	16	102	**25**	143	24	62	0	86	0	0	0	0	0	80	29	109	338
Total Volume	63	403	92	558	109	282	6	397	0	0	0	0	0	315	137	452	1407
% App. Total	11.3	72.2	16.5		27.5	71	1.5		0	0	0		0	69.7	30.3		
PHF	.716	.916	.920	.969	.826	.916	.250	.919	.000	.000	.000	.000	.000	.875	.901	.904	.956

All Traffic Data

(916) 771-8700
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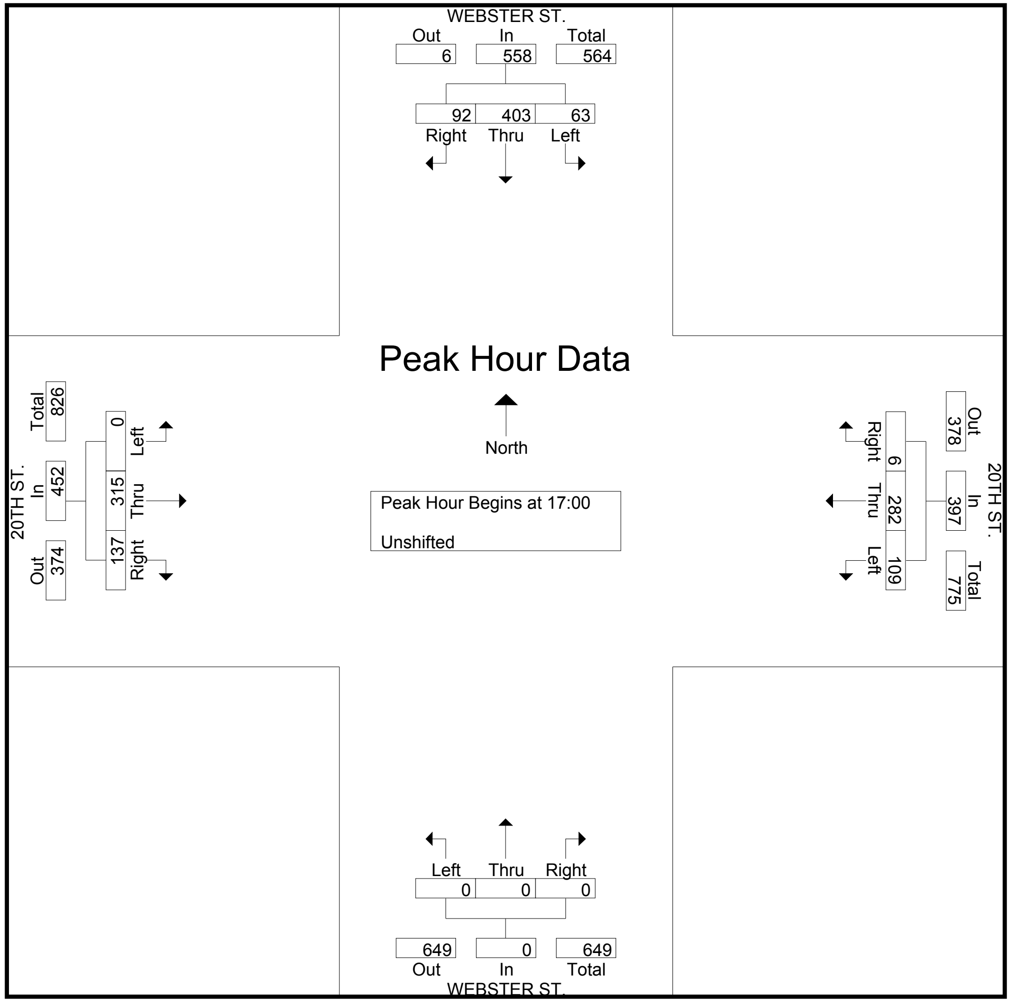
OAKLAND

File Name : 08-7458-014 WEBSTER-20TH-F
Site Code : 00000000
Start Date : 08/06/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700
FAX 786-2879

City of Oakland — Harrison St & 20th St — Date: 05/22/2008

	Harrison St				20th St				Harrison St				20th St				
	Southbound				Westbound				Northbound				Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	33	38	71	0	11	0	11	13	35	1	49	13	5	8	26	157
7:15	0	57	34	91	4	8	0	12	12	30	1	43	16	5	15	36	182
7:30	0	47	38	85	3	20	1	24	11	45	1	57	15	4	11	30	196
7:45	0	80	32	112	2	29	0	31	19	49	4	72	15	4	20	39	254
Total	0	217	142	359	9	68	1	78	55	159	7	221	59	18	54	131	789
8:00	0	72	50	122	2	26	0	28	20	58	5	83	14	6	24	44	277
8:15	0	73	50	123	3	33	0	36	17	65	4	86	25	7	26	58	303
8:30	0	75	44	119	4	38	0	42	21	62	2	85	21	10	37	68	314
8:45	0	91	47	138	2	41	0	43	21	64	4	89	23	8	35	66	336
Total	0	311	191	502	11	138	0	149	79	249	15	343	83	31	122	236	1230
16:00	0	52	24	76	2	20	0	22	16	103	6	125	60	17	6	83	306
16:15	0	37	36	73	1	19	0	20	15	113	3	131	58	20	7	85	309
16:30	0	39	33	72	2	14	0	16	17	119	3	139	69	16	10	95	322
16:45	0	38	29	67	2	23	0	25	20	127	5	152	70	23	10	103	347
Total	0	166	122	288	7	76	0	83	68	462	17	547	257	76	33	366	1284
17:00	0	44	35	79	1	25	0	26	34	165	3	202	75	23	9	107	414
17:15	0	29	31	60	2	20	0	22	26	178	5	209	60	26	12	98	389
17:30	0	27	37	64	0	18	0	18	16	159	7	182	51	17	4	72	336
17:45	0	32	28	60	0	19	1	20	15	146	8	169	67	21	7	95	344
Total	0	132	131	263	3	82	1	86	91	648	23	762	253	87	32	372	1483
Grand Total	0	826	586	1412	30	364	2	396	293	1518	62	1873	652	212	241	1105	4786
Apprch%	0.0%	58.5%	41.5%		7.6%	91.9%	0.5%		15.6%	81.0%	3.3%		59.0%	19.2%	21.8%		
Total %	0.0%	17.3%	12.2%	29.5%	0.6%	7.6%	0.0%	8.3%	6.1%	31.7%	1.3%	39.1%	13.6%	4.4%	5.0%	23.1%	

City of Oakland — Harrison St & 20th St — Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Harrison St				20th St				Harrison St				20th St				
	Southbound				Westbound				Northbound				Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	72	50	122	2	26	0	28	20	58	5	83	14	6	24	44	277
815	0	73	50	123	3	33	0	36	17	65	4	86	25	7	26	58	303
830	0	75	44	119	4	38	0	42	21	62	2	85	21	10	37	68	314
845	0	91	47	138	2	41	0	43	21	64	4	89	23	8	35	66	336
Total Volume	0	311	191	502	11	138	0	149	79	249	15	343	83	31	122	236	1230
% App Total.	0.0%	62.0%	38.0%		7.4%	92.6%	0.0%		23.0%	72.6%	4.4%		35.2%	13.1%	51.7%		
PHF	0.909				0.866				0.963				0.868				

PM Peak Hr Begins at 445 PM

	Harrison St				20th St				Harrison St				20th St				
	Southbound				Westbound				Northbound				Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	0	38	29	67	2	23	0	25	20	127	5	152	70	23	10	103	347
500	0	44	35	79	1	25	0	26	34	165	3	202	75	23	9	107	414
515	0	29	31	60	2	20	0	22	26	178	5	209	60	26	12	98	389
530	0	27	37	64	0	18	0	18	16	159	7	182	51	17	4	72	336
Total Volume	0	138	132	270	5	86	0	91	96	629	20	745	256	89	35	380	1486
% App Total.	0.0%	51.1%	48.9%		5.5%	94.5%	0.0%		12.9%	84.4%	2.7%		67.4%	23.4%	9.2%		
PHF	0.854				0.875				0.891				0.888				

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-015 INTERNAL-20TH ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

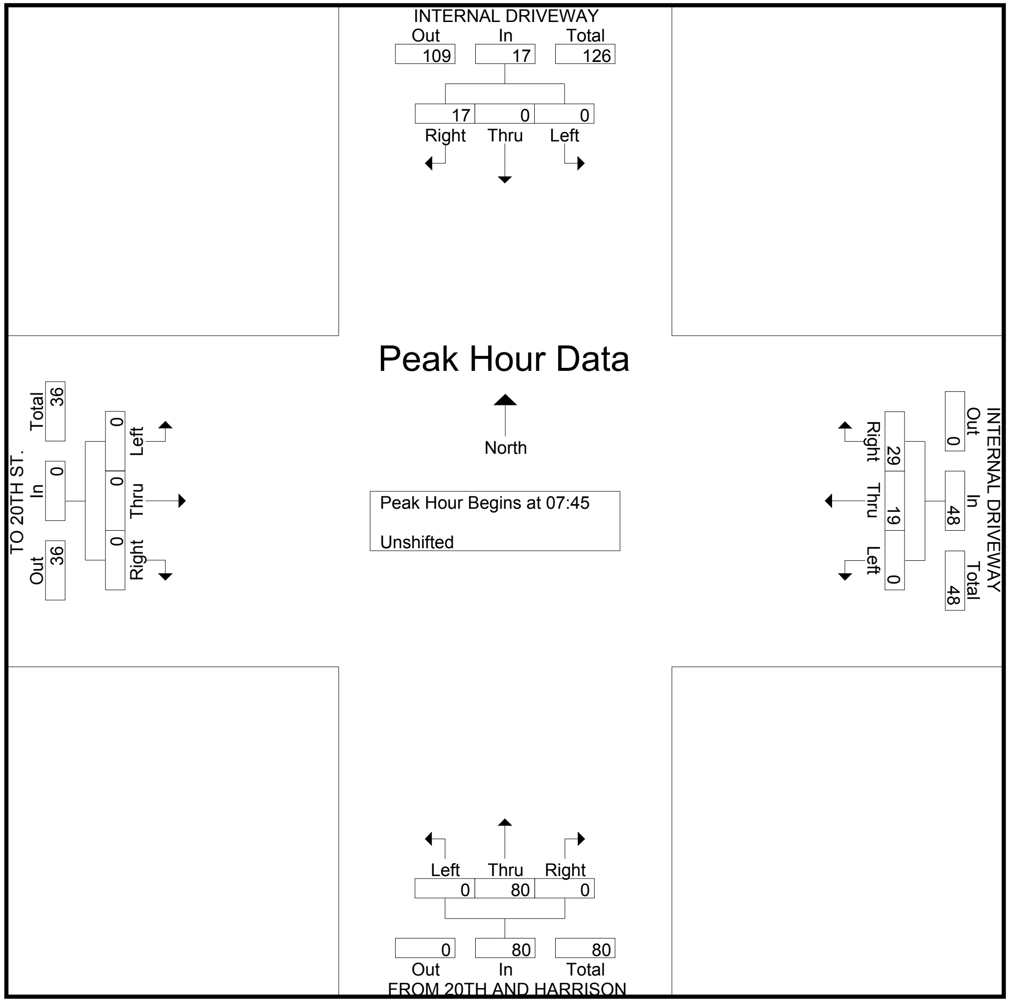
Groups Printed- Unshifted

	INTERNAL DRIVEWAY Southbound					INTERNAL DRIVEWAY Westbound					FROM 20TH AND HARRISON Northbound					TO 20TH ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	1	11	1	0	4	2	1	6	0	14	0	11	14	0	0	0	0	0	23	21	44
07:15	0	0	0	21	0	0	1	1	0	2	0	11	0	19	11	0	0	0	0	0	40	13	53
07:30	0	0	3	62	3	0	3	3	0	6	0	15	0	46	15	0	0	0	0	0	108	24	132
07:45	0	0	9	84	9	0	8	5	0	13	0	17	0	64	17	0	0	0	0	0	148	39	187
Total	0	0	13	178	13	0	16	11	1	27	0	57	0	140	57	0	0	0	0	0	319	97	416
08:00	0	0	2	96	2	0	3	5	0	8	0	22	0	79	22	0	0	0	0	0	175	32	207
08:15	0	0	2	92	2	0	4	9	0	13	0	15	0	60	15	0	0	0	0	0	152	30	182
08:30	0	0	4	64	4	0	4	10	0	14	0	26	0	54	26	0	0	0	0	0	118	44	162
08:45	0	0	0	84	0	0	6	8	0	14	0	18	0	65	18	0	0	0	0	0	149	32	181
Total	0	0	8	336	8	0	17	32	0	49	0	81	0	258	81	0	0	0	0	0	594	138	732
*** BREAK ***																							
16:00	0	0	12	55	12	0	11	10	0	21	0	5	0	65	5	0	0	0	0	0	120	38	158
16:15	0	0	10	33	10	0	8	9	0	17	0	13	0	67	13	0	0	0	0	0	100	40	140
16:30	0	0	14	53	14	0	7	11	0	18	0	11	0	61	11	0	0	0	0	0	114	43	157
16:45	0	0	22	54	22	0	12	12	0	24	0	7	0	85	7	0	0	0	0	0	139	53	192
Total	0	0	58	195	58	0	38	42	0	80	0	36	0	278	36	0	0	0	0	0	473	174	647
17:00	0	0	12	37	12	0	9	10	0	19	0	9	0	54	9	0	0	0	0	0	91	40	131
17:15	0	0	15	57	15	0	3	12	0	15	0	10	0	79	10	0	0	0	0	0	136	40	176
17:30	0	0	10	34	10	0	11	5	0	16	0	11	0	61	11	0	0	0	0	0	95	37	132
17:45	0	0	10	26	10	0	10	9	0	19	0	9	0	54	9	0	0	0	0	0	80	38	118
Total	0	0	47	154	47	0	33	36	0	69	0	39	0	248	39	0	0	0	0	0	402	155	557
Grand Total	0	0	126	863	126	0	104	121	1	225	0	213	0	924	213	0	0	0	0	0	1788	564	2352
Apprch %	0	0	100			0	46.2	53.8			0	100	0			0	0	0					
Total %	0	0	22.3		22.3	0	18.4	21.5		39.9	0	37.8	0		37.8	0	0	0		0	76	24	

	INTERNAL DRIVEWAY Southbound				INTERNAL DRIVEWAY Westbound				FROM 20TH AND HARRISON Northbound				TO 20TH ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	0	0	**9**	**9**	0	**8**	5	13	0	17	0	17	0	0	0	0	39
08:00	0	0	2	2	0	3	5	8	0	22	0	22	0	0	0	0	32
08:15	0	0	2	2	0	4	9	13	0	15	0	15	0	0	0	0	30
08:30	0	0	4	4	0	4	**10**	**14**	0	**26**	0	**26**	0	0	0	0	**44**
Total Volume	0	0	17	17	0	19	29	48	0	80	0	80	0	0	0	0	145
% App. Total	0	0	100		0	39.6	60.4		0	100	0		0	0	0		
PHF	.000	.000	.472	.472	.000	.594	.725	.857	.000	.769	.000	.769	.000	.000	.000	.000	.824

OAKLAND

File Name : 08-7458-015 INTERNAL-20TH ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:15

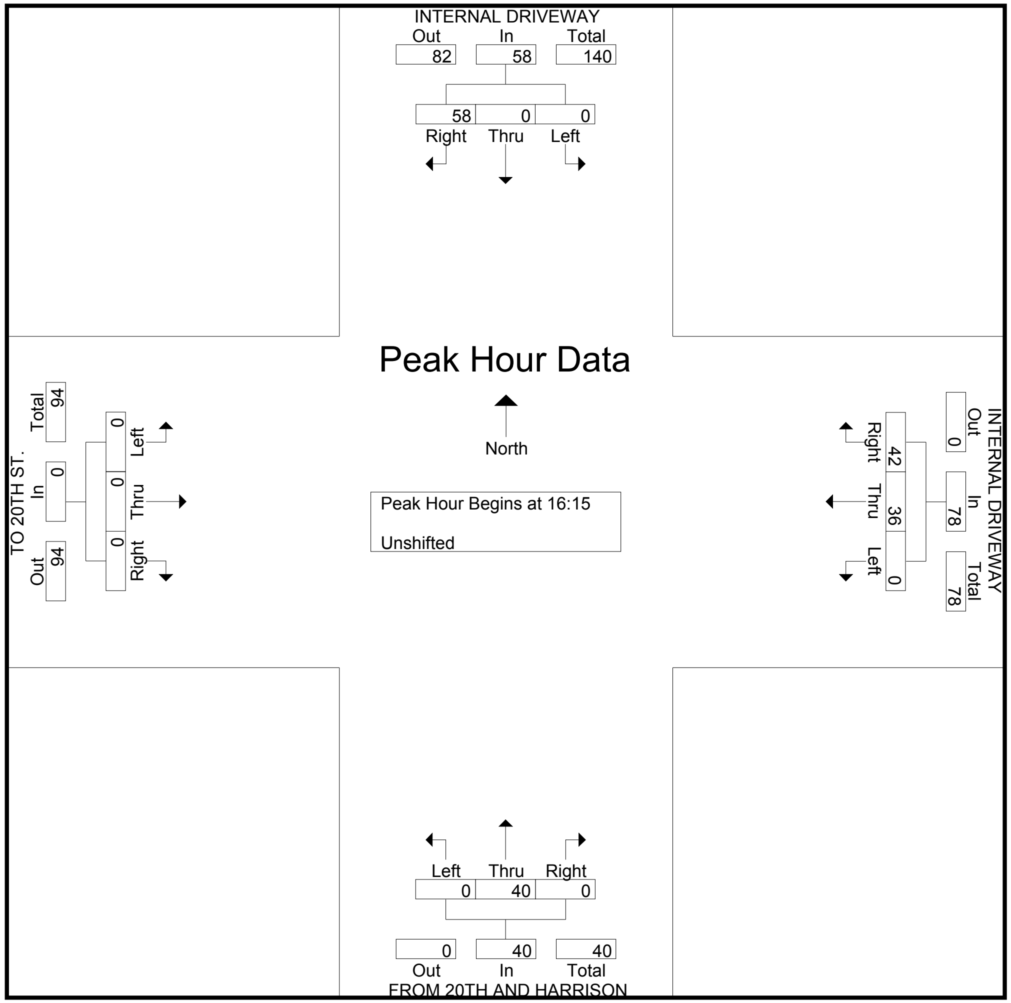
16:15	0	0	10	10	0	8	9	17	0	**13**	0	**13**	0	0	0	0	40
16:30	0	0	14	14	0	7	11	18	0	11	0	11	0	0	0	0	43
16:45	0	0	**22**	**22**	0	**12**	**12**	**24**	0	7	0	7	0	0	0	0	**53**
17:00	0	0	12	12	0	9	10	19	0	9	0	9	0	0	0	0	40
Total Volume	0	0	58	58	0	36	42	78	0	40	0	40	0	0	0	0	176
% App. Total	0	0	100		0	46.2	53.8		0	100	0		0	0	0		
PHF	.000	.000	.659	.659	.000	.750	.875	.813	.000	.769	.000	.769	.000	.000	.000	.000	.830

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-015 INTERNAL-20TH ST-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 3



ALL TRAFFIC DATA, INC

(916)771-8700

FAX 786-2879

City of Oakland — Harrison St & Lakeside Dr — Date: 05/22/2008

	Harrison St Southbound				Lakeside Dr Westbound				Harrison St Northbound				Lakeside Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	42	76	118	0	0	0	0	0	96	0	96	0	50	0	50	264
7:15	0	48	85	133	0	0	0	0	0	103	0	103	0	42	0	42	278
7:30	0	63	85	148	0	0	0	0	0	131	0	131	0	66	0	66	345
7:45	0	77	115	192	0	0	0	0	0	152	0	152	0	65	0	65	409
Total	0	230	361	591	0	0	0	0	0	482	0	482	0	223	0	223	1296
8:00	0	90	114	204	0	0	0	0	0	160	0	160	0	71	0	71	435
8:15	0	94	126	220	0	0	0	0	0	167	0	167	0	92	0	92	479
8:30	0	98	120	218	0	0	0	0	0	159	0	159	0	83	0	83	460
8:45	0	96	139	235	0	0	0	0	0	168	0	168	0	86	0	86	489
Total	0	378	499	877	0	0	0	0	0	654	0	654	0	332	0	332	1863
16:00	0	88	70	158	0	0	0	0	0	176	0	176	0	165	0	165	499
16:15	0	115	75	190	0	0	0	0	0	164	0	164	0	165	0	165	519
16:30	0	154	70	224	0	0	0	0	0	173	0	173	0	184	0	184	581
16:45	0	151	70	221	0	0	0	0	0	158	0	158	0	195	0	195	574
Total	0	508	285	793	0	0	0	0	0	671	0	671	0	709	0	709	2173
17:00	0	155	81	236	0	0	0	0	0	189	0	189	0	236	0	236	661
17:15	0	156	65	221	0	0	0	0	0	179	0	179	0	233	0	233	633
17:30	0	158	68	226	0	0	0	0	0	172	0	172	0	212	0	212	610
17:45	0	155	58	213	0	0	0	0	0	163	0	163	0	212	0	212	588
Total	0	624	272	896	0	0	0	0	0	703	0	703	0	893	0	893	2492
Grand Total	0	1740	1417	3157	0	0	0	0	0	2510	0	2510	0	2157	0	2157	7824
Apprch%	0.0%	55.1%	44.9%		0.0%	0.0%	0.0%		0.0%	100.0%	0.0%		0.0%	100.0%	0.0%		
Total %	0.0%	22.2%	18.1%	40.4%	0.0%	0.0%	0.0%	0.0%	0.0%	32.1%	0.0%	32.1%	0.0%	27.6%	0.0%	27.6%	

City of Oakland — Harrison St & Lakeside Dr — Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Harrison St Southbound				Lakeside Dr Westbound				Harrison St Northbound				Lakeside Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	90	114	204	0	0	0	0	0	160	0	160	0	71	0	71	435
815	0	94	126	220	0	0	0	0	0	167	0	167	0	92	0	92	479
830	0	98	120	218	0	0	0	0	0	159	0	159	0	83	0	83	460
845	0	96	139	235	0	0	0	0	0	168	0	168	0	86	0	86	489
Total Volume	0	378	499	877	0	0	0	0	0	654	0	654	0	332	0	332	1863
% App Total.	0.0%	43.1%	56.9%		0.0%	0.0%	0.0%		0.0%	100.0%	0.0%		0.0%	100.0%	0.0%		
PHF	0.933				0.000				0.973				0.902				

PM Peak Hr Begins at 500 PM

	Harrison St Southbound				Lakeside Dr Westbound				Harrison St Northbound				Lakeside Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	0	155	81	236	0	0	0	0	0	189	0	189	0	236	0	236	661
515	0	156	65	221	0	0	0	0	0	179	0	179	0	233	0	233	633
530	0	158	68	226	0	0	0	0	0	172	0	172	0	212	0	212	610
545	0	155	58	213	0	0	0	0	0	163	0	163	0	212	0	212	588
Total Volume	0	624	272	896	0	0	0	0	0	703	0	703	0	893	0	893	2492
% App Total.	0.0%	69.6%	30.4%		0.0%	0.0%	0.0%		0.0%	100.0%	0.0%		0.0%	100.0%	0.0%		
PHF	0.949				0.000				0.930				0.946				

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-016 LAKESIDE-20TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 1

Groups Printed- Unshifted

	LAKESIDE DR. Southbound					Westbound					LAKESIDE DR. Northbound					20TH ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	38	0	0	38	0	0	0	0	0	12	68	0	0	80	0	7	0	0	7	0	125	125
07:15	0	46	0	0	46	0	0	0	0	0	17	73	0	0	90	0	5	0	0	5	0	141	141
07:30	0	67	0	0	67	0	0	0	0	0	24	118	0	0	142	0	8	0	0	8	0	217	217
07:45	0	68	0	0	68	0	0	0	0	0	26	124	0	0	150	0	11	0	0	11	0	229	229
Total	0	219	0	0	219	0	0	0	0	0	79	383	0	0	462	0	31	0	0	31	0	712	712
08:00	0	77	0	0	77	0	0	0	0	0	26	142	0	0	168	0	14	0	0	14	0	259	259
08:15	0	86	0	0	86	0	0	0	0	0	36	137	0	0	173	0	10	0	0	10	0	269	269
08:30	0	105	0	0	105	0	0	0	0	0	27	152	0	0	179	0	14	0	0	14	0	298	298
08:45	0	76	0	0	76	0	0	0	0	0	33	138	0	0	171	0	15	0	0	15	0	262	262
Total	0	344	0	0	344	0	0	0	0	0	122	569	0	0	691	0	53	0	0	53	0	1088	1088
*** BREAK ***																							
16:00	0	112	0	0	112	0	0	0	0	0	24	158	0	0	182	0	21	0	0	21	0	315	315
16:15	0	90	0	0	90	0	0	0	0	0	21	129	0	0	150	0	13	0	0	13	0	253	253
16:30	0	103	0	0	103	0	0	0	0	0	19	169	0	0	188	0	20	0	0	20	0	311	311
16:45	0	123	0	0	123	0	0	0	0	0	25	168	0	0	193	0	20	0	0	20	0	336	336
Total	0	428	0	0	428	0	0	0	0	0	89	624	0	0	713	0	74	0	0	74	0	1215	1215
17:00	0	146	0	0	146	0	0	0	0	0	27	125	0	0	152	0	20	0	0	20	0	318	318
17:15	0	129	0	0	129	0	0	0	0	0	48	174	0	0	222	0	34	0	0	34	0	385	385
17:30	0	137	0	0	137	0	0	0	0	0	32	144	0	0	176	0	23	0	0	23	0	336	336
17:45	0	121	0	0	121	0	0	0	0	0	26	149	0	0	175	0	27	0	0	27	0	323	323
Total	0	533	0	0	533	0	0	0	0	0	133	592	0	0	725	0	104	0	0	104	0	1362	1362
Grand Total	0	1524	0	0	1524	0	0	0	0	0	423	2168	0	0	2591	0	262	0	0	262	0	4377	4377
Apprch %	0	100	0			0	0	0			16.3	83.7	0			0	100	0					
Total %	0	34.8	0		34.8	0	0	0		0	9.7	49.5	0		59.2	0	6	0		6	0	100	

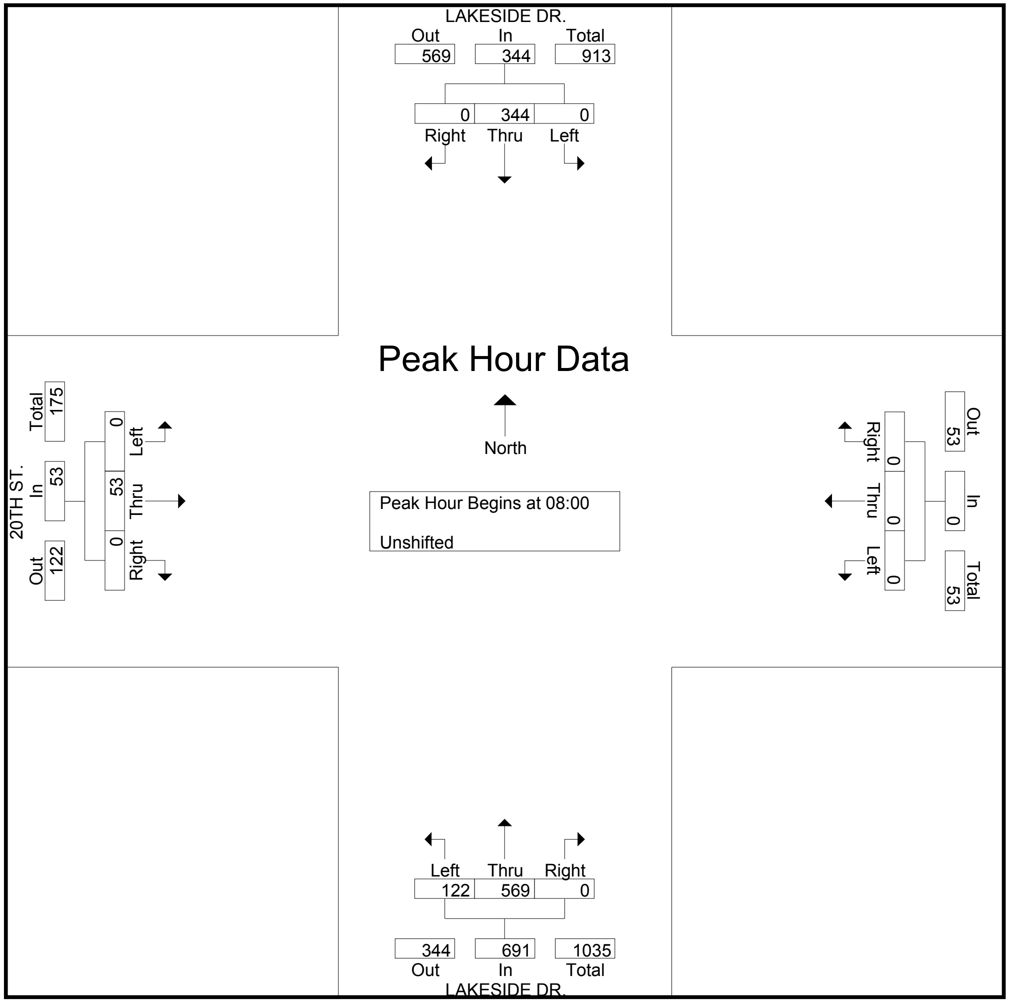
	LAKESIDE DR. Southbound				Westbound				LAKESIDE DR. Northbound				20TH ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 11:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	77	0	77	0	0	0	0	26	142	0	168	0	14	0	14	259
08:15	0	86	0	86	0	0	0	0	**36**	137	0	173	0	10	0	10	269
08:30	0	**105**	0	**105**	0	0	0	0	27	**152**	0	**179**	0	14	0	14	**298**
08:45	0	76	0	76	0	0	0	0	33	138	0	171	0	**15**	0	**15**	262
Total Volume	0	344	0	344	0	0	0	0	122	569	0	691	0	53	0	53	1088
% App. Total	0	100	0		0	0	0		17.7	82.3	0		0	100	0		
PHF	.000	.819	.000	.819	.000	.000	.000	.000	.847	.936	.000	.965	.000	.883	.000	.883	.913

All Traffic Data

(916) 771-8700
F (916) 786-2879

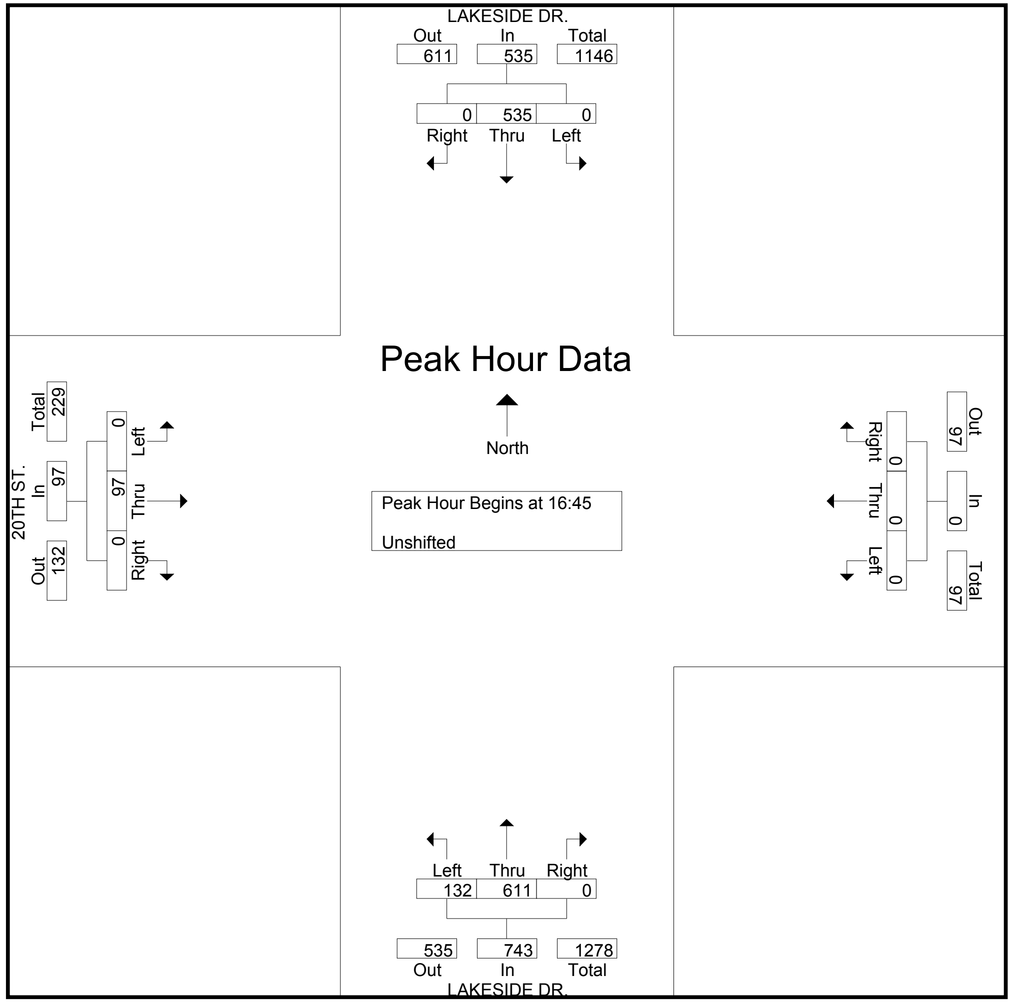
OAKLAND

File Name : 08-7458-016 LAKESIDE-20TH-F
Site Code : 00000000
Start Date : 08/07/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

16:45	0	123	0	123	0	0	0	0	25	168	0	193	0	20	0	20	336
17:00	0	**146**	0	**146**	0	0	0	0	27	125	0	152	0	20	0	20	318
17:15	0	129	0	129	0	0	0	0	**48**	**174**	0	**222**	0	**34**	0	**34**	**385**
17:30	0	137	0	137	0	0	0	0	32	144	0	176	0	23	0	23	336
Total Volume	0	535	0	535	0	0	0	0	132	611	0	743	0	97	0	97	1375
% App. Total	0	100	0		0	0	0		17.8	82.2	0		0	100	0		
PHF	.000	.916	.000	.916	.000	.000	.000	.000	.688	.878	.000	.837	.000	.713	.000	.713	.893


LAKESIDE DR.
Out In Total
611 535 1146
0 535 0
Right Thru Left
Peak Hour Data
North
Peak Hour Begins at 16:45
Unshifted
20TH ST.
Total 229
In 97
Out 132
Left 0
Thru 97
Right 0
Out 97
In 0
Total 97
Right 0
Thru 0
Left 0
Left Thru Right
132 611 0
535 743 1278
Out In Total
LAKESIDE DR.

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-009 BRUSH-18TH-F
Site Code : 00000000
Start Date : 06/02/2008

Groups Printed- Unshifted

	BRUSH ST. Southbound						SB I-980 OFF RAMP Southwestbound						18TH ST. Westbound						BRUSH ST. Northbound						18TH ST. Eastbound								
Start Time	Hard Left	Left	Thru	Right	Peds	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	Peds	App. Total	Left	Thru	Right	Hard Right	Peds	App. Total	Left	Thru	Bear Right	Right	Peds	App. Total	Left	Bear Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	35	2	0	37	0	232	0	0	0	232	15	21	0	0	0	36	0	0	0	0	1	0	0	0	0	0	0	0	1	305	306
07:15	0	0	42	4	0	46	0	290	0	0	0	290	12	23	0	0	0	35	0	0	0	0	2	0	0	0	0	0	5	5	2	376	378
07:30	0	0	53	4	0	57	0	398	0	0	0	398	18	32	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	505	505
07:45	0	0	64	2	0	66	0	401	0	0	0	401	17	38	0	0	0	55	0	0	0	0	3	0	0	0	0	0	6	6	3	528	531
Total	0	0	194	12	0	206	0	1321	0	0	0	1321	62	114	0	0	0	176	0	0	0	0	6	0	0	0	0	0	11	11	6	1714	1720
08:00	0	0	49	0	0	49	0	484	0	0	0	484	19	30	0	0	0	49	0	0	0	0	3	0	0	0	0	0	6	6	3	588	591
08:15	0	0	67	4	0	71	0	541	0	0	0	541	22	24	0	0	0	46	0	0	0	0	9	0	0	0	0	0	5	5	9	663	672
08:30	0	0	65	0	0	65	0	539	0	0	0	539	20	33	0	0	0	53	0	0	0	0	2	0	0	0	0	0	0	0	2	657	659
08:45	0	0	67	5	0	72	0	503	0	0	0	503	21	23	0	0	0	44	0	0	0	0	6	0	0	0	0	0	3	3	6	622	628
Total	0	0	248	9	0	257	0	2067	0	0	0	2067	82	110	0	0	0	192	0	0	0	0	20	0	0	0	0	0	14	14	20	2530	2550
*** BREAK ***																																	
16:00	0	0	91	2	0	93	0	154	27	0	0	181	25	31	0	0	0	56	0	0	0	0	2	0	0	0	0	0	5	5	2	335	337
16:15	0	0	91	2	0	93	0	143	21	0	0	164	21	30	0	0	0	51	0	0	0	0	7	0	0	0	0	0	9	9	7	317	324
16:30	0	0	106	2	0	108	0	124	31	0	0	155	29	30	0	0	0	59	0	0	0	0	7	0	0	0	0	0	5	5	7	327	334
16:45	0	0	94	0	0	94	0	147	27	0	0	174	32	40	0	0	0	72	0	0	0	0	4	0	0	0	0	0	1	1	4	341	345
Total	0	0	382	6	0	388	0	568	106	0	0	674	107	131	0	0	0	238	0	0	0	0	20	0	0	0	0	0	20	20	20	1320	1340
17:00	0	0	104	0	0	104	0	141	27	0	0	168	38	42	0	0	0	80	0	0	0	0	7	0	0	0	0	0	4	4	7	356	363
17:15	0	0	110	0	0	110	0	139	32	0	0	171	40	35	0	0	0	75	0	0	0	0	8	0	0	0	0	0	4	4	8	360	368
17:30	0	0	106	0	0	106	0	145	28	0	0	173	36	34	0	0	0	70	0	0	0	0	5	0	0	0	0	0	1	1	5	350	355
17:45	0	0	72	2	0	74	0	151	34	0	0	185	31	30	0	0	0	61	0	0	0	0	3	0	0	0	0	0	0	0	3	320	323
Total	0	0	392	2	0	394	0	576	121	0	0	697	145	141	0	0	0	286	0	0	0	0	23	0	0	0	0	0	9	9	23	1386	1409
Grand Total	0	0	1216	29	0	1245	0	4532	227	0	0	4759	396	496	0	0	0	892	0	0	0	0	69	0	0	0	0	0	54	54	69	6950	7019
Apprch %	0	0	97.7	2.3			0	95.2	4.8	0			44.4	55.6	0	0			0	0	0	0			0	0	0	0	100				
Total %	0	0	17.5	0.4		17.9	0	65.2	3.3	0		68.5	5.7	7.1	0	0		12.8	0	0	0	0		0	0	0	0	0	0.8	0.8	1	99	

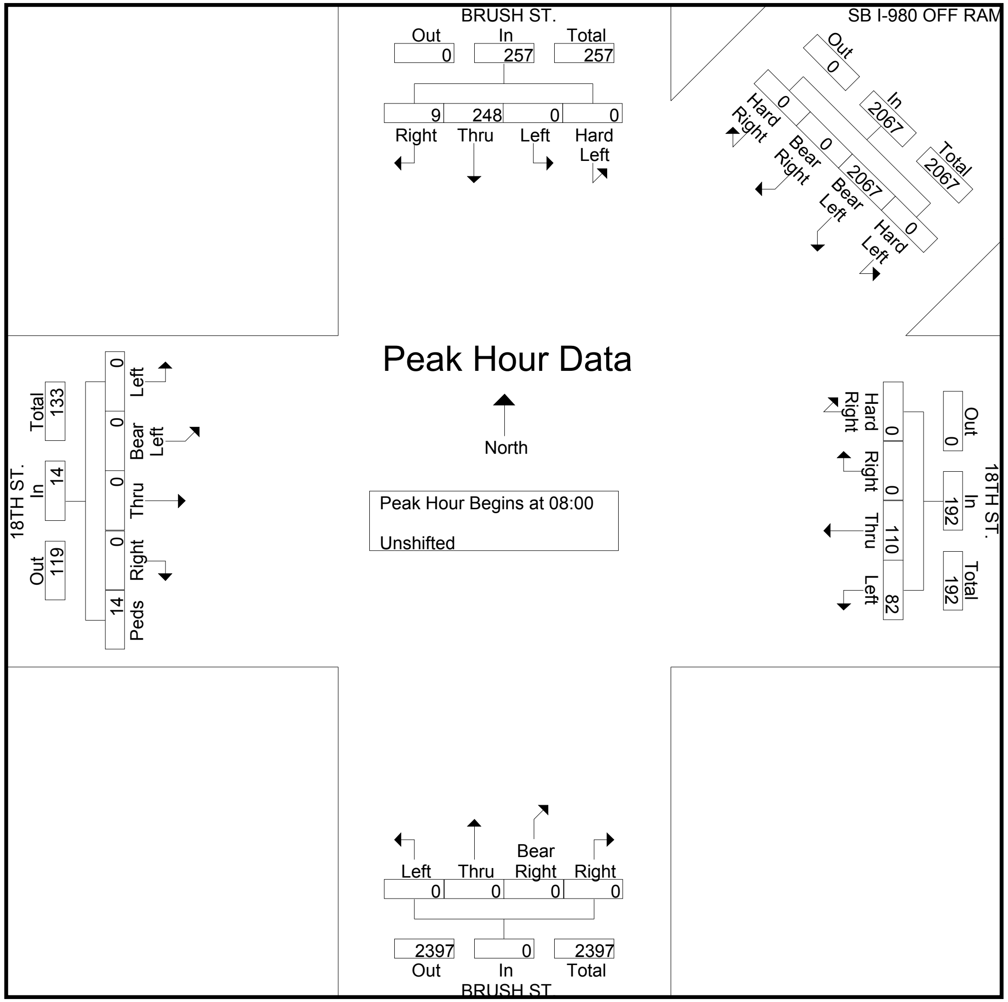
	BRUSH ST. Southbound					SB I-980 OFF RAMP Southwestbound					18TH ST. Westbound					BRUSH ST. Northbound					18TH ST. Eastbound						
Start Time	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																											
Peak Hour for Entire Intersection Begins at 08:00																											
08:00	0	0	49	0	49	0	484	0	0	484	19	30	0	0	49	0	0	0	0	0	0	0	0	0	**6**	**6**	588
08:15	0	0	**67**	4	71	0	**541**	0	0	**541**	**22**	24	0	0	46	0	0	0	0	0	0	0	0	0	5	5	**663**
08:30	0	0	65	0	65	0	539	0	0	539	20	**33**	0	0	**53**	0	0	0	0	0	0	0	0	0	0	0	657
08:45	0	0	67	**5**	**72**	0	503	0	0	503	21	23	0	0	44	0	0	0	0	0	0	0	0	0	3	3	622
Total Volume	0	0	248	9	257	0	2067	0	0	2067	82	110	0	0	192	0	0	0	0	0	0	0	0	0	14	14	2530
% App. Total	0	0	96.5	3.5		0	100	0	0		42.7	57.3	0	0		0	0	0	0		0	0	0	0	100		
PHF	.000	.000	.925	.450	.892	.000	.955	.000	.000	.955	.932	.833	.000	.000	.906	.000	.000	.000	.000	.000	.000	.000	.000	.000	.583	.583	.954

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-009 BRUSH-18TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

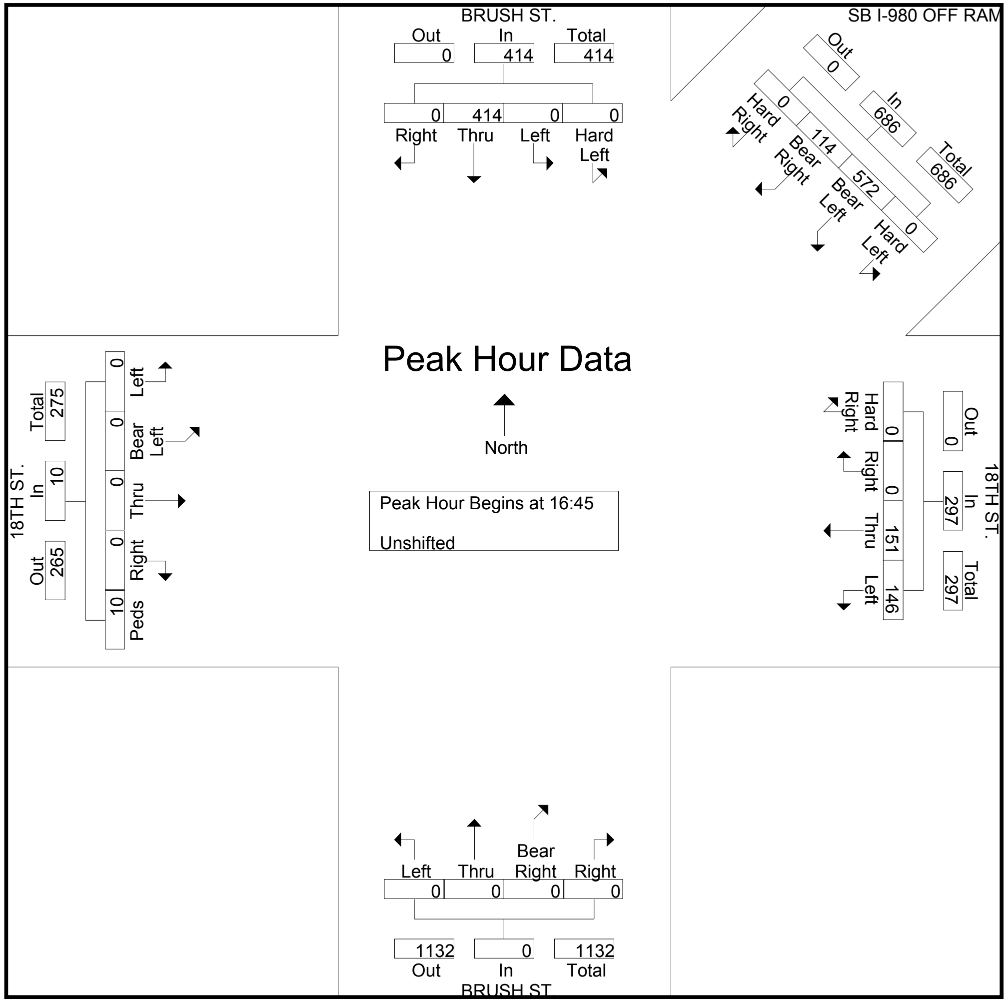
16:45	0	0	94	0	94	0	**147**	27	0	**174**	32	40	0	0	72	0	0	0	0	0	0	0	0	0	1	1	341
17:00	0	0	104	0	104	0	141	27	0	168	38	**42**	0	0	**80**	0	0	0	0	0	0	0	0	0	**4**	**4**	356
17:15	0	0	**110**	0	**110**	0	139	**32**	0	171	**40**	35	0	0	75	0	0	0	0	0	0	0	0	0	4	4	**360**
17:30	0	0	106	0	106	0	145	28	0	173	36	34	0	0	70	0	0	0	0	0	0	0	0	0	1	1	350
Total Volume	0	0	414	0	414	0	572	114	0	686	146	151	0	0	297	0	0	0	0	0	0	0	0	0	10	10	1407
% App. Total	0	0	100	0		0	83.4	16.6	0		49.2	50.8	0	0		0	0	0	0		0	0	0	0	100		
PHF	.000	.000	.941	.000	.941	.000	.973	.891	.000	.986	.913	.899	.000	.000	.928	.000	.000	.000	.000	.000	.000	.000	.000	.000	.625	.625	.977

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-009 BRUSH-18TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 3



All Traffic Data

(916) 771-8700
Fax 786-2879

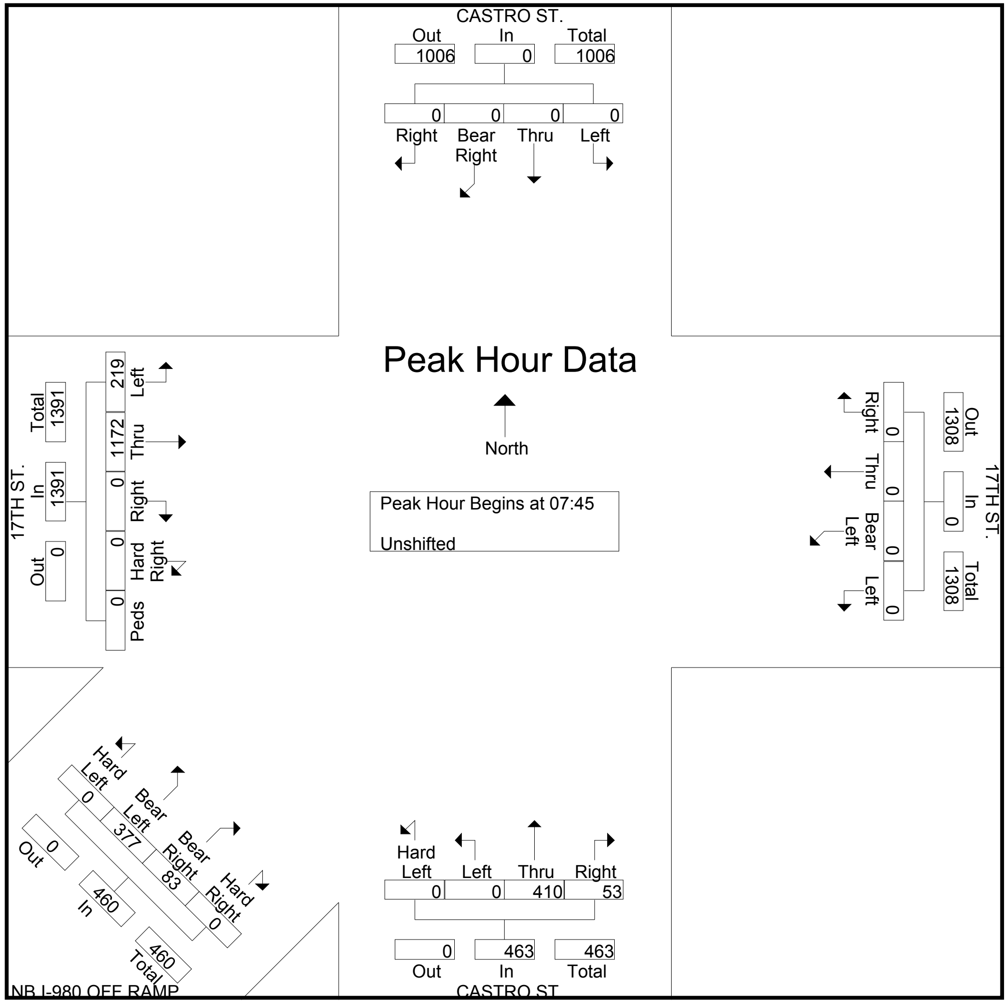
OAKLAND

File Name : 08-7065-006 CASTRO-17TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 1

Groups Printed- Unshifted

	CASTRO ST. Southbound						17TH ST. Westbound						CASTRO ST. Northbound						NB I-980 OFF RAMP Northeastbound						17TH ST. Eastbound								
Start Time	Left	Thru	Bear Right	Right	Peds	App. Total	Left	Bear Left	Thru	Right	Peds	App. Total	Hard Left	Left	Thru	Right	Peds	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	Peds	App. Total	Left	Thru	Right	Hard Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	74	11	4	85	0	61	10	0	0	71	26	117	0	0	0	143	5	299	304
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	11	4	81	0	86	20	0	0	106	28	177	0	0	0	205	4	392	396
07:30	0	0	0	0	0	0	0	0	0	0	3	0	0	0	118	14	8	132	0	100	25	0	0	125	41	221	0	0	0	262	11	519	530
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	108	18	9	126	0	92	16	0	0	108	50	290	0	0	0	340	9	574	583
Total	0	0	0	0	0	0	0	0	0	0	4	0	0	0	370	54	25	424	0	339	71	0	0	410	145	805	0	0	0	950	29	1784	1813
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	13	8	118	0	91	24	0	0	115	64	280	0	0	0	344	8	577	585
08:15	0	0	0	0	0	0	0	0	0	0	2	0	0	0	101	12	14	113	0	100	24	0	0	124	56	306	0	0	0	362	16	599	615
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	10	14	106	0	94	19	0	0	113	49	296	0	0	0	345	14	564	578
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	12	8	105	0	90	21	0	0	111	41	271	0	0	0	312	8	528	536
Total	0	0	0	0	0	0	0	0	0	0	2	0	0	0	395	47	44	442	0	375	88	0	0	463	210	1153	0	0	0	1363	46	2268	2314
*** BREAK ***																																	
16:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	190	7	3	197	0	70	15	0	0	85	42	95	0	0	0	137	4	419	423
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	203	11	3	214	0	78	8	0	0	86	59	97	0	0	0	156	3	456	459
16:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	229	16	3	245	0	58	9	0	0	67	61	89	0	0	0	150	4	462	466
16:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	231	14	14	245	0	64	8	0	0	72	58	102	0	0	0	160	15	477	492
Total	0	0	0	0	0	0	0	0	0	0	3	0	0	0	853	48	23	901	0	270	40	0	0	310	220	383	0	0	0	603	26	1814	1840
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256	18	5	274	0	74	7	0	0	81	45	106	0	0	0	151	5	506	511
17:15	0	0	0	0	0	0	0	0	0	0	1	0	0	0	231	11	10	242	0	73	8	0	0	81	36	99	0	0	0	135	11	458	469
17:30	0	0	0	0	0	0	0	0	0	0	6	0	0	0	215	8	11	223	0	71	3	0	0	74	37	99	0	0	0	136	17	433	450
17:45	0	0	0	0	0	0	0	0	0	0	3	0	0	0	188	11	8	199	0	65	4	0	0	69	33	98	0	0	0	131	11	399	410
Total	0	0	0	0	0	0	0	0	0	0	10	0	0	0	890	48	34	938	0	283	22	0	0	305	151	402	0	0	0	553	44	1796	1840
Grand Total	0	0	0	0	0	0	0	0	0	0	19	0	0	0	2508	197	126	2705	0	1267	221	0	0	1488	726	2743	0	0	0	3469	145	7662	7807
Apprch %	0	0	0	0			0	0	0	0			0	0	92.7	7.3			0	85.1	14.9	0			20.9	79.1	0	0	0				
Total %	0	0	0	0		0	0	0	0	0		0	0	0	32.7	2.6		35.3	0	16.5	2.9	0		19.4	9.5	35.8	0	0	0	45.3	1.9	98.1	

	CASTRO ST. Southbound					17TH ST. Westbound					CASTRO ST. Northbound					NB I-980 OFF RAMP Northeastbound					17TH ST. Eastbound						
Start Time	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																											
Peak Hour for Entire Intersection Begins at 07:45																											
07:45	0	0	0	0	0	0	0	0	0	0	0	0	**108**	**18**	**126**	0	92	16	0	108	50	290	0	0	0	340	574
08:00	0	0	0	0	0	0	0	0	0	0	0	0	105	13	118	0	91	**24**	0	115	**64**	280	0	0	0	344	577
08:15	0	0	0	0	0	0	0	0	0	0	0	0	101	12	113	0	**100**	24	0	**124**	56	**306**	0	0	0	**362**	**599**
08:30	0	0	0	0	0	0	0	0	0	0	0	0	96	10	106	0	94	19	0	113	49	296	0	0	0	345	564
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	410	53	463	0	377	83	0	460	219	1172	0	0	0	1391	2314
% App. Total	0	0	0	0		0	0	0	0		0	0	88.6	11.4		0	82	18	0		15.7	84.3	0	0	0		



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

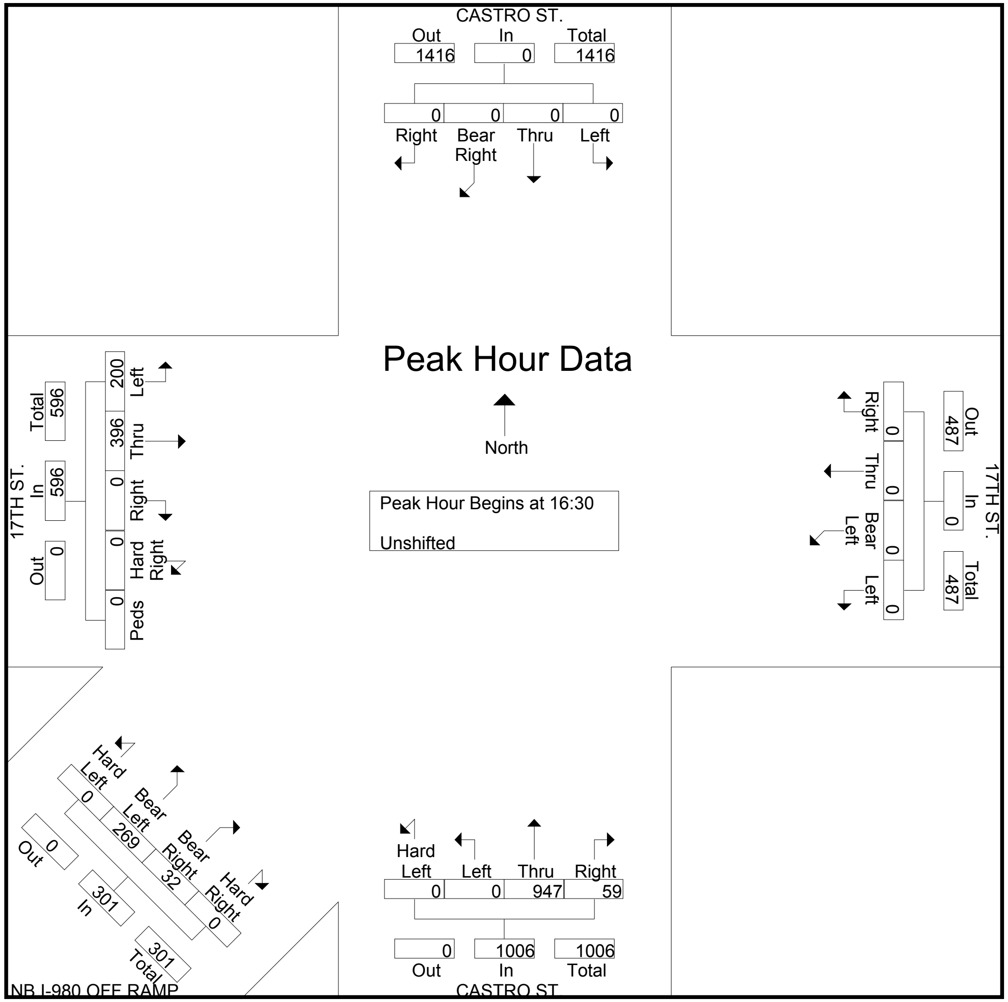
16:30	0	0	0	0	0	0	0	0	0	0	0	0	229	16	245	0	58	**9**	0	67	**61**	89	0	0	0	150	462
16:45	0	0	0	0	0	0	0	0	0	0	0	0	231	14	245	0	64	8	0	72	58	102	0	0	0	**160**	477
17:00	0	0	0	0	0	0	0	0	0	0	0	0	**256**	**18**	**274**	0	**74**	7	0	**81**	45	**106**	0	0	0	151	**506**
17:15	0	0	0	0	0	0	0	0	0	0	0	0	231	11	242	0	73	8	0	81	36	99	0	0	0	135	458
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	947	59	1006	0	269	32	0	301	200	396	0	0	0	596	1903
% App. Total	0	0	0	0		0	0	0	0		0	0	94.1	5.9		0	89.4	10.6	0		33.6	66.4	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.925	.819	.918	.000	.909	.889	.000	.929	.820	.934	.000	.000	.000	.931	.940

All Traffic Data

(916) 771-8700
Fax 786-2879

OAKLAND

File Name : 08-7065-006 CASTRO-17TH-F
Site Code : 00000000
Start Date : 06/02/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-019 CASTRO-12TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

	CASTRO ST. Southbound						12TH ST. Westbound						CASTRO ST. Northbound						12TH ST. Eastbound						I-980 ON RAMP Southeastbound								
Start Time	Left	Thru	Right	Hard Right	Peds	App. Total	Left	Thru	Bear Right	Right	Peds	App. Total	Left	Bear Left	Thru	Right	Peds	App. Total	Hard Left	Left	Thru	Right	Peds	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	0	0	0	0	19	16	21	2	56	7	26	42	0	1	75	0	0	0	0	0	0	0	0	0	0	0	0	3	131	134
07:15	0	0	0	0	0	0	0	21	12	31	0	64	6	29	41	0	2	76	0	0	0	0	0	0	0	0	0	0	0	0	2	140	142
07:30	0	0	0	0	0	0	0	29	18	26	1	73	11	35	44	0	0	90	0	0	0	0	1	0	0	0	0	0	0	0	2	163	165
07:45	0	0	0	0	0	0	0	26	19	30	1	75	9	60	61	0	2	130	0	0	0	0	0	0	0	0	0	0	0	0	3	205	208
Total	0	0	0	0	0	0	0	95	65	108	4	268	33	150	188	0	5	371	0	0	0	0	1	0	0	0	0	0	0	0	10	639	649
08:00	0	0	0	0	0	0	0	31	16	36	0	83	6	51	61	0	4	118	0	0	0	0	0	0	0	0	0	0	0	0	4	201	205
08:15	0	0	0	0	0	0	0	34	17	40	1	91	10	68	76	0	2	154	0	0	0	0	0	0	0	0	0	0	0	0	3	245	248
08:30	0	0	0	0	0	0	0	29	14	32	0	75	7	62	65	0	1	134	0	0	0	0	0	0	0	0	0	0	0	0	1	209	210
08:45	0	0	0	0	0	0	0	34	21	26	0	81	12	56	71	0	3	139	0	0	0	0	0	0	0	0	0	0	0	0	3	220	223
Total	0	0	0	0	0	0	0	128	68	134	1	330	35	237	273	0	10	545	0	0	0	0	0	0	0	0	0	0	0	0	11	875	886
*** BREAK ***																																	
16:00	0	0	0	0	0	0	0	52	69	50	8	171	12	160	92	0	11	264	0	0	0	0	0	0	0	0	0	0	0	0	19	435	454
16:15	0	0	0	0	0	0	0	48	75	51	0	174	6	171	98	0	4	275	0	0	0	0	1	0	0	0	0	0	0	0	5	449	454
16:30	0	0	0	0	0	0	0	52	89	71	4	212	14	168	105	0	8	287	0	0	0	0	0	0	0	0	0	0	0	0	12	499	511
16:45	0	0	0	0	0	0	0	73	72	76	3	221	10	184	114	0	7	308	0	0	0	0	1	0	0	0	0	0	0	0	11	529	540
Total	0	0	0	0	0	0	0	225	305	248	15	778	42	683	409	0	30	1134	0	0	0	0	2	0	0	0	0	0	0	0	47	1912	1959
17:00	0	0	0	0	0	0	0	45	105	81	3	231	10	234	121	0	12	365	0	0	0	0	1	0	0	0	0	0	0	0	16	596	612
17:15	0	0	0	0	0	0	0	53	124	104	0	281	18	211	106	0	5	335	0	0	0	0	0	0	0	0	0	0	0	0	5	616	621
17:30	0	0	0	0	0	0	0	55	103	91	3	249	17	192	111	0	6	320	0	0	0	0	0	0	0	0	0	0	0	0	9	569	578
17:45	0	0	0	0	0	0	0	70	98	68	3	236	5	201	85	0	4	291	0	0	0	0	1	0	0	0	0	0	0	0	8	527	535
Total	0	0	0	0	0	0	0	223	430	344	9	997	50	838	423	0	27	1311	0	0	0	0	2	0	0	0	0	0	0	0	38	2308	2346
Grand Total	0	0	0	0	0	0	0	671	868	834	29	2373	160	1908	1293	0	72	3361	0	0	0	0	5	0	0	0	0	0	0	0	106	5734	5840
Apprch %	0	0	0	0			0	28.3	36.6	35.1			4.8	56.8	38.5	0			0	0	0	0			0	0	0	0					
Total %	0	0	0	0		0	0	11.7	15.1	14.5		41.4	2.8	33.3	22.5	0		58.6	0	0	0	0		0	0	0	0	0		0	1.8	98.2	

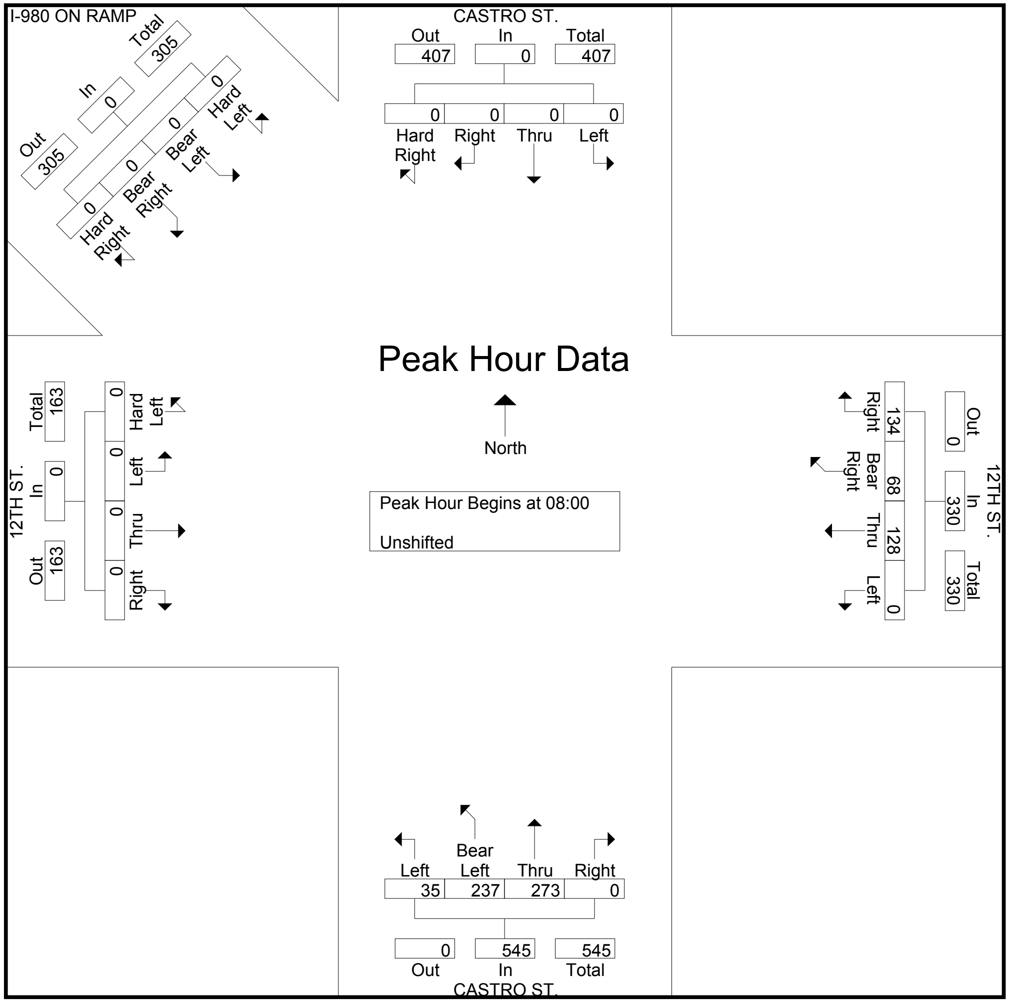
	CASTRO ST. Southbound					12TH ST. Westbound					CASTRO ST. Northbound					12TH ST. Eastbound					I-980 ON RAMP Southeastbound					
Start Time	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 08:00																										
08:00	0	0	0	0	0	0	31	16	36	83	6	51	61	0	118	0	0	0	0	0	0	0	0	0	0	201
08:15	0	0	0	0	0	0	**34**	17	**40**	**91**	10	**68**	**76**	0	**154**	0	0	0	0	0	0	0	0	0	0	**245**
08:30	0	0	0	0	0	0	29	14	32	75	7	62	65	0	134	0	0	0	0	0	0	0	0	0	0	209
08:45	0	0	0	0	0	0	34	**21**	26	81	**12**	56	71	0	139	0	0	0	0	0	0	0	0	0	0	220
Total Volume	0	0	0	0	0	0	128	68	134	330	35	237	273	0	545	0	0	0	0	0	0	0	0	0	0	875
% App. Total	0	0	0	0		0	38.8	20.6	40.6		6.4	43.5	50.1	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.941	.810	.838	.907	.729	.871	.898	.000	.885	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.893

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-019 CASTRO-12TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:45

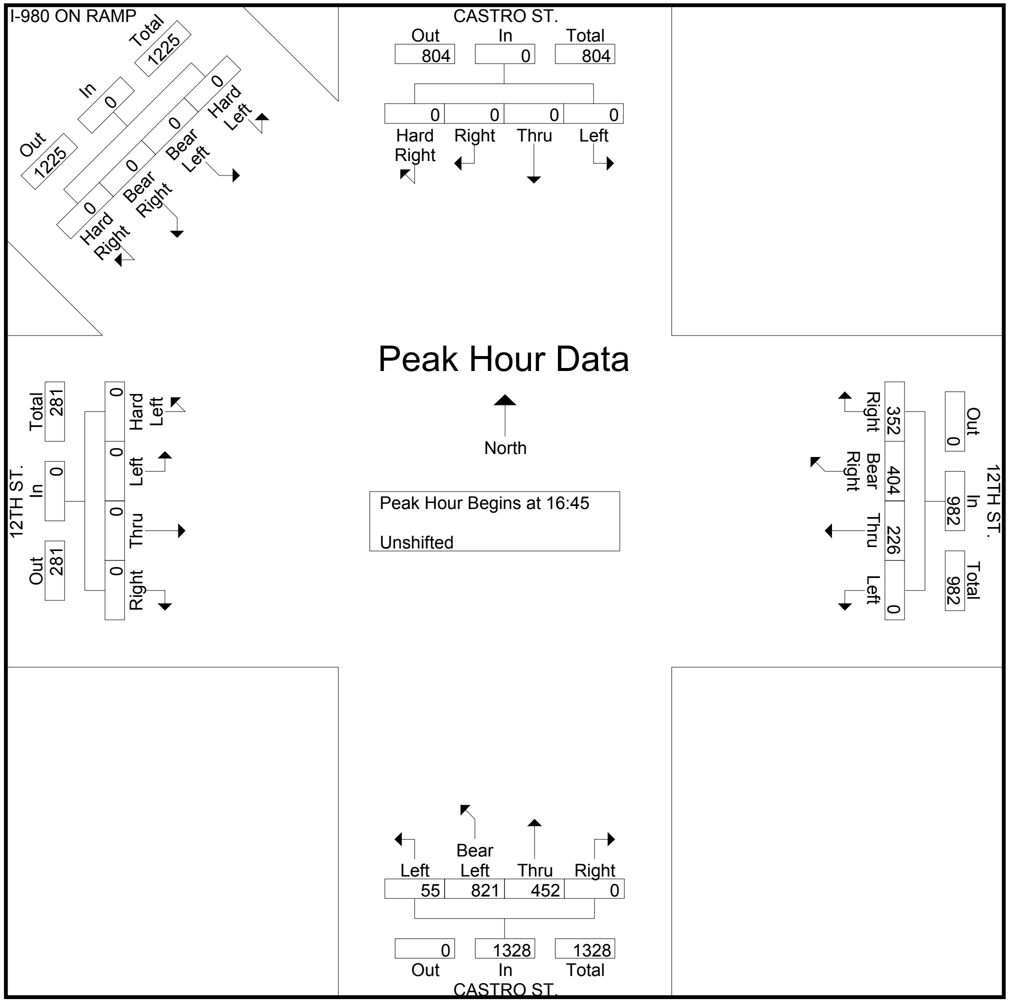
16:45	**0**	**0**	**0**	**0**	**0**	**0**	73	72	76	221	10	184	114	0	308	0	0	0	0	0	0	0	0	0	0	529
17:00	0	0	0	0	0	0	45	105	81	231	10	234	121	0	365	0	0	0	0	0	0	0	0	0	0	596
17:15	0	0	0	0	0	0	53	**124**	**104**	**281**	**18**	211	106	0	335	0	0	0	0	0	0	0	0	0	0	**616**
17:30	0	0	0	0	0	0	55	103	91	249	17	192	111	0	320	0	0	0	0	0	0	0	0	0	0	569
Total Volume	0	0	0	0	0	0	226	404	352	982	55	821	452	0	1328	0	0	0	0	0	0	0	0	0	0	2310
% App. Total	0	0	0	0		0	23	41.1	35.8		4.1	61.8	34	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.774	.815	.846	.874	.764	.877	.934	.000	.910	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.938

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-019 CASTRO-12TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 3



All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-018 BRUSH-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

	BRUSH ST. Southbound						11TH ST. Westbound						I-980 ON RAMP Northwestbound						BRUSH ST. Northbound						11TH ST. Eastbound								
Start Time	Left	Bear Left	Thru	Right	Peds	App. Total	Hard Left	Left	Thru	Right	Peds	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	Peds	App. Total	Left	Thru	Right	Hard Right	Peds	App. Total	Left	Thru	Bear Right	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	113	9	181	3	1	306	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	13	5	1	0	19	2	325	327
07:15	144	15	223	7	3	389	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	8	0	0	28	3	417	420
07:30	154	18	281	9	2	462	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	5	2	2	30	4	492	496
07:45	219	14	286	10	1	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	11	1	2	50	3	579	582
Total	630	56	971	29	7	1686	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	94	29	4	4	127	12	1813	1825
08:00	249	28	296	7	10	580	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	4	0	2	37	12	617	629
08:15	221	15	228	7	5	471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	6	0	4	44	9	515	524
08:30	196	12	261	6	6	475	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	9	0	4	41	10	516	526
08:45	188	12	271	7	2	478	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	7	4	2	62	4	540	544
Total	854	67	1056	27	23	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	26	4	12	184	35	2188	2223
*** BREAK ***																																	
16:00	86	34	145	6	7	271	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	12	1	4	63	11	334	345
16:15	95	29	173	14	5	311	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	45	10	3	4	58	10	369	379
16:30	96	39	184	14	1	333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	15	4	3	69	4	402	406
16:45	94	30	179	12	2	315	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	9	3	3	69	5	384	389
Total	371	132	681	46	15	1230	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	202	46	11	14	259	30	1489	1519
17:00	78	27	177	11	6	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	9	4	4	60	10	353	363
17:15	93	23	237	10	4	363	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	15	3	4	78	8	441	449
17:30	94	24	220	6	3	344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	12	4	1	57	4	401	405
17:45	74	18	195	11	0	298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	4	0	1	45	1	343	344
Total	339	92	829	38	13	1298	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	189	40	11	10	240	23	1538	1561
Grand Total	2194	347	3537	140	58	6218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	639	141	30	40	810	100	7028	7128
Apprch %	35.3	5.6	56.9	2.3			0	0	0	0			0	0	0	0			0	0	0	0			0	78.9	17.4	3.7					
Total %	31.2	4.9	50.3	2		88.5	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	9.1	2	0.4		11.5	1.4	98.6	

	BRUSH ST. Southbound					11TH ST. Westbound					I-980 ON RAMP Northwestbound					BRUSH ST. Northbound					11TH ST. Eastbound					
Start Time	Left	Bear Left	Thru	Right	App. Total	Hard Left	Left	Thru	Right	App. Total	Hard Left	Bear Left	Bear Right	Hard Right	App. Total	Left	Thru	Right	Hard Right	App. Total	Left	Thru	Bear Right	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																										
Peak Hour for Entire Intersection Begins at 07:45																										
07:45	219	14	286	**10**	529	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**38**	**11**	**1**	**50**	579
08:00	**249**	**28**	**296**	7	**580**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	4	0	37	**617**
08:15	221	15	228	7	471	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38	6	0	44	515
08:30	196	12	261	6	475	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	9	0	41	516
Total Volume	885	69	1071	30	2055	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	141	30	1	172	2227
% App. Total	43.1	3.4	52.1	1.5		0	0	0	0		0	0	0	0		0	0	0	0		0	82	17.4	0.6		
PHF	.889	.616	.905	.750	.886	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.928	.682	.250	.860	.902

All Traffic Data

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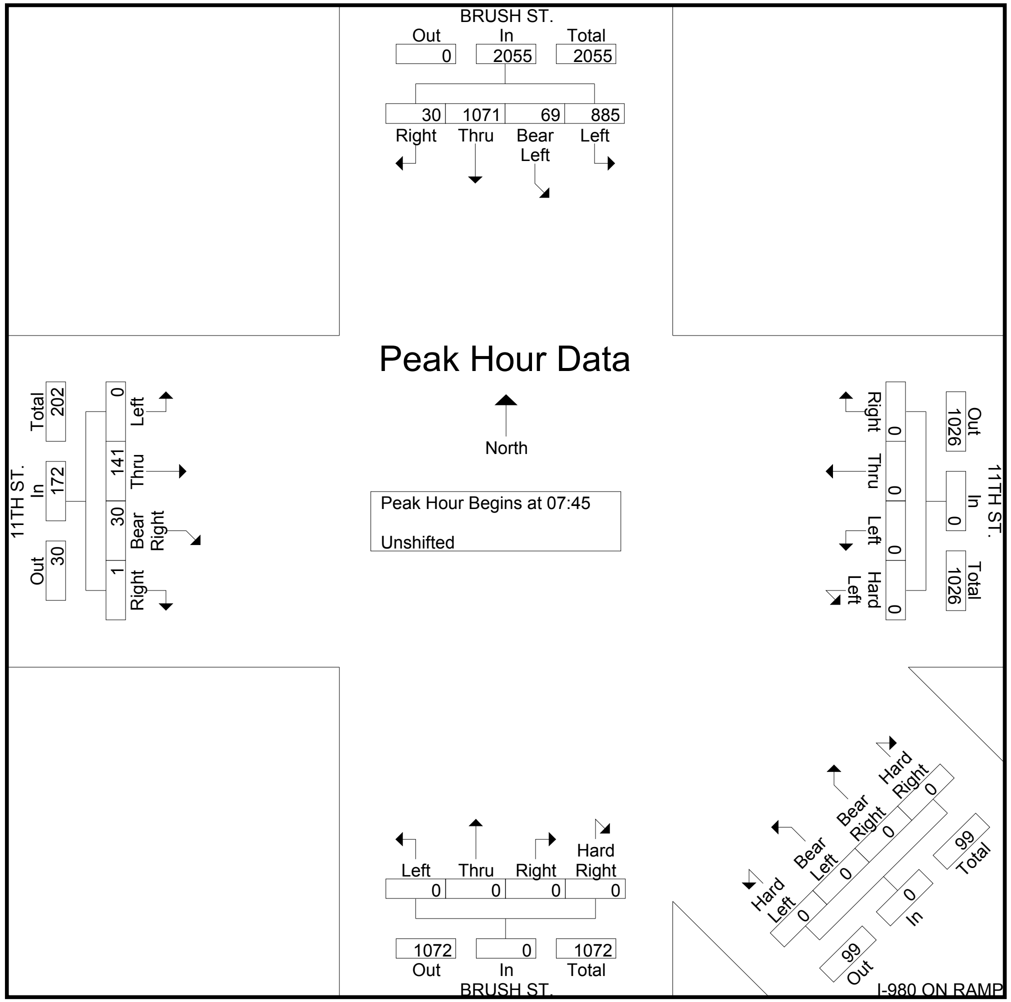
File Name : 08-7458-018 BRUSH-11TH-F
Site Code : 00000000
Start Date : 08/05/2008



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 16:30

16:30	96	39	184	14	333	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	15	**4**	69	402
16:45	94	30	179	12	315	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	9	3	69	384
17:00	78	27	177	11	293	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	9	4	60	353
17:15	93	23	**237**	10	**363**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**60**	15	3	**78**	**441**
Total Volume	361	119	777	47	1304	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	214	48	14	276	1580
% App. Total	27.7	9.1	59.6	3.6		0	0	0	0		0	0	0	0		0	0	0	0		0	77.5	17.4	5.1		
PHF	.940	.763	.820	.839	.898	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.892	.800	.875	.885	.896

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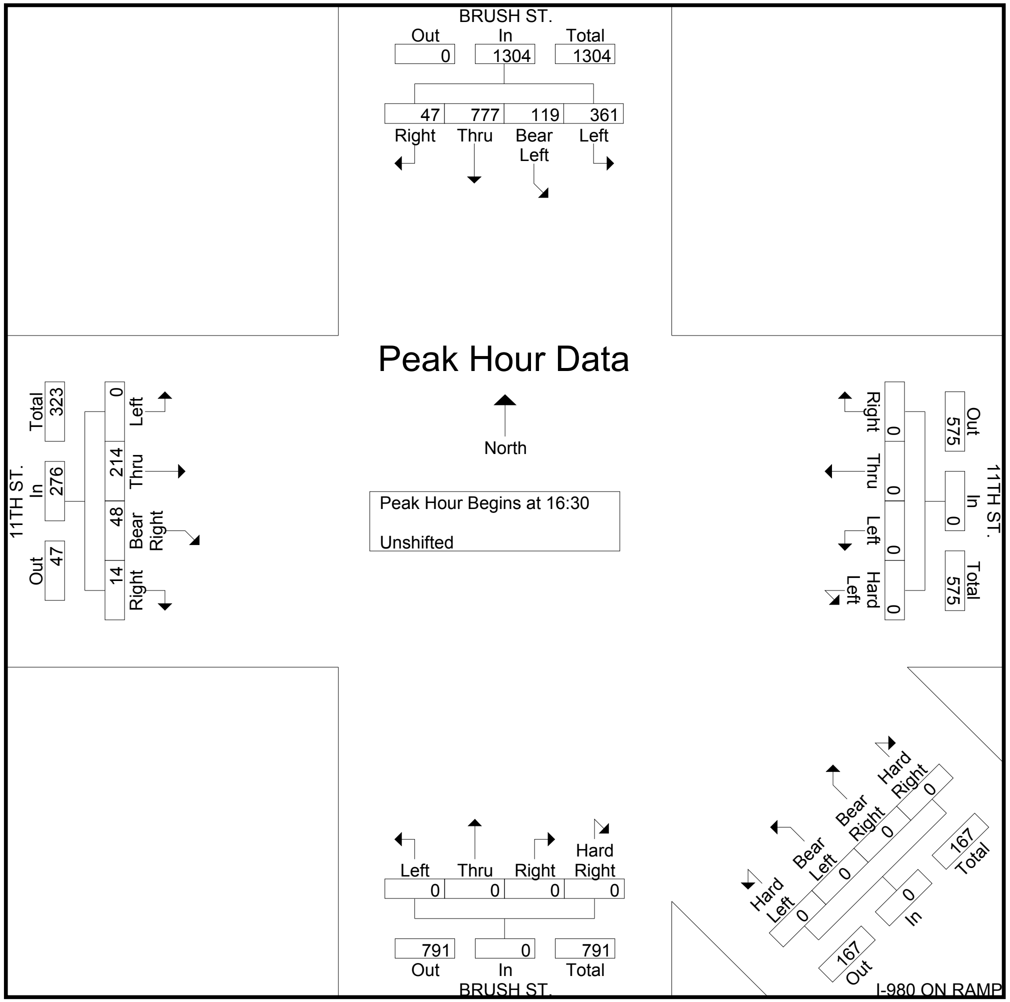
File Name : 08-7458-018 BRUSH-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 3



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City of Oakland | Oak St & 14th St | Date: 05/21/2008

	Oak St Southbound				14th St Westbound				Oak St Northbound				14th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	0	0	0	0	42	30	72	10	79	0	89	2	32	0	34	195
7:15	0	0	0	0	0	62	59	121	13	95	1	109	8	30	0	38	268
7:30	0	0	0	0	0	75	78	153	18	111	0	129	7	45	0	52	334
7:45	0	0	0	0	0	104	93	197	26	135	3	164	8	45	0	53	414
Total	0	0	0	0	0	283	260	543	67	420	4	491	25	152	0	177	1211
8:00	0	0	0	0	1	129	125	255	24	119	3	146	8	58	0	66	467
8:15	0	0	0	0	0	155	112	267	28	132	8	168	10	73	0	83	518
8:30	0	0	0	0	0	140	124	264	34	126	4	164	8	72	0	80	508
8:45	0	0	0	0	0	123	119	242	30	128	8	166	8	58	0	66	474
Total	0	0	0	0	1	547	480	1028	116	505	23	644	34	261	0	295	1967
16:00	0	0	0	0	0	85	51	136	43	104	8	155	25	106	0	131	422
16:15	0	0	0	0	0	80	54	134	25	95	7	127	21	119	0	140	401
16:30	0	0	0	0	0	90	46	136	35	119	7	161	21	126	0	147	444
16:45	0	0	0	0	0	92	52	144	32	120	12	164	12	165	0	177	485
Total	0	0	0	0	0	347	203	550	135	438	34	607	79	516	0	595	1752
17:00	0	0	0	0	0	92	48	140	44	144	7	195	7	174	0	181	516
17:15	0	0	0	0	0	87	57	144	51	133	8	192	13	224	0	237	573
17:30	0	0	0	0	0	84	61	145	44	131	8	183	21	204	0	225	553
17:45	0	0	0	0	0	71	40	111	40	132	3	175	23	173	0	196	482
Total	0	0	0	0	0	334	206	540	179	540	26	745	64	775	0	839	2124
Grand Total	0	0	0	0	1	1511	1149	2661	497	1903	87	2487	202	1704	0	1906	7054
Apprch%	0.0%	0.0%	0.0%		0.0%	56.8%	43.2%		20.0%	76.5%	3.5%		10.6%	89.4%	0.0%		
Total %	0.0%	0.0%	0.0%	0.0%	0.0%	21.4%	16.3%	37.7%	7.0%	27.0%	1.2%	35.3%	2.9%	24.2%	0.0%	27.0%	

City of Oakland | Oak St & 14th St | Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Oak St Southbound				14th St Westbound				Oak St Northbound				14th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	0	0	0	1	129	125	255	24	119	3	146	8	58	0	66	467
815	0	0	0	0	0	155	112	267	28	132	8	168	10	73	0	83	518
830	0	0	0	0	0	140	124	264	34	126	4	164	8	72	0	80	508
845	0	0	0	0	0	123	119	242	30	128	8	166	8	58	0	66	474
Total Volume	0	0	0	0	1	547	480	1028	116	505	23	644	34	261	0	295	1967
% App Total.	0.0%	0.0%	0.0%		0.1%	53.2%	46.7%		18.0%	78.4%	3.6%		11.5%	88.5%	0.0%		
PHF	0.000				0.963				0.958				0.889				

PM Peak Hr Begins at 445 PM

	Oak St Southbound				14th St Westbound				Oak St Northbound				14th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
445	0	0	0	0	0	92	52	144	32	120	12	164	12	165	0	177	485
500	0	0	0	0	0	92	48	140	44	144	7	195	7	174	0	181	516
515	0	0	0	0	0	87	57	144	51	133	8	192	13	224	0	237	573
530	0	0	0	0	0	84	61	145	44	131	8	183	21	204	0	225	553
Total Volume	0	0	0	0	0	355	218	573	171	528	35	734	53	767	0	820	2127
% App Total.	0.0%	0.0%	0.0%		0.0%	62.0%	38.0%		23.3%	71.9%	4.8%		6.5%	93.5%	0.0%		
PHF	0.000				0.988				0.941				0.865				

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City of Oakland — Madison St & 14th St — Date: 05/22/2008

	Madison St Southbound				14th St Westbound				Madison St Northbound				14th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	5	48	2	55	2	61	0	63	0	0	0	0	0	30	4	34	152
7:15	6	59	1	66	1	74	0	75	0	0	0	0	0	54	6	60	201
7:30	9	63	3	75	2	96	0	98	0	0	0	0	0	46	9	55	228
7:45	14	75	2	91	4	129	0	133	0	0	0	0	0	49	8	57	281
Total	34	245	8	287	9	360	0	369	0	0	0	0	0	179	27	206	862
8:00	10	79	6	95	2	142	0	144	0	0	0	0	0	52	10	62	301
8:15	17	80	5	102	6	161	0	167	0	0	0	0	0	78	14	92	361
8:30	14	74	2	90	8	160	0	168	0	0	0	0	0	52	9	61	319
8:45	9	75	4	88	5	158	0	163	0	0	0	0	0	51	6	57	308
Total	50	308	17	375	21	621	0	642	0	0	0	0	0	233	39	272	1289
16:00	42	107	2	151	3	127	0	130	0	0	0	0	0	103	16	119	400
16:15	42	128	4	174	6	130	0	136	0	0	0	0	0	104	21	125	435
16:30	52	112	4	168	8	124	0	132	0	0	0	0	0	110	15	125	425
16:45	61	115	6	182	6	116	0	122	0	0	0	0	0	115	15	130	434
Total	197	462	16	675	23	497	0	520	0	0	0	0	0	432	67	499	1694
17:00	69	131	3	203	7	129	0	136	0	0	0	0	0	123	15	138	477
17:15	74	123	1	198	2	109	0	111	0	0	0	0	0	143	20	163	472
17:30	76	125	6	207	6	112	0	118	0	0	0	0	0	148	14	162	487
17:45	68	122	6	196	7	118	0	125	0	0	0	0	0	124	12	136	457
Total	287	501	16	804	22	468	0	490	0	0	0	0	0	538	61	599	1893
Grand Total	568	1516	57	2141	75	1946	0	2021	0	0	0	0	0	1382	194	1576	5738
Apprch%	####	70.8%	2.7%		3.7%	96.3%	0.0%		0.0%	0.0%	0.0%		0.0%	87.7%	12.3%		
Total %	9.9%	26.4%	1.0%	37.3%	1.3%	33.9%	0.0%	35.2%	0.0%	0.0%	0.0%	0.0%	0.0%	24.1%	3.4%	27.5%	

City of Oakland — Madison St & 14th St — Date: 05/22/2008

AM Peak Hr Begins at 800 AM

	Madison St Southbound				14th St Westbound				Madison St Northbound				14th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	10	79	6	95	2	142	0	144	0	0	0	0	0	52	10	62	301
815	17	80	5	102	6	161	0	167	0	0	0	0	0	78	14	92	361
830	14	74	2	90	8	160	0	168	0	0	0	0	0	52	9	61	319
845	9	75	4	88	5	158	0	163	0	0	0	0	0	51	6	57	308
Total Volume	50	308	17	375	21	621	0	642	0	0	0	0	0	233	39	272	1289
% App Total.	####	82.1%	4.5%		3.3%	96.7%	0.0%		0.0%	0.0%	0.0%		0.0%	85.7%	14.3%		
PHF	0.919				0.955				0.000				0.739				

PM Peak Hr Begins at 500 PM

	Madison St Southbound				14th St Westbound				Madison St Northbound				14th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	69	131	3	203	7	129	0	136	0	0	0	0	0	123	15	138	477
515	74	123	1	198	2	109	0	111	0	0	0	0	0	143	20	163	472
530	76	125	6	207	6	112	0	118	0	0	0	0	0	148	14	162	487
545	68	122	6	196	7	118	0	125	0	0	0	0	0	124	12	136	457
Total Volume	287	501	16	804	22	468	0	490	0	0	0	0	0	538	61	599	1893
% App Total.	####	62.3%	2.0%		4.5%	95.5%	0.0%		0.0%	0.0%	0.0%		0.0%	89.8%	10.2%		
PHF	0.971				0.901				0.000				0.919				

All Traffic Data

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File Name : 08-7458-017 HARRISON-14TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

	HARRISON ST. Southbound					14TH ST. Westbound					HARRISON ST. Northbound					14TH ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	3	11	3	7	17	1	33	12	15	46	5	49	1	9	55	3	23	1	2	27	33	145	178
07:15	5	10	3	5	18	3	37	9	11	49	7	49	2	5	58	1	17	1	3	19	24	144	168
07:30	5	11	1	14	17	2	64	18	18	84	9	51	5	6	65	2	22	0	7	24	45	190	235
07:45	5	10	1	25	16	2	88	16	23	106	16	84	4	13	104	6	29	1	19	36	80	262	342
Total	18	42	8	51	68	8	222	55	67	285	37	233	12	33	282	12	91	3	31	106	182	741	923
08:00	3	16	7	12	26	2	78	17	29	97	12	82	4	7	98	11	22	1	10	34	58	255	313
08:15	6	15	5	20	26	2	81	25	28	108	9	98	5	15	112	11	37	2	13	50	76	296	372
08:30	6	10	6	23	22	1	93	14	23	108	16	81	11	22	108	4	38	0	13	42	81	280	361
08:45	10	22	6	25	38	2	88	28	31	118	19	92	3	39	114	12	44	7	25	63	120	333	453
Total	25	63	24	80	112	7	340	84	111	431	56	353	23	83	432	38	141	10	61	189	335	1164	1499
*** BREAK ***																							
16:00	9	29	5	16	43	2	73	24	24	99	13	88	8	20	109	7	46	3	6	56	66	307	373
16:15	11	18	5	18	34	2	72	15	19	89	20	84	3	19	107	5	66	6	17	77	73	307	380
16:30	11	26	5	8	42	4	82	17	23	103	16	90	11	15	117	9	53	2	25	64	71	326	397
16:45	12	27	7	16	46	2	71	11	16	84	13	73	2	15	88	14	73	3	22	90	69	308	377
Total	43	100	22	58	165	10	298	67	82	375	62	335	24	69	421	35	238	14	70	287	279	1248	1527
17:00	29	41	13	20	83	3	78	7	27	88	17	87	4	13	108	14	91	3	34	108	94	387	481
17:15	24	43	9	15	76	4	101	8	14	113	14	108	2	30	124	19	93	0	25	112	84	425	509
17:30	21	35	13	16	69	4	76	9	40	89	17	89	6	14	112	13	77	1	52	91	122	361	483
17:45	21	30	7	31	58	5	80	13	35	98	10	88	9	31	107	15	98	3	50	116	147	379	526
Total	95	149	42	82	286	16	335	37	116	388	58	372	21	88	451	61	359	7	161	427	447	1552	1999
Grand Total	181	354	96	271	631	41	1195	243	376	1479	213	1293	80	273	1586	146	829	34	323	1009	1243	4705	5948
Apprch %	28.7	56.1	15.2			2.8	80.8	16.4			13.4	81.5	5			14.5	82.2	3.4					
Total %	3.8	7.5	2		13.4	0.9	25.4	5.2		31.4	4.5	27.5	1.7		33.7	3.1	17.6	0.7		21.4	20.9	79.1	

	HARRISON ST. Southbound				14TH ST. Westbound				HARRISON ST. Northbound				14TH ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	3	16	**7**	26	**2**	78	17	97	12	82	4	98	11	22	1	34	255
08:15	6	15	5	26	2	81	25	108	9	**98**	5	112	11	37	2	50	296
08:30	6	10	6	22	1	**93**	14	108	16	81	**11**	108	4	38	0	42	280
08:45	**10**	**22**	6	**38**	2	88	**28**	**118**	**19**	92	3	**114**	**12**	**44**	**7**	**63**	**333**
Total Volume	25	63	24	112	7	340	84	431	56	353	23	432	38	141	10	189	1164
% App. Total	22.3	56.2	21.4		1.6	78.9	19.5		13	81.7	5.3		20.1	74.6	5.3		
PHF	.625	.716	.857	.737	.875	.914	.750	.913	.737	.901	.523	.947	.792	.801	.357	.750	.874

All Traffic Data

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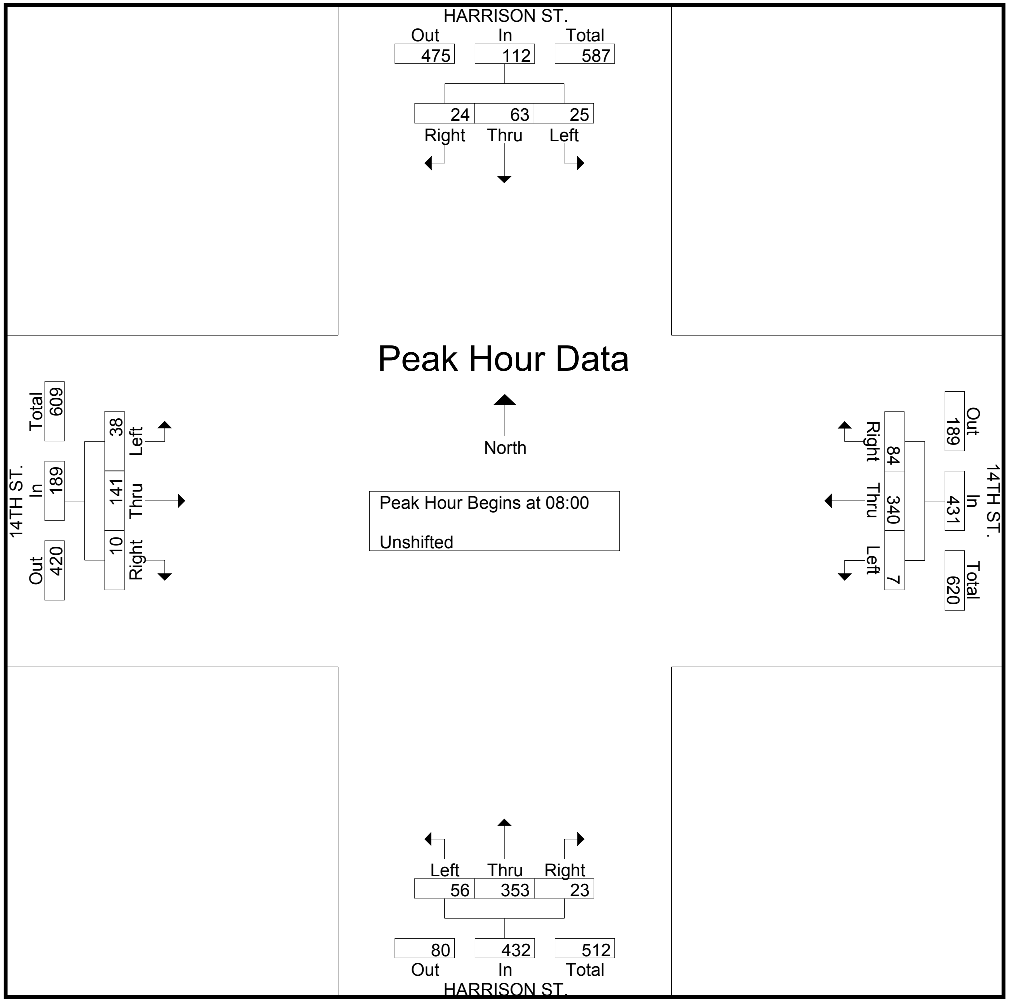
File Name : 08-7458-017 HARRISON-14TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

17:00	**29**	41	**13**	**83**	3	78	7	88	**17**	87	4	108	14	91	**3**	108	387
17:15	24	**43**	9	76	4	**101**	8	**113**	14	**108**	2	**124**	**19**	93	0	112	**425**
17:30	21	35	13	69	4	76	9	89	17	89	6	112	13	77	1	91	361
17:45	21	30	7	58	**5**	80	**13**	98	10	88	**9**	107	15	**98**	3	**116**	379
Total Volume	95	149	42	286	16	335	37	388	58	372	21	451	61	359	7	427	1552
% App. Total	33.2	52.1	14.7		4.1	86.3	9.5		12.9	82.5	4.7		14.3	84.1	1.6		
PHF	.819	.866	.808	.861	.800	.829	.712	.858	.853	.861	.583	.909	.803	.916	.583	.920	.913

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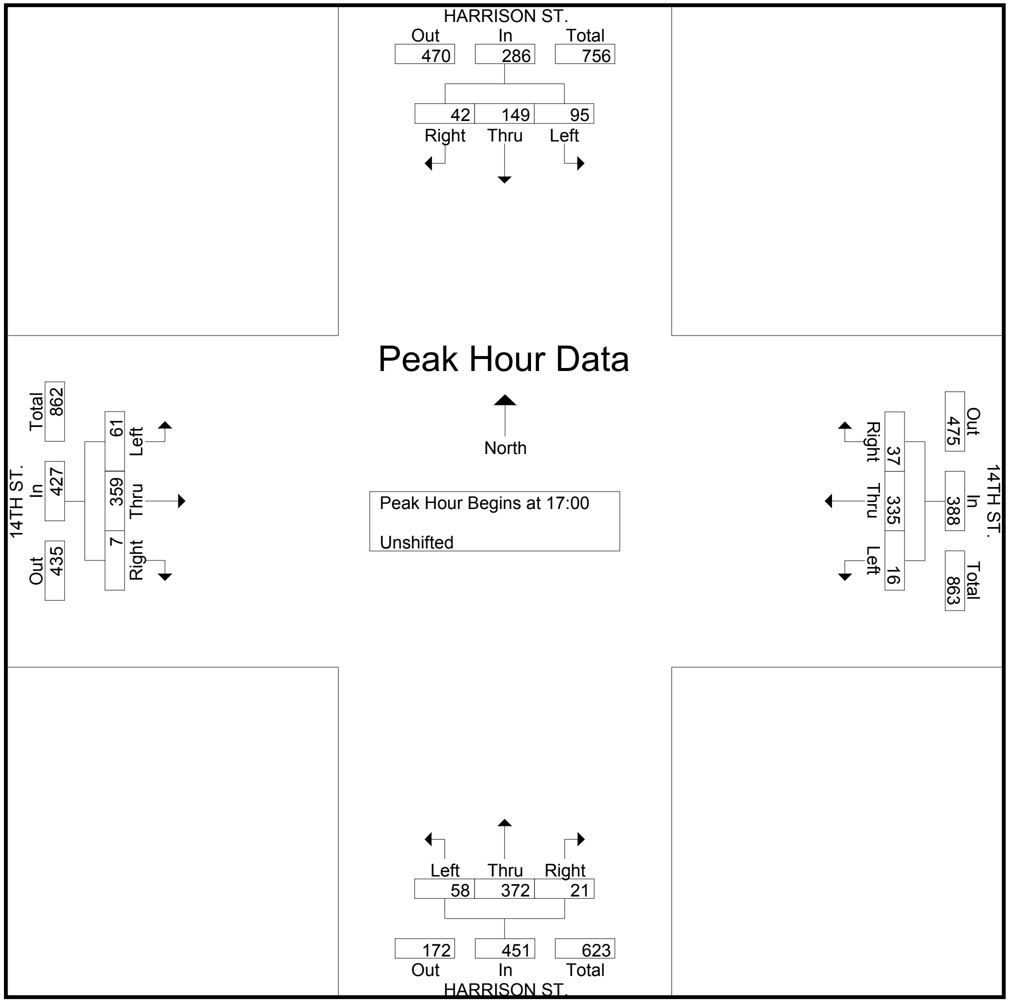
File Name : 08-7458-017 HARRISON-14TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 3



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City of Oakland | Madison St & 12th St | Date: 05/21/2008

	Madison St Southbound				12th St Westbound				Madison St Northbound				12th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	43	9	52	33	120	0	153	0	0	0	0	0	0	0	0	205
7:15	0	57	10	67	64	163	0	227	0	0	0	0	0	0	0	0	294
7:30	0	52	17	69	65	230	0	295	0	0	0	0	0	0	0	0	364
7:45	0	69	9	78	78	273	0	351	0	0	0	0	0	0	0	0	429
Total	0	221	45	266	240	786	0	1026	0	0	0	0	0	0	0	0	1292
8:00	0	80	12	92	79	315	0	394	0	0	0	0	0	0	0	0	486
8:15	0	80	20	100	86	315	0	401	0	0	0	0	0	0	0	0	501
8:30	0	81	18	99	97	329	0	426	0	0	0	0	0	0	0	0	525
8:45	0	75	15	90	91	318	0	409	0	0	0	0	0	0	0	0	499
Total	0	316	65	381	353	1277	0	1630	0	0	0	0	0	0	0	0	2011
16:00	0	120	11	131	50	152	0	202	0	0	0	0	0	0	0	0	333
16:15	0	116	13	129	47	168	0	215	0	0	0	0	0	0	0	0	344
16:30	0	127	17	144	62	179	0	241	0	0	0	0	0	0	0	0	385
16:45	0	120	24	144	48	188	0	236	0	0	0	0	0	0	0	0	380
Total	0	483	65	548	207	687	0	894	0	0	0	0	0	0	0	0	1442
17:00	0	157	11	168	57	202	0	259	0	0	0	0	0	0	0	0	427
17:15	0	169	10	179	44	198	0	242	0	0	0	0	0	0	0	0	421
17:30	0	129	8	137	54	195	0	249	0	0	0	0	0	0	0	0	386
17:45	0	127	9	136	53	191	0	244	0	0	0	0	0	0	0	0	380
Total	0	582	38	620	208	786	0	994	0	0	0	0	0	0	0	0	1614
Grand Total	0	1602	213	1815	1008	3536	0	4544	0	0	0	0	0	0	0	0	6359
Apprch%	0.0%	88.3%	11.7%		22.2%	77.8%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		
Total %	0.0%	25.2%	3.3%	28.5%	15.9%	55.6%	0.0%	71.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

City of Oakland | Madison St & 12th St | Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Madison St Southbound				12th St Westbound				Madison St Northbound				12th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	80	12	92	79	315	0	394	0	0	0	0	0	0	0	0	486
815	0	80	20	100	86	315	0	401	0	0	0	0	0	0	0	0	501
830	0	81	18	99	97	329	0	426	0	0	0	0	0	0	0	0	525
845	0	75	15	90	91	318	0	409	0	0	0	0	0	0	0	0	499
Total Volume	0	316	65	381	353	1277	0	1630	0	0	0	0	0	0	0	0	2011
% App Total.	0.0%	82.9%	17.1%		21.7%	78.3%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		
PHF	0.953				0.957				0.000				0.000				

PM Peak Hr Begins at 500 PM

	Madison St Southbound				12th St Westbound				Madison St Northbound				12th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	0	157	11	168	57	202	0	259	0	0	0	0	0	0	0	0	427
515	0	169	10	179	44	198	0	242	0	0	0	0	0	0	0	0	421
530	0	129	8	137	54	195	0	249	0	0	0	0	0	0	0	0	386
545	0	127	9	136	53	191	0	244	0	0	0	0	0	0	0	0	380
Total Volume	0	582	38	620	208	786	0	994	0	0	0	0	0	0	0	0	1614
% App Total.	0.0%	93.9%	6.1%		20.9%	79.1%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		
PHF	0.866				0.959				0.000				0.000				

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City of Oakland　　Oak St & 12th St　　Date: 05/21/2008

	Oak St Southbound				12th St Westbound				Oak St Northbound				12th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	0	0	0	0	140	5	145	18	92	0	110	0	0	0	0	255
7:15	0	0	0	0	0	199	4	203	30	110	0	140	0	0	0	0	343
7:30	0	0	0	0	0	265	8	273	45	134	0	179	0	0	0	0	452
7:45	0	0	0	0	0	300	11	311	65	170	0	235	0	0	0	0	546
Total	0	0	0	0	0	904	28	932	158	506	0	664	0	0	0	0	1596
8:00	0	0	0	0	0	346	18	364	71	146	0	217	0	0	0	0	581
8:15	0	0	0	0	0	362	16	378	64	181	0	245	0	0	0	0	623
8:30	0	0	0	0	0	368	19	387	74	161	0	235	0	0	0	0	622
8:45	0	0	0	0	0	355	13	368	66	180	0	246	0	0	0	0	614
Total	0	0	0	0	0	1431	66	1497	275	668	0	943	0	0	0	0	2440
16:00	0	0	0	0	0	162	11	173	36	161	0	197	0	0	0	0	370
16:15	0	0	0	0	0	197	9	206	29	133	0	162	0	0	0	0	368
16:30	0	0	0	0	0	205	10	215	34	171	0	205	0	0	0	0	420
16:45	0	0	0	0	0	207	9	216	32	173	0	205	0	0	0	0	421
Total	0	0	0	0	0	771	39	810	131	638	0	769	0	0	0	0	1579
17:00	0	0	0	0	0	222	12	234	45	220	0	265	0	0	0	0	499
17:15	0	0	0	0	0	203	16	219	41	215	0	256	0	0	0	0	475
17:30	0	0	0	0	0	210	12	222	36	198	0	234	0	0	0	0	456
17:45	0	0	0	0	0	213	10	223	27	189	0	216	0	0	0	0	439
Total	0	0	0	0	0	848	50	898	149	822	0	971	0	0	0	0	1869
Grand Total	0	0	0	0	0	3954	183	4137	713	2634	0	3347	0	0	0	0	7484
Apprch%	0.0%	0.0%	0.0%		0.0%	95.6%	4.4%		21.3%	78.7%	0.0%		0.0%	0.0%	0.0%		
Total %	0.0%	0.0%	0.0%	0.0%	0.0%	52.8%	2.4%	55.3%	9.5%	35.2%	0.0%	44.7%	0.0%	0.0%	0.0%	0.0%	

City of Oakland　　Oak St & 12th St　　Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Oak St Southbound				12th St Westbound				Oak St Northbound				12th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	0	0	0	0	346	18	364	71	146	0	217	0	0	0	0	581
815	0	0	0	0	0	362	16	378	64	181	0	245	0	0	0	0	623
830	0	0	0	0	0	368	19	387	74	161	0	235	0	0	0	0	622
845	0	0	0	0	0	355	13	368	66	180	0	246	0	0	0	0	614
Total Volume	0	0	0	0	0	1431	66	1497	275	668	0	943	0	0	0	0	2440
% App Total.	0.0%	0.0%	0.0%		0.0%	95.6%	4.4%		29.2%	70.8%	0.0%		0.0%	0.0%	0.0%		
PHF	0.000				0.967				0.958				0.000				

PM Peak Hr Begins at 500 PM

	Oak St Southbound				12th St Westbound				Oak St Northbound				12th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	0	0	0	0	0	222	12	234	45	220	0	265	0	0	0	0	499
515	0	0	0	0	0	203	16	219	41	215	0	256	0	0	0	0	475
530	0	0	0	0	0	210	12	222	36	198	0	234	0	0	0	0	456
545	0	0	0	0	0	213	10	223	27	189	0	216	0	0	0	0	439
Total Volume	0	0	0	0	0	848	50	898	149	822	0	971	0	0	0	0	1869
% App Total.	0.0%	0.0%	0.0%		0.0%	94.4%	5.6%		15.3%	84.7%	0.0%		0.0%	0.0%	0.0%		
PHF	0.000				0.959				0.916				0.000				

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City of Oakland Oak St & 11th St Date: 05/21/2008

	Oak St Southbound				11th St Westbound				Oak St Northbound				11th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	0	0	0	0	0	0	0	0	109	0	109	2	0	0	2	111
7:15	0	0	0	0	0	0	0	0	0	132	0	132	4	0	0	4	136
7:30	0	0	0	0	0	0	0	0	0	172	0	172	6	0	0	6	178
7:45	0	0	0	0	0	0	0	0	0	219	0	219	10	0	0	10	229
Total	0	0	0	0	0	0	0	0	0	632	0	632	22	0	0	22	654
8:00	0	0	0	0	0	0	0	0	0	220	0	220	11	0	0	11	231
8:15	0	0	0	0	0	0	0	0	0	229	0	229	14	0	0	14	243
8:30	0	0	0	0	0	0	0	0	0	225	0	225	16	0	0	16	241
8:45	0	0	0	0	0	0	0	0	0	229	0	229	15	0	0	15	244
Total	0	0	0	0	0	0	0	0	0	903	0	903	56	0	0	56	959
16:00	0	0	0	0	0	0	0	0	0	181	0	181	16	0	0	16	197
16:15	0	0	0	0	0	0	0	0	0	149	0	149	10	0	0	10	159
16:30	0	0	0	0	0	0	0	0	0	194	0	194	8	0	0	8	202
16:45	0	0	0	0	0	0	0	0	0	196	0	196	10	0	0	10	206
Total	0	0	0	0	0	0	0	0	0	720	0	720	44	0	0	44	764
17:00	0	0	0	0	0	0	0	0	0	244	0	244	20	0	0	20	264
17:15	0	0	0	0	0	0	0	0	0	235	0	235	17	0	0	17	252
17:30	0	0	0	0	0	0	0	0	0	221	0	221	11	0	0	11	232
17:45	0	0	0	0	0	0	0	0	0	201	0	201	9	0	0	9	210
Total	0	0	0	0	0	0	0	0	0	901	0	901	57	0	0	57	958
Grand Total	0	0	0	0	0	0	0	0	0	3156	0	3156	179	0	0	179	3335
Apprch%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	100.0%	0.0%		#####	0.0%	0.0%		
Total %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	94.6%	0.0%	94.6%	5.4%	0.0%	0.0%	5.4%	

City of Oakland Oak St & 11th St Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Oak St Southbound				11th St Westbound				Oak St Northbound				11th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	0	0	0	0	0	0	0	0	220	0	220	11	0	0	11	231
815	0	0	0	0	0	0	0	0	0	229	0	229	14	0	0	14	243
830	0	0	0	0	0	0	0	0	0	225	0	225	16	0	0	16	241
845	0	0	0	0	0	0	0	0	0	229	0	229	15	0	0	15	244
Total Volume	0	0	0	0	0	0	0	0	0	903	0	903	56	0	0	56	959
% App Total.	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	100.0%	0.0%		#####	0.0%	0.0%		
PHF	0.000				0.000				0.986				0.875				

PM Peak Hr Begins at 500 PM

	Oak St Southbound				11th St Westbound				Oak St Northbound				11th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	0	0	0	0	0	0	0	0	0	244	0	244	20	0	0	20	264
515	0	0	0	0	0	0	0	0	0	235	0	235	17	0	0	17	252
530	0	0	0	0	0	0	0	0	0	221	0	221	11	0	0	11	232
545	0	0	0	0	0	0	0	0	0	201	0	201	9	0	0	9	210
Total Volume	0	0	0	0	0	0	0	0	0	901	0	901	57	0	0	57	958
% App Total.	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	100.0%	0.0%		#####	0.0%	0.0%		
PHF	0.000				0.000				0.923				0.713				

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City of Oakland | Madison St & 11th St | Date: 05/21/2008

	Madison St Southbound				11th St Westbound				Madison St Northbound				11th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	3	73	0	76	0	0	0	0	0	0	0	0	0	29	6	35	111
7:15	2	114	0	116	0	0	0	0	0	0	0	0	0	30	14	44	160
7:30	3	112	0	115	0	0	0	0	0	0	0	0	0	46	15	61	176
7:45	2	163	0	165	0	0	0	0	0	0	0	0	0	67	25	92	257
Total	10	462	0	472	0	0	0	0	0	0	0	0	0	172	60	232	704
8:00	1	160	0	161	0	0	0	0	0	0	0	0	0	82	30	112	273
8:15	9	161	0	170	0	0	0	0	0	0	0	0	0	91	30	121	291
8:30	10	172	0	182	0	0	0	0	0	0	0	0	0	98	36	134	316
8:45	9	159	0	168	0	0	0	0	0	0	0	0	0	61	26	87	255
Total	29	652	0	681	0	0	0	0	0	0	0	0	0	332	122	454	1135
16:00	12	160	0	172	0	0	0	0	0	0	0	0	0	140	32	172	344
16:15	9	144	0	153	0	0	0	0	0	0	0	0	0	125	27	152	305
16:30	17	188	0	205	0	0	0	0	0	0	0	0	0	158	43	201	406
16:45	11	153	0	164	0	0	0	0	0	0	0	0	0	151	32	183	347
Total	49	645	0	694	0	0	0	0	0	0	0	0	0	574	134	708	1402
17:00	13	198	0	211	0	0	0	0	0	0	0	0	0	181	35	216	427
17:15	15	195	0	210	0	0	0	0	0	0	0	0	0	194	41	235	445
17:30	7	162	0	169	0	0	0	0	0	0	0	0	0	198	39	237	406
17:45	8	174	0	182	0	0	0	0	0	0	0	0	0	187	47	234	416
Total	43	729	0	772	0	0	0	0	0	0	0	0	0	760	162	922	1694
Grand Total	131	2488	0	2619	0	0	0	0	0	0	0	0	0	1838	478	2316	4935
Apprch%	5.0%	95.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	79.4%	20.6%		
Total %	2.7%	50.4%	0.0%	53.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.2%	9.7%	46.9%	

City of Oakland | Madison St & 11th St | Date: 05/21/2008

AM Peak Hr Begins at 745 AM

	Madison St Southbound				11th St Westbound				Madison St Northbound				11th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
745	2	163	0	165	0	0	0	0	0	0	0	0	0	67	25	92	257
800	1	160	0	161	0	0	0	0	0	0	0	0	0	82	30	112	273
815	9	161	0	170	0	0	0	0	0	0	0	0	0	91	30	121	291
830	10	172	0	182	0	0	0	0	0	0	0	0	0	98	36	134	316
Total Volume	22	656	0	678	0	0	0	0	0	0	0	0	0	338	121	459	1137
% App Total.	3.2%	96.8%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	73.6%	26.4%		
PHF	0.931				0.000				0.000				0.856				

PM Peak Hr Begins at 500 PM

	Madison St Southbound				11th St Westbound				Madison St Northbound				11th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	13	198	0	211	0	0	0	0	0	0	0	0	0	181	35	216	427
515	15	195	0	210	0	0	0	0	0	0	0	0	0	194	41	235	445
530	7	162	0	169	0	0	0	0	0	0	0	0	0	198	39	237	406
545	8	174	0	182	0	0	0	0	0	0	0	0	0	187	47	234	416
Total Volume	43	729	0	772	0	0	0	0	0	0	0	0	0	760	162	922	1694
% App Total.	5.6%	94.4%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	82.4%	17.6%		
PHF	0.915				0.000				0.000				0.973				

All Traffic Data

(916) 771-8700
F (916) 786-2879

OAKLAND

File Name : 08-7458-020 FRANKLIN-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 1

Groups Printed- Unshifted

	FRANKLIN ST. Southbound					11TH ST. Westbound					FRANKLIN ST. Northbound					11TH ST. Eastbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00	0	0	0	10	0	0	0	0	23	0	0	25	9	13	34	20	41	0	14	61	60	95	155
07:15	0	0	0	24	0	0	0	0	13	0	0	42	14	20	56	19	61	0	18	80	75	136	211
07:30	0	0	0	29	0	0	0	0	28	0	0	56	11	27	67	18	58	0	22	76	106	143	249
07:45	0	0	0	21	0	0	0	0	31	0	0	61	14	17	75	20	64	0	24	84	93	159	252
Total	0	0	0	84	0	0	0	0	95	0	0	184	48	77	232	77	224	0	78	301	334	533	867
08:00	0	0	0	35	0	0	0	0	44	0	0	63	12	21	75	20	83	0	37	103	137	178	315
08:15	0	0	0	22	0	0	0	0	32	0	0	94	11	2	105	23	82	0	21	105	77	210	287
08:30	0	0	0	22	0	0	0	0	15	0	0	59	15	12	74	13	92	0	14	105	63	179	242
08:45	0	0	0	26	0	0	0	0	22	0	0	63	12	8	75	17	85	0	20	102	76	177	253
Total	0	0	0	105	0	0	0	0	113	0	0	279	50	43	329	73	342	0	92	415	353	744	1097
*** BREAK ***																							
16:00	0	0	0	19	0	0	0	0	2	0	6	75	14	8	95	1	131	0	17	132	46	227	273
16:15	0	0	0	39	0	0	0	0	8	0	0	52	29	35	81	2	121	0	37	123	119	204	323
16:30	0	0	0	51	0	0	0	0	5	0	0	47	27	51	74	2	120	0	47	122	154	196	350
16:45	0	0	0	50	0	0	0	0	19	0	0	53	21	69	74	4	129	0	40	133	178	207	385
Total	0	0	0	159	0	0	0	0	34	0	6	227	91	163	324	9	501	0	141	510	497	834	1331
17:00	0	0	0	55	0	0	0	0	4	0	0	63	28	42	91	4	152	0	24	156	125	247	372
17:15	0	0	0	24	0	0	0	0	12	0	0	61	29	16	90	8	173	0	21	181	73	271	344
17:30	0	0	0	26	0	0	0	0	10	0	0	65	27	21	92	5	157	0	22	162	79	254	333
17:45	0	0	0	32	0	0	0	0	8	0	0	77	28	27	105	3	123	0	25	126	92	231	323
Total	0	0	0	137	0	0	0	0	34	0	0	266	112	106	378	20	605	0	92	625	369	1003	1372
Grand Total	0	0	0	485	0	0	0	0	276	0	6	956	301	389	1263	179	1672	0	403	1851	1553	3114	4667
Apprch %	0	0	0			0	0	0			0.5	75.7	23.8			9.7	90.3	0					
Total %	0	0	0		0	0	0	0		0	0.2	30.7	9.7		40.6	5.7	53.7	0		59.4	33.3	66.7	

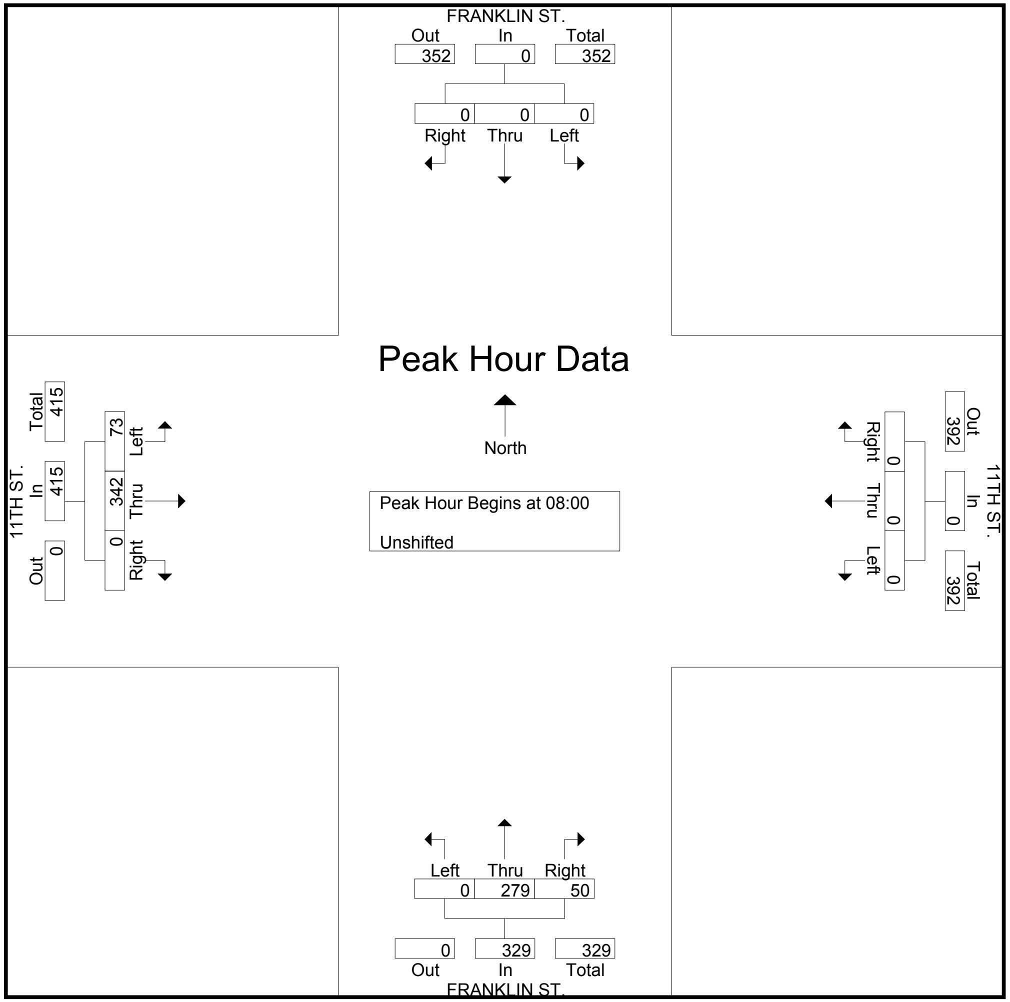
	FRANKLIN ST. Southbound				11TH ST. Westbound				FRANKLIN ST. Northbound				11TH ST. Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 08:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00																	
08:00	0	0	0	0	0	0	0	0	0	63	12	75	20	83	0	103	178
08:15	0	0	0	0	0	0	0	0	0	**94**	11	**105**	**23**	82	0	**105**	**210**
08:30	0	0	0	0	0	0	0	0	0	59	**15**	74	13	**92**	0	105	179
08:45	0	0	0	0	0	0	0	0	0	63	12	75	17	85	0	102	177
Total Volume	0	0	0	0	0	0	0	0	0	279	50	329	73	342	0	415	744
% App. Total	0	0	0		0	0	0		0	84.8	15.2		17.6	82.4	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.742	.833	.783	.793	.929	.000	.988	.886

All Traffic Data

(916) 771-8700
F (916) 786-2879

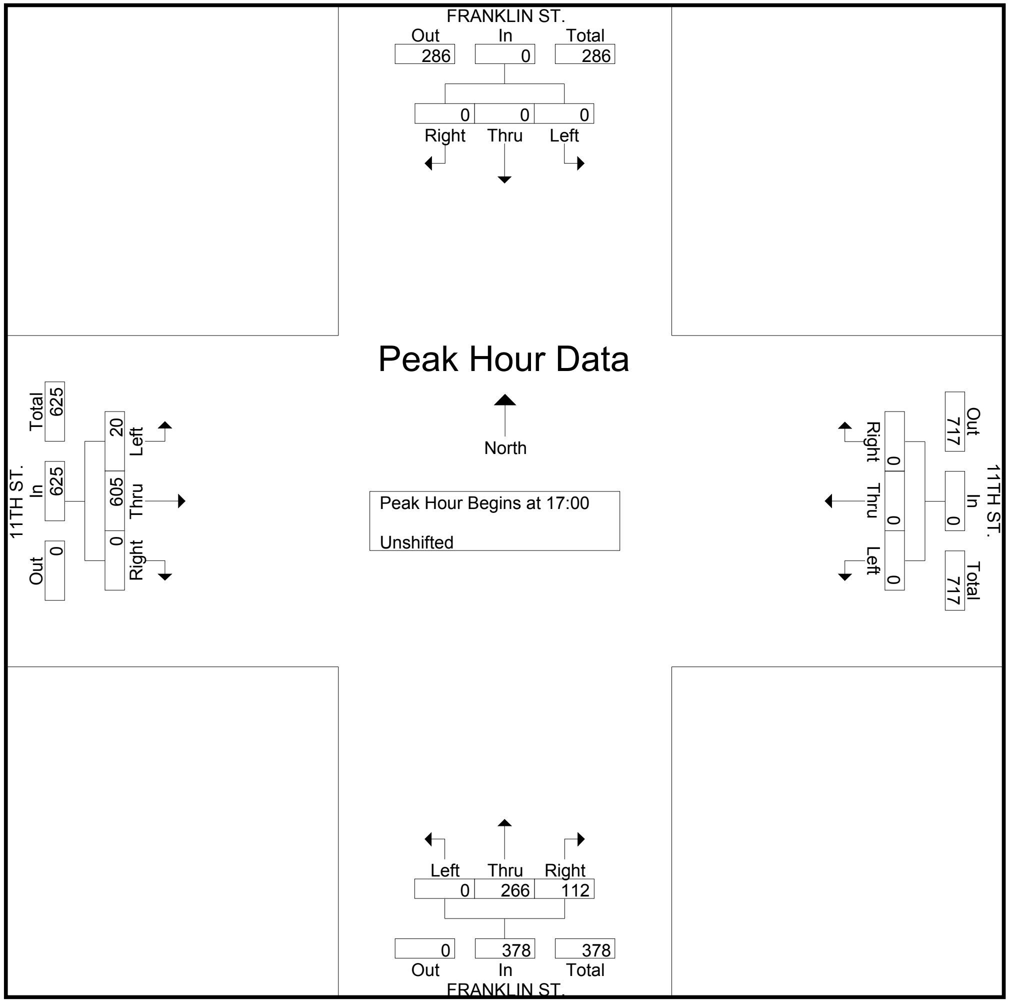
OAKLAND

File Name : 08-7458-020 FRANKLIN-11TH-F
Site Code : 00000000
Start Date : 08/05/2008
Page No : 2



Peak Hour Analysis From 16:00 to 17:45 - Peak 1 of 1
Peak Hour for Entire Intersection Begins at 17:00

17:00	0	0	0	0	0	0	0	0	0	63	28	91	4	152	0	156	247
17:15	0	0	0	0	0	0	0	0	0	61	**29**	90	**8**	**173**	0	**181**	**271**
17:30	0	0	0	0	0	0	0	0	0	65	27	92	5	157	0	162	254
17:45	0	0	0	0	0	0	0	0	0	**77**	28	**105**	3	123	0	126	231
Total Volume	0	0	0	0	0	0	0	0	0	266	112	378	20	605	0	625	1003
% App. Total	0	0	0		0	0	0		0	70.4	29.6		3.2	96.8	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.864	.966	.900	.625	.874	.000	.863	.925



FRANKLIN ST.
Out
In
Total
286
0
286
0
0
0
Right
Thru
Left
Peak Hour Data
North
Peak Hour Begins at 17:00
Unshifted
11TH ST.
Total
625
In
625
Out
0
20
Left
605
Thru
0
Right
11TH ST.
Out
717
In
0
Total
717
0
Right
0
Thru
0
Left
Left
Thru
Right
0
266
112
0
378
378
Out
In
Total
FRANKLIN ST.

ALL TRAFFIC DATA, INC
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City of Oakland | Oak St & 7th St | Date: 05/21/2008

	Oak St Southbound				7th St Westbound				Oak St Northbound				7th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	0	0	0	0	0	0	0	0	125	18	143	13	55	0	68	211
7:15	0	0	0	0	0	0	0	0	0	137	25	162	14	55	0	69	231
7:30	0	0	0	0	0	0	0	0	0	192	36	228	23	84	0	107	335
7:45	0	0	0	0	0	0	0	0	0	201	49	250	22	131	0	153	403
Total	0	0	0	0	0	0	0	0	0	655	128	783	72	325	0	397	1180
8:00	0	0	0	0	0	0	0	0	0	218	53	271	28	98	0	126	397
8:15	0	0	0	0	0	0	0	0	0	277	44	321	31	133	0	164	485
8:30	0	0	0	0	0	0	0	0	0	220	63	283	30	127	0	157	440
8:45	0	0	0	0	0	0	0	0	0	223	87	310	26	125	0	151	461
Total	0	0	0	0	0	0	0	0	0	938	247	1185	115	483	0	598	1783
16:00	0	0	0	0	0	0	0	0	0	158	45	203	34	139	0	173	376
16:15	0	0	0	0	0	0	0	0	0	140	40	180	15	151	0	166	346
16:30	0	0	0	0	0	0	0	0	0	162	43	205	39	183	0	222	427
16:45	0	0	0	0	0	0	0	0	0	162	59	221	34	170	0	204	425
Total	0	0	0	0	0	0	0	0	0	622	187	809	122	643	0	765	1574
17:00	0	0	0	0	0	0	0	0	0	202	85	287	44	230	0	274	561
17:15	0	0	0	0	0	0	0	0	0	208	85	293	36	229	0	265	558
17:30	0	0	0	0	0	0	0	0	0	191	86	277	41	219	0	260	537
17:45	0	0	0	0	0	0	0	0	0	184	73	257	28	219	0	247	504
Total	0	0	0	0	0	0	0	0	0	785	329	1114	149	897	0	1046	2160
Grand Total	0	0	0	0	0	0	0	0	0	3000	891	3891	458	2348	0	2806	6697
Apprch%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	77.1%	22.9%		16.3%	83.7%	0.0%		
Total %	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	44.8%	13.3%	58.1%	6.8%	35.1%	0.0%	41.9%	

City of Oakland | Oak St & 7th St | Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Oak St Southbound				7th St Westbound				Oak St Northbound				7th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	0	0	0	0	0	0	0	0	218	53	271	28	98	0	126	397
815	0	0	0	0	0	0	0	0	0	277	44	321	31	133	0	164	485
830	0	0	0	0	0	0	0	0	0	220	63	283	30	127	0	157	440
845	0	0	0	0	0	0	0	0	0	223	87	310	26	125	0	151	461
Total Volume	0	0	0	0	0	0	0	0	0	938	247	1185	115	483	0	598	1783
% App Total.	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	79.2%	20.8%		19.2%	80.8%	0.0%		
PHF	0.000				0.000				0.923				0.912				

PM Peak Hr Begins at 500 PM

	Oak St Southbound				7th St Westbound				Oak St Northbound				7th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	0	0	0	0	0	0	0	0	0	202	85	287	44	230	0	274	561
515	0	0	0	0	0	0	0	0	0	208	85	293	36	229	0	265	558
530	0	0	0	0	0	0	0	0	0	191	86	277	41	219	0	260	537
545	0	0	0	0	0	0	0	0	0	184	73	257	28	219	0	247	504
Total Volume	0	0	0	0	0	0	0	0	0	785	329	1114	149	897	0	1046	2160
% App Total.	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	70.5%	29.5%		14.2%	85.8%	0.0%		
PHF	0.000				0.000				0.951				0.954				

ALL TRAFFIC DATA, INC
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FAX 786-2879

City of Oakland Madison St & 7th St Date: 05/21/2008

	Madison St Southbound				7th St Westbound				Madison St Northbound				7th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	13	100	0	113	0	0	0	0	0	0	0	0	0	54	68	122	235
7:15	12	113	0	125	0	0	0	0	0	0	0	0	0	56	99	155	280
7:30	21	125	0	146	0	0	0	0	0	0	0	0	0	90	78	168	314
7:45	39	134	0	173	0	0	0	0	0	0	0	0	0	102	70	172	345
Total	85	472	0	557	0	0	0	0	0	0	0	0	0	302	315	617	1174
8:00	29	134	0	163	0	0	0	0	0	0	0	0	0	94	61	155	318
8:15	35	130	0	165	0	0	0	0	0	0	0	0	0	122	50	172	337
8:30	30	131	0	161	0	0	0	0	0	0	0	0	0	127	59	186	347
8:45	31	129	0	160	0	0	0	0	0	0	0	0	0	126	70	196	356
Total	125	524	0	649	0	0	0	0	0	0	0	0	0	469	240	709	1358
16:00	26	166	0	192	0	0	0	0	0	0	0	0	0	138	75	213	405
16:15	24	134	0	158	0	0	0	0	0	0	0	0	0	140	72	212	370
16:30	36	170	0	206	0	0	0	0	0	0	0	0	0	177	64	241	447
16:45	42	131	0	173	0	0	0	0	0	0	0	0	0	162	57	219	392
Total	128	601	0	729	0	0	0	0	0	0	0	0	0	617	268	885	1614
17:00	68	185	0	253	0	0	0	0	0	0	0	0	0	201	65	266	519
17:15	64	175	0	239	0	0	0	0	0	0	0	0	0	206	58	264	503
17:30	57	170	0	227	0	0	0	0	0	0	0	0	0	201	57	258	485
17:45	48	174	0	222	0	0	0	0	0	0	0	0	0	204	58	262	484
Total	237	704	0	941	0	0	0	0	0	0	0	0	0	812	238	1050	1991
Grand Total	575	2301	0	2876	0	0	0	0	0	0	0	0	0	2200	1061	3261	6137
Apprch%	####	80.0%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	67.5%	32.5%		
Total %	9.4%	37.5%	0.0%	46.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	35.8%	17.3%	53.1%	

City of Oakland Madison St & 7th St Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Madison St Southbound				7th St Westbound				Madison St Northbound				7th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	29	134	0	163	0	0	0	0	0	0	0	0	0	94	61	155	318
815	35	130	0	165	0	0	0	0	0	0	0	0	0	122	50	172	337
830	30	131	0	161	0	0	0	0	0	0	0	0	0	127	59	186	347
845	31	129	0	160	0	0	0	0	0	0	0	0	0	126	70	196	356
Total Volume	125	524	0	649	0	0	0	0	0	0	0	0	0	469	240	709	1358
% App Total.	####	80.7%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	66.1%	33.9%		
PHF	0.983				0.000				0.000				0.904				

PM Peak Hr Begins at 500 PM

	Madison St Southbound				7th St Westbound				Madison St Northbound				7th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	68	185	0	253	0	0	0	0	0	0	0	0	0	201	65	266	519
515	64	175	0	239	0	0	0	0	0	0	0	0	0	206	58	264	503
530	57	170	0	227	0	0	0	0	0	0	0	0	0	201	57	258	485
545	48	174	0	222	0	0	0	0	0	0	0	0	0	204	58	262	484
Total Volume	237	704	0	941	0	0	0	0	0	0	0	0	0	812	238	1050	1991
% App Total.	####	74.8%	0.0%		0.0%	0.0%	0.0%		0.0%	0.0%	0.0%		0.0%	77.3%	22.7%		
PHF	0.930				0.000				0.000				0.987				

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

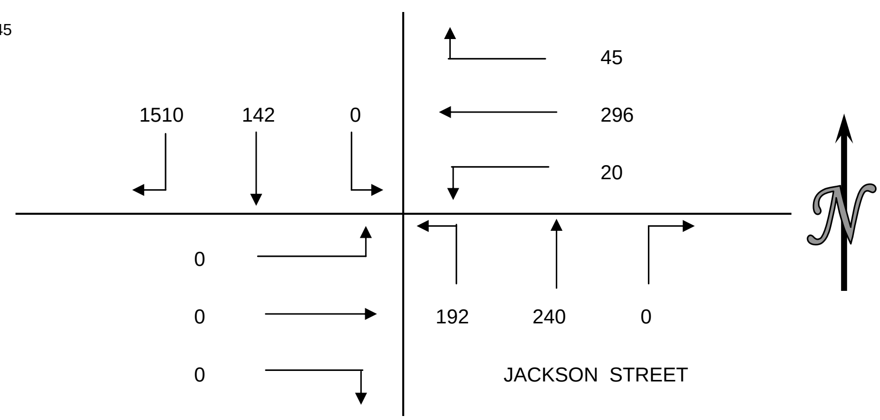
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		THURSDAY OCTOBER 23, 2008
PERIOD"		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	JACKSON STREET
	E/W	6TH STREET
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	277	19	0	7	65	3	0	33	38	0	0	0	442
715-730	373	36	0	10	71	6	0	33	43	0	0	0	572
730-745	336	19	0	9	81	2	0	42	61	0	0	0	550
745-800	392	33	0	9	77	5	0	69	57	0	0	0	642
800-815	368	26	0	11	73	5	0	54	47	0	0	0	584
815-830	399	39	0	13	77	3	0	65	41	0	0	0	637
830-845	351	44	0	12	69	7	0	52	47	0	0	0	582
845-900	320	42	0	7	96	5	0	66	50	0	0	0	586
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	1378	107	0	35	294	16	0	177	199	0	0	0	2206
715-815	1469	114	0	39	302	18	0	198	208	0	0	0	2348
730-830	1495	117	0	42	308	15	0	230	206	0	0	0	2413
745-845	1510	142	0	45	296	20	0	240	192	0	0	0	2445
800-900	1438	151	0	43	315	20	0	237	185	0	0	0	2389
PHF	0.946115	0.806818		0.865385	0.961039	0.714286		0.869565	0.842105				

AM PEAK HOUR: 745-845



6TH STREET

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	1	0	2	3
715-730	0	8	0	1	9
730-745	0	8	0	0	8
745-800	0	15	1	1	17
800-815	1	19	0	0	20
815-830	1	11	1	0	13
830-845	0	12	0	1	13
845-900	0	14	0	1	15
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	0	32	1	4	37
715-815	1	50	1	2	54
730-830	2	53	2	1	58
745-845	2	57	2	2	63
800-900	2	56	1	2	61

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	1	1
715-730	0	0	0	0	0
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	0	0	0	1	1
715-815	0	0	0	0	0
730-830	0	0	0	0	0
745-845	0	0	0	0	0
800-900	0	0	0	0	0

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

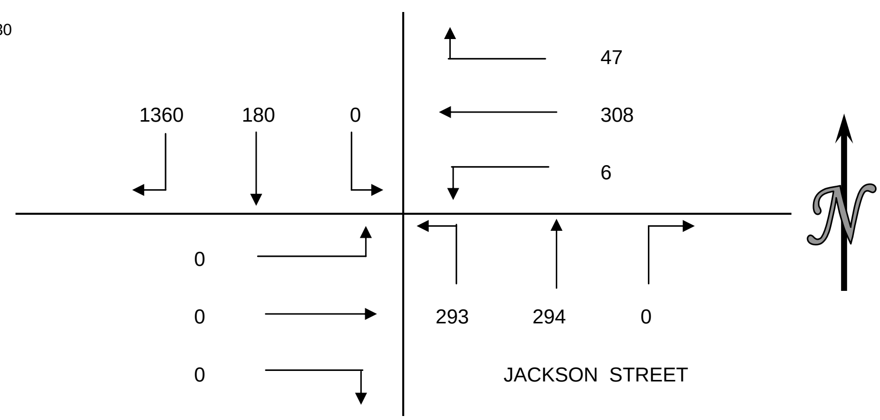
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		THURSDAY OCTOBER 23, 2008
PERIOD"		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	JACKSON STREET
	E/W	6TH STREET
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	335	42	0	7	101	1	0	60	73	0	0	0	619
415-430	307	29	0	9	67	1	0	52	70	0	0	0	535
430-445	345	45	0	11	97	2	0	79	87	0	0	0	666
445-500	329	43	0	11	53	1	0	82	74	0	0	0	593
500-515	348	49	0	11	99	0	0	76	72	0	0	0	655
515-530	338	43	0	14	59	3	0	57	60	0	0	0	574
530-545	336	48	0	9	83	1	0	56	52	0	0	0	585
545-600	304	52	0	19	83	4	0	59	69	0	0	0	590
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	1316	159	0	38	318	5	0	273	304	0	0	0	2413
415-515	1329	166	0	42	316	4	0	289	303	0	0	0	2449
430-530	1360	180	0	47	308	6	0	294	293	0	0	0	2488
445-545	1351	183	0	45	294	5	0	271	258	0	0	0	2407
500-600	1326	192	0	53	324	8	0	248	253	0	0	0	2404
PHF	0.977011	0.918367		0.839286	0.777778	0.5		0.896341	0.841954				

AM PEAK HOUR: 430-530



6TH STREET

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	11	0	0	11
415-430	0	3	0	0	3
430-445	0	7	0	0	7
445-500	0	3	0	0	3
500-515	0	9	0	0	9
515-530	0	4	0	0	4
530-545	0	6	0	0	6
545-600	0	8	0	0	8
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	0	24	0	0	24
415-515	0	22	0	0	22
430-530	0	23	0	0	23
445-545	0	22	0	0	22
500-600	0	27	0	0	27

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	1	1
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	0	2	0	0	2
515-530	0	0	0	0	0
530-545	0	2	0	0	2
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	1	1
415-515	0	2	0	1	3
430-530	0	2	0	0	2
445-545	0	4	0	0	4
500-600	0	4	0	0	4

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City of Oakland Oak St & 6th St Date: 05/21/2008

	Oak St Southbound				6th St Westbound				Oak St Northbound				6th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
7:00	0	0	0	0	21	19	95	135	23	38	0	61	0	0	0	0	196
7:15	0	0	0	0	23	16	131	170	18	43	0	61	0	0	0	0	231
7:30	0	0	0	0	27	17	164	208	34	60	0	94	0	0	0	0	302
7:45	0	0	0	0	35	15	150	200	20	100	0	120	0	0	0	0	320
Total	0	0	0	0	106	67	540	713	95	241	0	336	0	0	0	0	1049
8:00	0	0	0	0	39	10	162	211	25	97	0	122	0	0	0	0	333
8:15	0	0	0	0	30	11	206	247	31	109	0	140	0	0	0	0	387
8:30	0	0	0	0	33	14	165	212	26	112	0	138	0	0	0	0	350
8:45	0	0	0	0	18	13	204	235	41	111	0	152	0	0	0	0	387
Total	0	0	0	0	120	48	737	905	123	429	0	552	0	0	0	0	1457
16:00	0	0	0	0	17	16	132	165	29	59	0	88	0	0	0	0	253
16:15	0	0	0	0	14	15	108	137	31	65	0	96	0	0	0	0	233
16:30	0	0	0	0	24	11	114	149	39	83	0	122	0	0	0	0	271
16:45	0	0	0	0	12	10	117	139	42	105	0	147	0	0	0	0	286
Total	0	0	0	0	67	52	471	590	141	312	0	453	0	0	0	0	1043
17:00	0	0	0	0	23	14	162	199	41	123	0	164	0	0	0	0	363
17:15	0	0	0	0	13	12	159	184	43	137	0	180	0	0	0	0	364
17:30	0	0	0	0	7	13	144	164	38	152	0	190	0	0	0	0	354
17:45	0	0	0	0	12	8	143	163	32	112	0	144	0	0	0	0	307
Total	0	0	0	0	55	47	608	710	154	524	0	678	0	0	0	0	1388
Grand Total	0	0	0	0	348	214	2356	2918	513	1506	0	2019	0	0	0	0	4937
Apprch%	0.0%	0.0%	0.0%		11.9%	7.3%	80.7%		25.4%	74.6%	0.0%		0.0%	0.0%	0.0%		
Total %	0.0%	0.0%	0.0%	0.0%	7.0%	4.3%	47.7%	59.1%	10.4%	30.5%	0.0%	40.9%	0.0%	0.0%	0.0%	0.0%	

City of Oakland Oak St & 6th St Date: 05/21/2008

AM Peak Hr Begins at 800 AM

	Oak St Southbound				6th St Westbound				Oak St Northbound				6th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
800	0	0	0	0	39	10	162	211	25	97	0	122	0	0	0	0	333
815	0	0	0	0	30	11	206	247	31	109	0	140	0	0	0	0	387
830	0	0	0	0	33	14	165	212	26	112	0	138	0	0	0	0	350
845	0	0	0	0	18	13	204	235	41	111	0	152	0	0	0	0	387
Total Volume	0	0	0	0	120	48	737	905	123	429	0	552	0	0	0	0	1457
% App Total.	0.0%	0.0%	0.0%		13.3%	5.3%	81.4%		22.3%	77.7%	0.0%		0.0%	0.0%	0.0%		
PHF	0.000				0.916				0.908				0.000				

PM Peak Hr Begins at 500 PM

	Oak St Southbound				6th St Westbound				Oak St Northbound				6th St Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int Total
500	0	0	0	0	23	14	162	199	41	123	0	164	0	0	0	0	363
515	0	0	0	0	13	12	159	184	43	137	0	180	0	0	0	0	364
530	0	0	0	0	7	13	144	164	38	152	0	190	0	0	0	0	354
545	0	0	0	0	12	8	143	163	32	112	0	144	0	0	0	0	307
Total Volume	0	0	0	0	55	47	608	710	154	524	0	678	0	0	0	0	1388
% App Total.	0.0%	0.0%	0.0%		7.7%	6.6%	85.6%		22.7%	77.3%	0.0%		0.0%	0.0%	0.0%		
PHF	0.000				0.892				0.892				0.000				

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City of Oakland — Oak St & 5th St — Date: 05/21/2008

Start Time	Oak St Southbound Left	Thru	Right	App. Total	5th St Westbound Left	Thru	Right	App. Total	Oak St Northbound Left	Thru	Right	App. Total	5th St Eastbound Left	Thru	Right	App. Total	Int Total
7:00	0	18	0	18	0	0	0	0	0	45	19	64	16	93	25	134	216
7:15	0	23	0	23	0	0	0	0	0	27	13	40	29	141	31	201	264
7:30	0	23	0	23	0	0	0	0	0	46	25	71	42	104	21	167	261
7:45	1	37	0	38	0	0	0	0	0	47	16	63	59	144	23	226	327
Total	1	101	0	102	0	0	0	0	0	165	73	238	146	482	100	728	1068
8:00	0	38	0	38	0	0	0	0	0	47	18	65	70	155	41	266	369
8:15	1	30	0	31	0	0	0	0	0	60	10	70	77	115	47	239	340
8:30	0	32	0	32	0	0	0	0	0	53	23	76	76	147	45	268	376
8:45	2	17	0	19	0	0	0	0	0	70	17	87	80	134	19	233	339
Total	3	117	0	120	0	0	0	0	0	230	68	298	303	551	152	1006	1424
16:00	2	10	0	12	0	0	0	0	0	58	15	73	30	91	18	139	224
16:15	1	18	0	19	0	0	0	0	0	43	13	56	42	129	19	190	265
16:30	0	24	0	24	0	0	0	0	0	59	20	79	58	123	14	195	298
16:45	0	14	0	14	0	0	0	0	0	78	13	91	66	128	24	218	323
Total	3	66	0	69	0	0	0	0	0	238	61	299	196	471	75	742	1110
17:00	1	19	0	20	0	0	0	0	0	97	22	119	71	124	20	215	354
17:15	0	16	0	16	0	0	0	0	0	123	14	137	57	122	16	195	348
17:30	0	9	0	9	0	0	0	0	0	148	13	161	49	102	9	160	330
17:45	0	9	0	9	0	0	0	0	0	106	14	120	39	104	6	149	278
Total	1	53	0	54	0	0	0	0	0	474	63	537	216	452	51	719	1310
Grand Total	8	337	0	345	0	0	0	0	0	1107	265	1372	861	1956	378	3195	4912
Apprch%	2.3%	97.7%	0.0%		0.0%	0.0%	0.0%		0.0%	80.7%	19.3%		26.9%	61.2%	11.8%		
Total %	0.2%	6.9%	0.0%	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%	22.5%	5.4%	27.9%	17.5%	39.8%	7.7%	65.0%	

City of Oakland — Oak St & 5th St — Date: 05/21/2008

AM Peak Hr Begins at 800 AM

Start Time	Oak St Southbound Left	Thru	Right	App. Total	5th St Westbound Left	Thru	Right	App. Total	Oak St Northbound Left	Thru	Right	App. Total	5th St Eastbound Left	Thru	Right	App. Total	Int Total
800	0	38	0	38	0	0	0	0	0	47	18	65	70	155	41	266	369
815	1	30	0	31	0	0	0	0	0	60	10	70	77	115	47	239	340
830	0	32	0	32	0	0	0	0	0	53	23	76	76	147	45	268	376
845	2	17	0	19	0	0	0	0	0	70	17	87	80	134	19	233	339
Total Volume	3	117	0	120	0	0	0	0	0	230	68	298	303	551	152	1006	1424
% App Total.	2.5%	97.5%	0.0%		0.0%	0.0%	0.0%		0.0%	77.2%	22.8%		30.1%	54.8%	15.1%		
PHF	0.789				0.000				0.856				0.938				

PM Peak Hr Begins at 445 PM

Start Time	Oak St Southbound Left	Thru	Right	App. Total	5th St Westbound Left	Thru	Right	App. Total	Oak St Northbound Left	Thru	Right	App. Total	5th St Eastbound Left	Thru	Right	App. Total	Int Total
445	0	14	0	14	0	0	0	0	0	78	13	91	66	128	24	218	323
500	1	19	0	20	0	0	0	0	0	97	22	119	71	124	20	215	354
515	0	16	0	16	0	0	0	0	0	123	14	137	57	122	16	195	348
530	0	9	0	9	0	0	0	0	0	148	13	161	49	102	9	160	330
Total Volume	1	58	0	59	0	0	0	0	0	446	62	508	243	476	69	788	1355
% App Total.	1.7%	98.3%	0.0%		0.0%	0.0%	0.0%		0.0%	87.8%	12.2%		30.8%	60.4%	8.8%		
PHF	0.738				0.000				0.789				0.904				

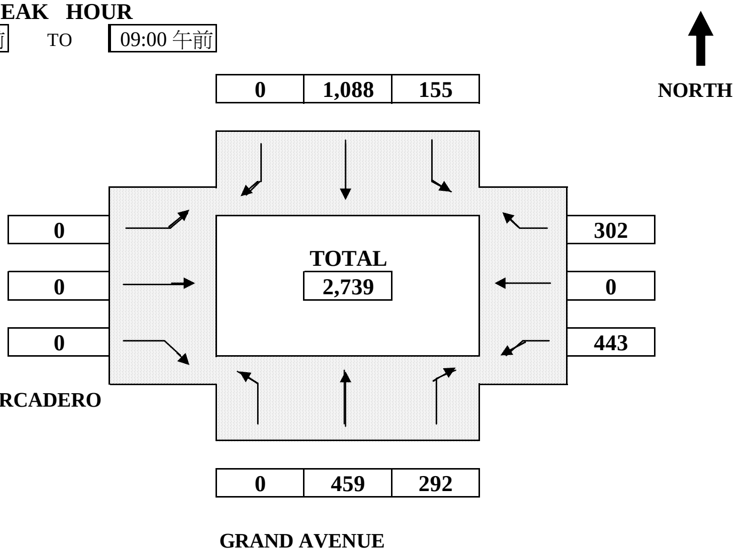
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

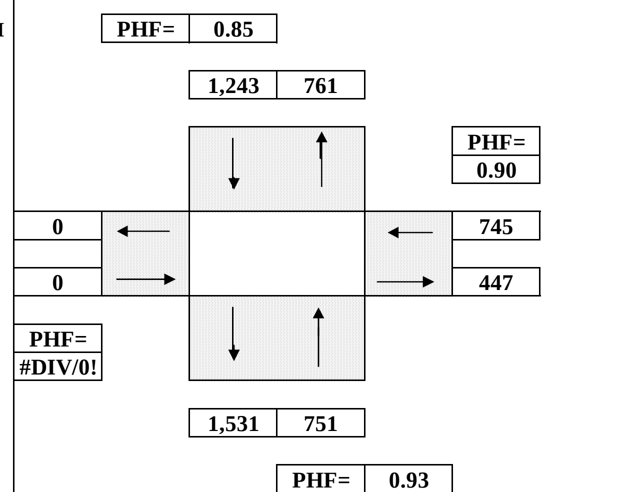
PROJECT:	**OAKLAND TRAFFIC STUDY**	**SURVEY DATE:**	**2008/11/12**	**DAY:**	**WEDNESDAY**
N-S Approach:	**GRAND AVENUE**	**SURVEY TIME:**	**7:00 午前**	**TO**	**9:00 午前**
E-W Approach:	**EL EMBARCADERO**	**CITY:**	**OAKLAND**	**FILE:**	**2811065-1AM**

PEAK HOUR

08:00 午前 TO 09:00 午前



ARRIVAL / DEPARTURE VOLUMES



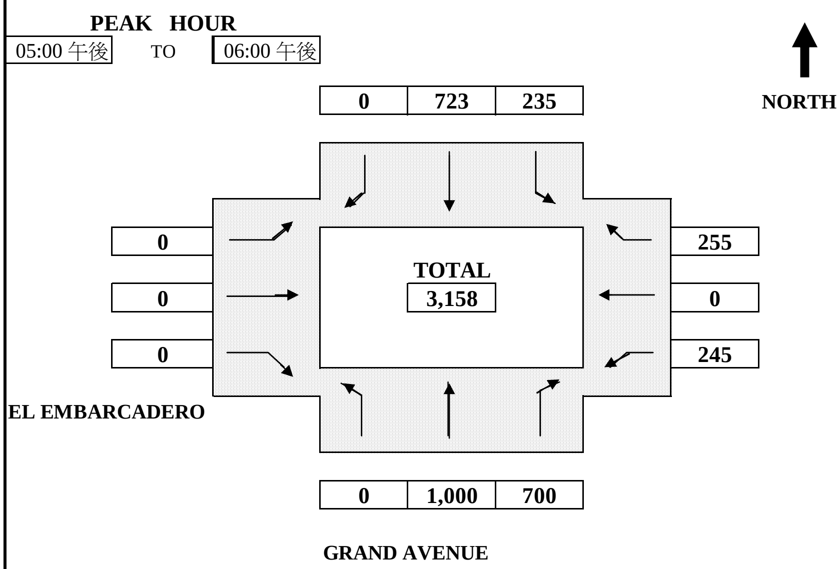
TIME PERIOD			NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
From		To	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	0	73	58	19	91	0	0	0	0	37	0	47	*325*
7:15 午前	---	7:30 午前	0	144	90	35	191	0	0	0	0	73	0	103	*636*
7:30 午前	---	7:45 午前	0	233	132	76	375	0	0	0	0	128	0	175	*1,119*
7:45 午前	---	8:00 午前	0	326	193	121	558	0	0	0	0	215	0	251	*1,664*
8:00 午前	---	8:15 午前	0	436	267	150	779	0	0	0	0	318	0	330	*2,280*
8:15 午前	---	8:30 午前	0	550	350	192	1,041	0	0	0	0	443	0	412	*2,988*
8:30 午前	---	8:45 午前	0	646	423	235	1,321	0	0	0	0	534	0	491	*3,650*
8:45 午前	---	9:00 午前	0	785	485	276	1,646	0	0	0	0	658	0	553	*4,403*
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	0	73	58	19	91	0	0	0	0	37	0	47	*325*
7:15 午前	---	7:30 午前	0	71	32	16	100	0	0	0	0	36	0	56	*311*
7:30 午前	---	7:45 午前	0	89	42	41	184	0	0	0	0	55	0	72	*483*
7:45 午前	---	8:00 午前	0	93	61	45	183	0	0	0	0	87	0	76	*545*
8:00 午前	---	8:15 午前	0	110	74	29	221	0	0	0	0	103	0	79	*616*
8:15 午前	---	8:30 午前	0	114	83	42	262	0	0	0	0	125	0	82	*708*
8:30 午前	---	8:45 午前	0	96	73	43	280	0	0	0	0	91	0	79	*662*
8:45 午前	---	9:00 午前	0	139	62	41	325	0	0	0	0	124	0	62	*753*
HOURLY TOTALS															
7:00 AM	---	8:00 午前	0	326	193	121	558	0	0	0	0	215	0	251	*1,664*
7:15 午前	---	8:15 午前	0	363	209	131	688	0	0	0	0	281	0	283	*1,955*
7:30 午前	---	8:30 午前	0	406	260	157	850	0	0	0	0	370	0	309	*2,352*
7:45 午前	---	8:45 午前	0	413	291	159	946	0	0	0	0	406	0	316	*2,531*
8:00 午前	---	9:00 午前	0	459	292	155	1,088	0	0	0	0	443	0	302	*2,739*

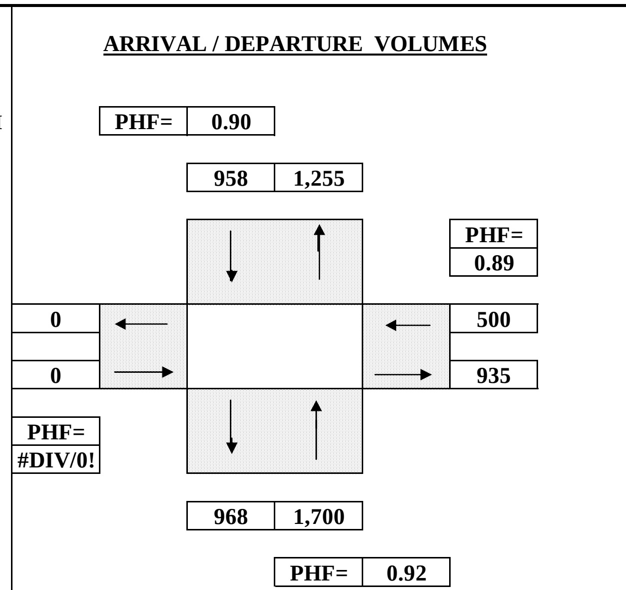
Telephone: (510)232-1271 **Fax: (510)232-1272**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**OAKLAND TRAFFIC STUDY**	**SURVEY DATE:**	**2008/11/06**	**DAY:**	**THURSDAY**
N-S Approach:	**GRAND AVENUE**	**SURVEY TIME:**	**4:00 午後**	**TO**	**6:00 午後**
E-W Approach:	**EL EMBARCADERO**	**CITY:**	**OAKLAND**	**FILE:**	**2811065-1PM**





TIME PERIOD			NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
From		To	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	0	142	114	47	143	0	0	0	0	48	0	47	***541***
4:15 午後	---	4:30 午後	0	285	219	95	275	0	0	0	0	99	0	92	***1,065***
4:30 午後	---	4:45 午後	0	498	392	164	429	0	0	0	0	154	0	129	***1,766***
4:45 午後	---	5:00 午後	0	681	541	206	565	0	0	0	0	197	0	189	***2,379***
5:00 午後	---	5:15 午後	0	891	665	270	738	0	0	0	0	255	0	271	***3,090***
5:15 午後	---	5:30 午後	0	1,145	874	328	915	0	0	0	0	316	0	350	***3,928***
5:30 午後	---	5:45 午後	0	1,412	1,070	381	1,083	0	0	0	0	375	0	407	***4,728***
5:45 午後	---	6:00 午後	0	1,681	1,241	441	1,288	0	0	0	0	442	0	444	***5,537***
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	0	142	114	47	143	0	0	0	0	48	0	47	***541***
4:15 午後	---	4:30 午後	0	143	105	48	132	0	0	0	0	51	0	45	***524***
4:30 午後	---	4:45 午後	0	213	173	69	154	0	0	0	0	55	0	37	***701***
4:45 午後	---	5:00 午後	0	183	149	42	136	0	0	0	0	43	0	60	***613***
5:00 午後	---	5:15 午後	0	210	124	64	173	0	0	0	0	58	0	82	***711***
5:15 午後	---	5:30 午後	0	254	209	58	177	0	0	0	0	61	0	79	***838***
5:30 午後	---	5:45 午後	0	267	196	53	168	0	0	0	0	59	0	57	***800***
5:45 午後	---	6:00 午後	0	269	171	60	205	0	0	0	0	67	0	37	***809***
HOURLY TOTALS															
4:00 PM	---	5:00 午後	0	681	541	206	565	0	0	0	0	197	0	189	***2,379***
4:15 午後	---	5:15 午後	0	749	551	223	595	0	0	0	0	207	0	224	***2,549***
4:30 午後	---	5:30 午後	0	860	655	233	640	0	0	0	0	217	0	258	***2,863***
4:45 午後	---	5:45 午後	0	914	678	217	654	0	0	0	0	221	0	278	***2,962***
5:00 午後	---	6:00 午後	0	1,000	700	235	723	0	0	0	0	245	0	255	***3,158***

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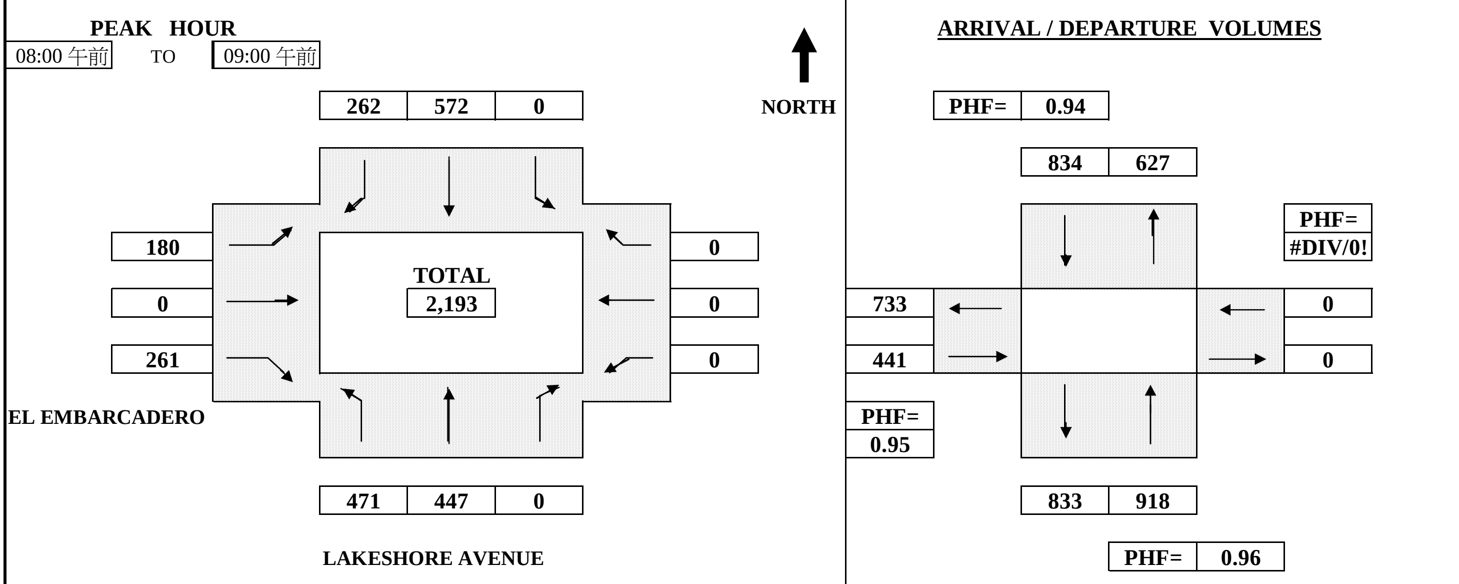
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**OAKLAND TRAFFIC STUDY**	**SURVEY DATE:**	**2008/11/12**	**DAY:**	**WEDNESDAY**
N-S Approach:	**LAKESHORE AVENUE**	**SURVEY TIME:**	**7:00 午前**	**TO**	**9:00 午前**
E-W Approach:	**EL EMBARCADERO**	**CITY: OAKLAND**		**FILE:**	**2811065-2AM**



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	62	60	0	0	67	25	35	0	32	0	0	0	***281***
7:15 午前	---	7:30 午前	127	150	0	0	186	47	59	0	57	0	0	0	***626***
7:30 午前	---	7:45 午前	218	250	0	0	343	85	87	0	108	0	0	0	***1,091***
7:45 午前	---	8:00 午前	336	372	0	0	494	128	123	0	175	0	0	0	***1,628***
8:00 午前	---	8:15 午前	461	479	0	0	627	184	176	0	238	0	0	0	***2,165***
8:15 午前	---	8:30 午前	586	587	0	0	759	258	224	0	302	0	0	0	***2,716***
8:30 午前	---	8:45 午前	693	702	0	0	908	331	273	0	365	0	0	0	***3,272***
8:45 午前	---	9:00 午前	807	819	0	0	1,066	390	303	0	436	0	0	0	***3,821***
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	62	60	0	0	67	25	35	0	32	0	0	0	***281***
7:15 午前	---	7:30 午前	65	90	0	0	119	22	24	0	25	0	0	0	***345***
7:30 午前	---	7:45 午前	91	100	0	0	157	38	28	0	51	0	0	0	***465***
7:45 午前	---	8:00 午前	118	122	0	0	151	43	36	0	67	0	0	0	***537***
8:00 午前	---	8:15 午前	125	107	0	0	133	56	**53**	0	63	0	0	0	***537***
8:15 午前	---	8:30 午前	**125**	108	0	0	132	**74**	48	0	64	0	0	0	***551***
8:30 午前	---	8:45 午前	107	115	0	0	149	73	49	0	63	0	0	0	***556***
8:45 午前	---	9:00 午前	114	**117**	0	0	**158**	59	30	0	**71**	0	0	0	***549***
HOURLY TOTALS															
7:00 AM	---	8:00 午前	336	372	0	0	494	128	123	0	175	0	0	0	***1,628***
7:15 午前	---	8:15 午前	399	419	0	0	560	159	141	0	206	0	0	0	***1,884***
7:30 午前	---	8:30 午前	459	437	0	0	573	211	165	0	245	0	0	0	***2,090***
7:45 午前	---	8:45 午前	475	452	0	0	565	246	186	0	257	0	0	0	***2,181***
8:00 午前	---	9:00 午前	471	447	0	0	572	262	180	0	261	0	0	0	***2,193***

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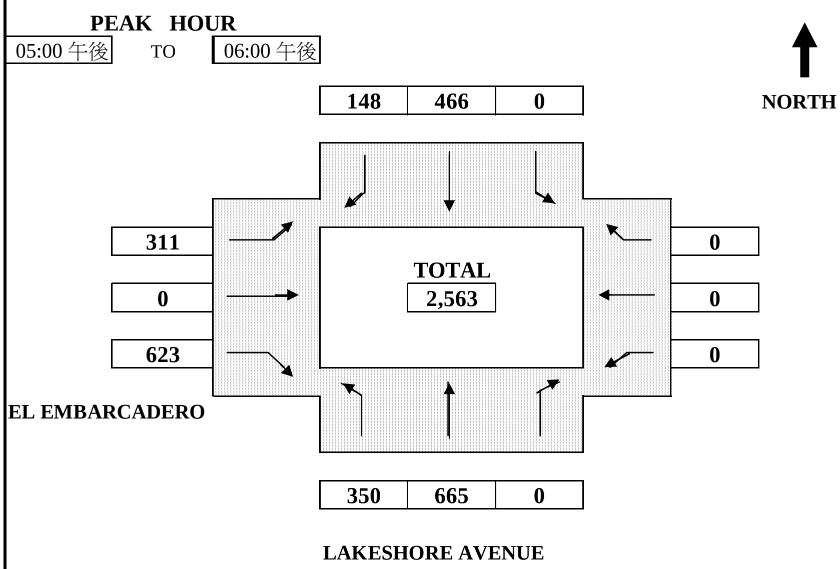
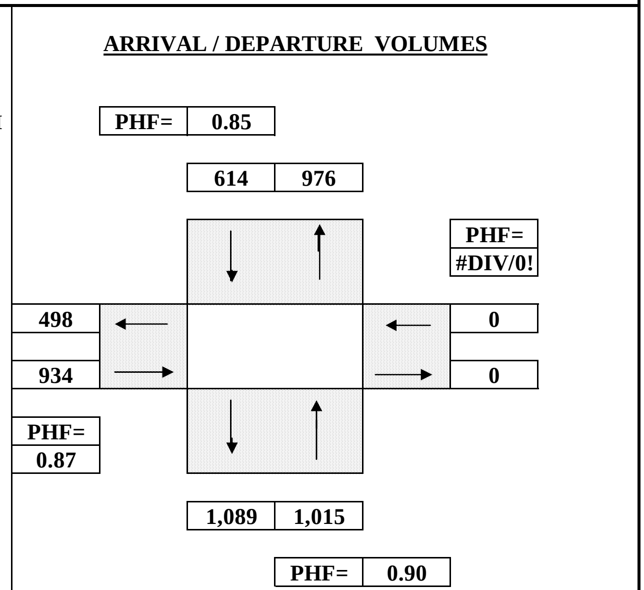
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**OAKLAND TRAFFIC STUDY**	**SURVEY DATE:**	**2008/11/06**	**DAY:**	**THURSDAY**
N-S Approach:	**LAKESHORE AVENUE**	**SURVEY TIME:**	**4:00 午後**	**TO**	**6:00 午後**
E-W Approach:	**EL EMBARCADERO**	**CITY:**	**OAKLAND**	**FILE:**	**2811065-2PM**





TIME PERIOD			NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
From		To	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	61	136	0	0	120	35	67	0	95	0	0	0	*514*
4:15 午後	---	4:30 午後	127	258	0	0	221	65	124	0	191	0	0	0	*986*
4:30 午後	---	4:45 午後	194	396	0	0	325	91	185	0	376	0	0	0	*1,567*
4:45 午後	---	5:00 午後	261	525	0	0	448	127	274	0	475	0	0	0	*2,110*
5:00 午後	---	5:15 午後	355	713	0	0	582	173	359	0	578	0	0	0	*2,760*
5:15 午後	---	5:30 午後	459	866	0	0	692	207	443	0	761	0	0	0	*3,428*
5:30 午後	---	5:45 午後	541	1,059	0	0	798	241	526	0	926	0	0	0	*4,091*
5:45 午後	---	6:00 午後	611	1,190	0	0	914	275	585	0	1,098	0	0	0	*4,673*
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	61	136	0	0	120	35	67	0	95	0	0	0	*514*
4:15 午後	---	4:30 午後	66	122	0	0	101	30	57	0	96	0	0	0	*472*
4:30 午後	---	4:45 午後	67	138	0	0	104	26	61	0	185	0	0	0	*581*
4:45 午後	---	5:00 午後	67	129	0	0	123	36	89	0	99	0	0	0	*543*
5:00 午後	---	5:15 午後	94	188	0	0	**134**	**46**	**85**	0	103	0	0	0	*650*
5:15 午後	---	5:30 午後	**104**	153	0	0	110	34	84	0	**183**	0	0	0	*668*
5:30 午後	---	5:45 午後	82	**193**	0	0	106	34	83	0	165	0	0	0	*663*
5:45 午後	---	6:00 午後	70	131	0	0	116	34	59	0	172	0	0	0	*582*
HOURLY TOTALS															
4:00 PM	---	5:00 午後	261	525	0	0	448	127	274	0	475	0	0	0	*2,110*
4:15 午後	---	5:15 午後	294	577	0	0	462	138	292	0	483	0	0	0	*2,246*
4:30 午後	---	5:30 午後	332	608	0	0	471	142	319	0	570	0	0	0	*2,442*
4:45 午後	---	5:45 午後	347	663	0	0	473	150	341	0	550	0	0	0	*2,524*
5:00 午後	---	6:00 午後	350	665	0	0	466	148	311	0	623	0	0	0	*2,563*

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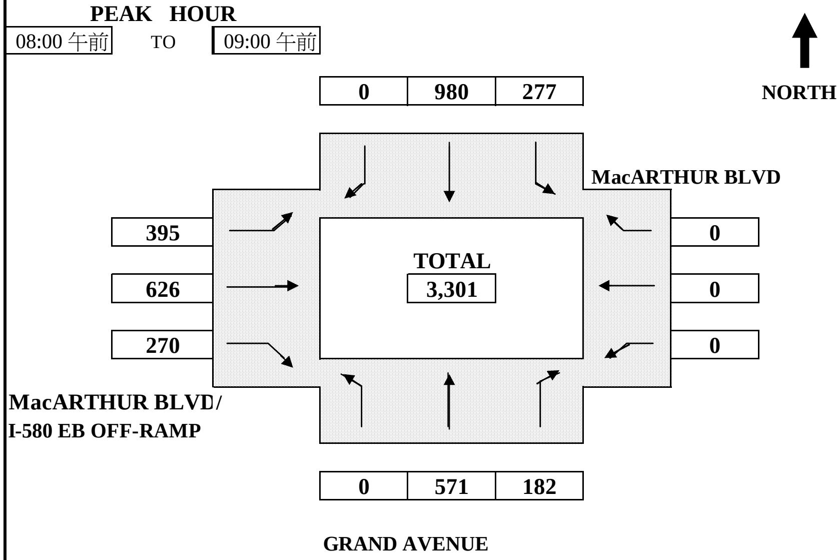
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

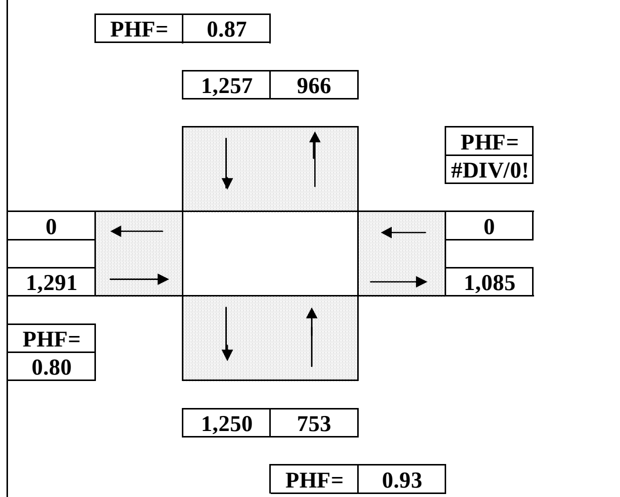
PROJECT:	**OAKLAND TRAFFIC STUDY**	**SURVEY DATE:**	**2008/11/12**	**DAY:**	**WEDNESDAY**
N-S Approach:	**GRAND AVENUE**	**SURVEY TIME:**	**7:00 午前**	**TO**	**9:00 午前**
E-W Approach:	**MacARTHUR BLVD / I-580 EB OFF-RAMP**	**CITY:**	**OAKLAND**	**FILE:**	**2811065-3AM**

PEAK HOUR

08:00 午前 TO 09:00 午前



ARRIVAL / DEPARTURE VOLUMES



TIME PERIOD			NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
From		To	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	0	91	27	32	87	0	43	67	21	0	0	0	*368*
7:15 午前	---	7:30 午前	0	193	48	53	179	0	87	164	47	0	0	0	*771*
7:30 午前	---	7:45 午前	0	314	90	95	351	0	143	275	100	0	0	0	*1,368*
7:45 午前	---	8:00 午前	0	440	133	162	534	0	210	411	144	0	0	0	*2,034*
8:00 午前	---	8:15 午前	0	588	174	212	715	0	319	577	209	0	0	0	*2,794*
8:15 午前	---	8:30 午前	0	744	216	284	972	0	401	731	260	0	0	0	*3,608*
8:30 午前	---	8:45 午前	0	868	255	371	1,221	0	479	859	316	0	0	0	*4,369*
8:45 午前	---	9:00 午前	0	1,011	315	439	1,514	0	605	1,037	414	0	0	0	*5,335*
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	0	91	27	32	87	0	43	67	21	0	0	0	*368*
7:15 午前	---	7:30 午前	0	102	21	21	92	0	44	97	26	0	0	0	*403*
7:30 午前	---	7:45 午前	0	121	42	42	172	0	56	111	53	0	0	0	*597*
7:45 午前	---	8:00 午前	0	126	43	67	183	0	67	136	44	0	0	0	*666*
8:00 午前	---	8:15 午前	0	148	41	50	181	0	109	166	65	0	0	0	*760*
8:15 午前	---	8:30 午前	0	**156**	42	72	257	0	82	154	51	0	0	0	*814*
8:30 午前	---	8:45 午前	0	124	39	**87**	249	0	78	128	56	0	0	0	*761*
8:45 午前	---	9:00 午前	0	143	**60**	68	**293**	0	**126**	**178**	**98**	0	0	0	*966*
HOURLY TOTALS															
7:00 AM	---	8:00 午前	0	440	133	162	534	0	210	411	144	0	0	0	*2,034*
7:15 午前	---	8:15 午前	0	497	147	180	628	0	276	510	188	0	0	0	*2,426*
7:30 午前	---	8:30 午前	0	551	168	231	793	0	314	567	213	0	0	0	*2,837*
7:45 午前	---	8:45 午前	0	554	165	276	870	0	336	584	216	0	0	0	*3,001*
8:00 午前	---	9:00 午前	0	571	182	277	980	0	395	626	270	0	0	0	*3,301*

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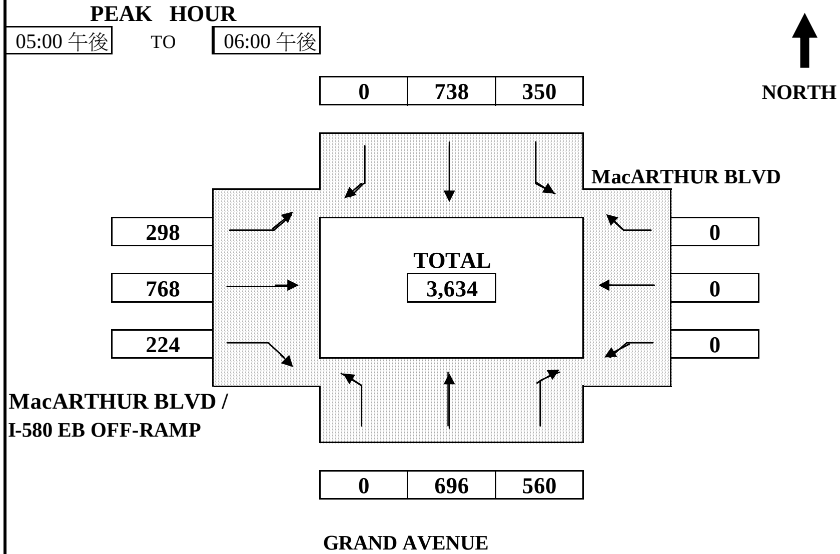
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

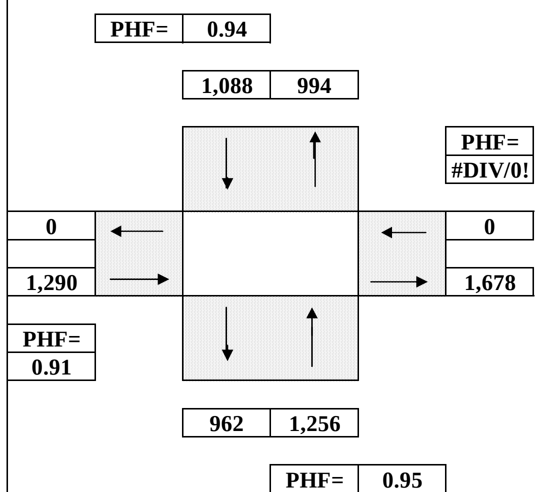
PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/06	DAY:	THURSDAY
N-S Approach:	GRAND AVENUE	SURVEY TIME:	4:00 午後	TO	6:00 午後
E-W Approach:	MacARTHUR BLVD / I-580 EB OFF-RAMP	CITY:	OAKLAND	FILE:	2811065-3PM

PEAK HOUR

05:00 午後 TO 06:00 午後



ARRIVAL / DEPARTURE VOLUMES



TIME PERIOD			NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
From		To	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	0	115	72	80	134	0	85	158	62	0	0	0	*706*
4:15 午後	---	4:30 午後	0	232	140	145	263	0	176	286	110	0	0	0	*1,352*
4:30 午後	---	4:45 午後	0	351	260	219	420	0	267	479	181	0	0	0	*2,177*
4:45 午後	---	5:00 午後	0	497	365	302	568	0	339	687	214	0	0	0	*2,972*
5:00 午後	---	5:15 午後	0	656	492	379	740	0	415	898	277	0	0	0	*3,857*
5:15 午後	---	5:30 午後	0	843	633	476	925	0	493	1,105	325	0	0	0	*4,800*
5:30 午後	---	5:45 午後	0	1,007	799	565	1,104	0	563	1,272	371	0	0	0	*5,681*
5:45 午後	---	6:00 午後	0	1,193	925	652	1,306	0	637	1,455	438	0	0	0	*6,606*
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	0	115	72	80	134	0	85	158	62	0	0	0	*706*
4:15 午後	---	4:30 午後	0	117	68	65	129	0	91	128	48	0	0	0	*646*
4:30 午後	---	4:45 午後	0	119	120	74	157	0	91	193	71	0	0	0	*825*
4:45 午後	---	5:00 午後	0	146	105	83	148	0	72	208	33	0	0	0	*795*
5:00 午後	---	5:15 午後	0	159	127	77	172	0	76	**211**	63	0	0	0	*885*
5:15 午後	---	5:30 午後	0	**187**	141	**97**	185	0	**78**	207	48	0	0	0	*943*
5:30 午後	---	5:45 午後	0	164	**166**	89	179	0	70	167	46	0	0	0	*881*
5:45 午後	---	6:00 午後	0	186	126	87	**202**	0	74	183	**67**	0	0	0	*925*
HOURLY TOTALS															
4:00 PM	---	5:00 午後	0	497	365	302	568	0	339	687	214	0	0	0	*2,972*
4:15 午後	---	5:15 午後	0	541	420	299	606	0	330	740	215	0	0	0	*3,151*
4:30 午後	---	5:30 午後	0	611	493	331	662	0	317	819	215	0	0	0	*3,448*
4:45 午後	---	5:45 午後	0	656	539	346	684	0	296	793	190	0	0	0	*3,504*
5:00 午後	---	6:00 午後	0	696	560	350	738	0	298	768	224	0	0	0	*3,634*

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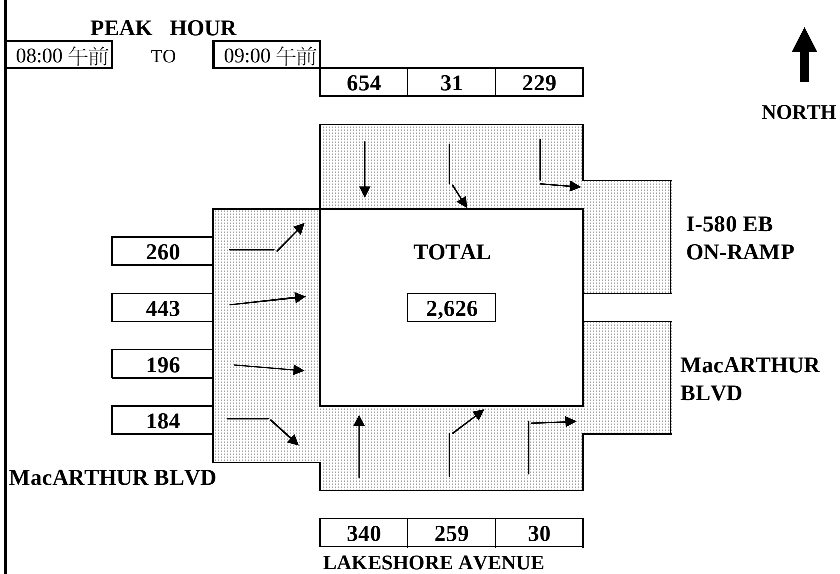
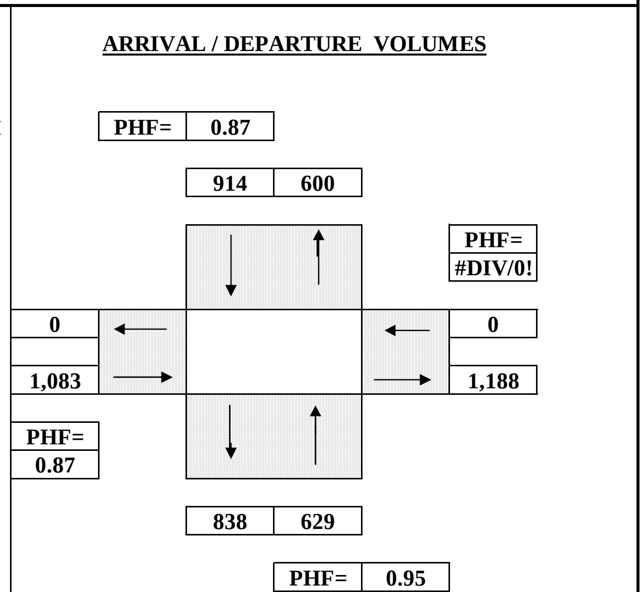
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/12	DAY:	WEDNESDAY
N-S Approach:	LAKESHORE AVENUE	SURVEY TIME:	7:00 午前	TO	9:00 午前
E-W Approach:	MacARTHUR BLVD / I-580 EB ON-RAMP	CITY:	OAKLAND	FILE:	2811065-4AM





TIME PERIOD From		To	NORTHBOUND Thur	To 580	To Mac	SOUTHBOUND Thru	To Mac	To 580	EASTBOUND Left	To 580	To Mac	Right	WESTBOUND		TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	28	58	7	71	5	57	30	57	20	18	0	0	***351***
7:15 午前	---	7:30 午前	84	112	10	191	8	133	55	132	45	40	0	0	***810***
7:30 午前	---	7:45 午前	151	165	15	365	17	213	85	233	81	68	0	0	***1,393***
7:45 午前	---	8:00 午前	230	237	25	511	21	307	118	365	122	110	0	0	***2,046***
8:00 午前	---	8:15 午前	320	298	34	666	29	357	178	474	171	150	0	0	***2,677***
8:15 午前	---	8:30 午前	405	360	43	817	33	427	228	582	222	202	0	0	***3,319***
8:30 午前	---	8:45 午前	489	436	49	996	43	494	298	682	263	244	0	0	***3,994***
8:45 午前	---	9:00 午前	570	496	55	1,165	52	536	378	808	318	294	0	0	***4,672***
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	28	58	7	71	5	57	30	57	20	18	0	0	***351***
7:15 午前	---	7:30 午前	56	54	3	120	3	76	25	75	25	22	0	0	***459***
7:30 午前	---	7:45 午前	67	53	5	174	9	80	30	101	36	28	0	0	***583***
7:45 午前	---	8:00 午前	79	72	10	146	4	94	33	132	41	42	0	0	***653***
8:00 午前	---	8:15 午前	**90**	61	**9**	155	8	50	60	109	49	40	0	0	***631***
8:15 午前	---	8:30 午前	85	62	9	151	4	**70**	50	108	51	**52**	0	0	***642***
8:30 午前	---	8:45 午前	84	**76**	6	**179**	**10**	67	70	100	41	42	0	0	***675***
8:45 午前	---	9:00 午前	81	60	6	169	9	42	**80**	**126**	**55**	50	0	0	***678***
HOURLY TOTALS															
7:00 AM	---	8:00 午前	230	237	25	511	21	307	118	365	122	110	0	0	***2,046***
7:15 午前	---	8:15 午前	292	240	27	595	24	300	148	417	151	132	0	0	***2,326***
7:30 午前	---	8:30 午前	321	248	33	626	25	294	173	450	177	162	0	0	***2,509***
7:45 午前	---	8:45 午前	338	271	34	631	26	281	213	449	182	176	0	0	***2,601***
8:00 午前	---	9:00 午前	340	259	30	654	31	229	260	443	196	184	0	0	***2,626***

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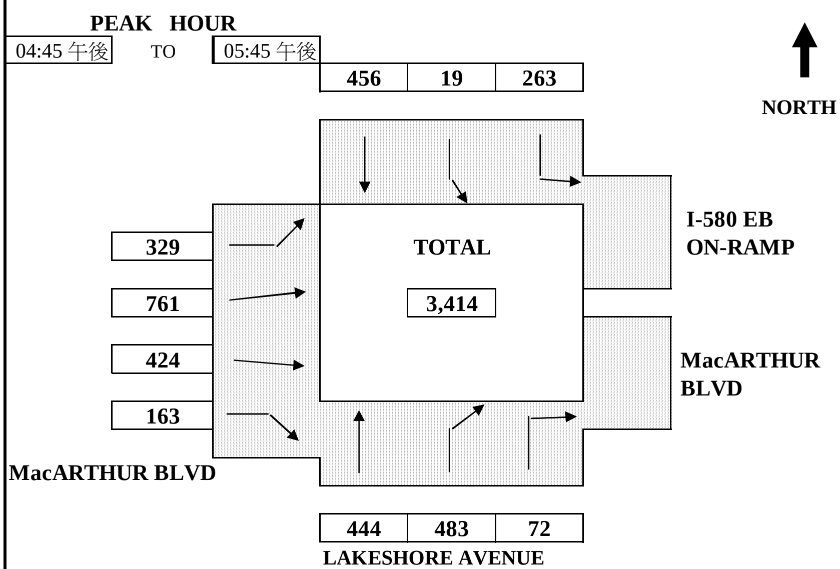
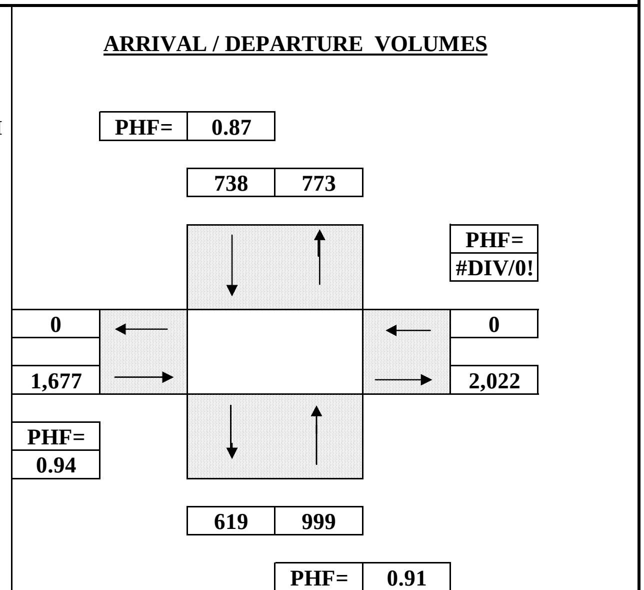
B . A . Y . M . E . T . R . I . C . S .

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	**OAKLAND TRAFFIC STUDY**	**SURVEY DATE:**	**2008/11/06**	**DAY:**	**THURSDAY**
N-S Approach:	**LAKESHORE AVENUE**	**SURVEY TIME:**	**4:00 午後**	**TO**	**6:00 午後**
E-W Approach:	**MacARTHUR BLVD / I-580 EB ON-RAMP**	**CITY:**	**OAKLAND**	**FILE:**	**2811065-4PM**





TIME PERIOD From		To	NORTHBOUND Thur	NORTHBOUND To 580	NORTHBOUND To Mac	SOUTHBOUND Thru	SOUTHBOUND To Mac	SOUTHBOUND To 580	EASTBOUND Left	EASTBOUND To 580	EASTBOUND To Mac	EASTBOUND Right	WESTBOUND		TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	84	121	0	104	0	76	8	176	86	42	0	0	*697*
4:15 午後	---	4:30 午後	166	206	7	191	6	138	50	311	129	83	0	0	*1,287*
4:30 午後	---	4:45 午後	253	309	11	279	11	206	191	447	194	128	0	0	*2,029*
4:45 午後	---	5:00 午後	351	424	27	385	18	272	264	629	280	183	0	0	*2,833*
5:00 午後	---	5:15 午後	461	567	40	522	20	344	318	832	395	224	0	0	*3,723*
5:15 午後	---	5:30 午後	560	675	63	619	24	405	435	1,017	496	267	0	0	*4,561*
5:30 午後	---	5:45 午後	697	792	83	735	30	469	520	1,208	618	291	0	0	*5,443*
5:45 午後	---	6:00 午後	790	879	100	848	36	537	591	1,362	750	329	0	0	*6,222*
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	84	121	0	104	0	76	8	176	86	42	0	0	*697*
4:15 午後	---	4:30 午後	82	85	7	87	6	62	42	135	43	41	0	0	*590*
4:30 午後	---	4:45 午後	87	103	4	88	5	68	141	136	65	45	0	0	*742*
4:45 午後	---	5:00 午後	98	115	16	106	**7**	66	73	182	86	**55**	0	0	*804*
5:00 午後	---	5:15 午後	110	**143**	13	**137**	2	**72**	54	**203**	115	41	0	0	*890*
5:15 午後	---	5:30 午後	99	108	23	97	4	61	**117**	185	101	43	0	0	*838*
5:30 午後	---	5:45 午後	**137**	117	**20**	116	6	64	85	191	**122**	24	0	0	*882*
5:45 午後	---	6:00 午後	93	87	17	113	6	68	71	154	132	38	0	0	*779*
HOURLY TOTALS															
4:00 PM	---	5:00 午後	351	424	27	385	18	272	264	629	280	183	0	0	*2,833*
4:15 午後	---	5:15 午後	377	446	40	418	20	268	310	656	309	182	0	0	*3,026*
4:30 午後	---	5:30 午後	394	469	56	428	18	267	385	706	367	184	0	0	*3,274*
4:45 午後	---	5:45 午後	444	483	72	456	19	263	329	761	424	163	0	0	*3,414*
5:00 午後	---	6:00 午後	439	455	73	463	18	265	327	733	470	146	0	0	*3,389*

Telephone: (510)232-1271 **Fax: (510)232-1272**

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

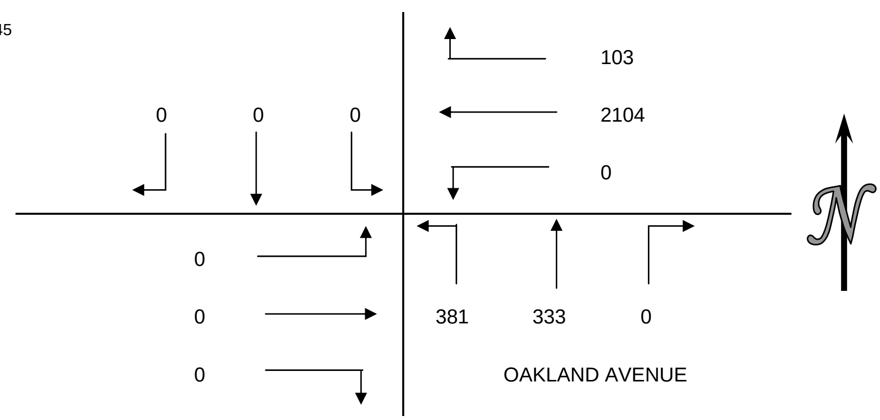
CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		WEDNESDAY OCTOBER 29, 2008
PERIOD"		7:00 AM TO 9:00 AM
INTERSECTION:	N/S	OAKLAND AVENUE
	E/W	SANTA CLARA AVENUE
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	0	0	0	10	336	0	0	50	55	0	0	0	451
715-730	0	0	0	14	402	0	0	52	75	0	0	0	543
730-745	0	0	0	20	442	0	0	79	80	0	0	0	621
745-800	0	0	0	21	505	0	0	88	87	0	0	0	701
800-815	0	0	0	22	509	0	0	88	91	0	0	0	710
815-830	0	0	0	27	544	0	0	72	101	0	0	0	744
830-845	0	0	0	33	546	0	0	85	102	0	0	0	766
845-900	0	0	0	28	514	0	0	65	90	0	0	0	697
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	0	0	0	65	1685	0	0	269	297	0	0	0	2316
715-815	0	0	0	77	1858	0	0	307	333	0	0	0	2575
730-830	0	0	0	90	2000	0	0	327	359	0	0	0	2776
745-845	0	0	0	103	2104	0	0	333	381	0	0	0	2921
800-900	0	0	0	110	2113	0	0	310	384	0	0	0	2917

PHF				WBRT	WBTH			NBTH	NBLT				
PHF				0.780303	0.96337			0.946023	0.933824				

AM PEAK HOUR: 745-845



SANTA CLARA AVENUE

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	3	4	0	0	7
715-730	8	8	0	0	16
730-745	9	7	0	0	16
745-800	3	3	0	0	6
800-815	10	9	0	0	19
815-830	8	1	0	0	9
830-845	9	4	0	0	13
845-900	7	7	0	0	14
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	23	22	0	0	45
715-815	30	27	0	0	57
730-830	30	20	0	0	50
745-845	30	17	0	0	47
800-900	34	21	0	0	55

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	1	0	0	0	1
715-730	1	1	0	0	2
730-745	1	2	0	0	3
745-800	1	0	0	0	1
800-815	0	0	0	0	0
815-830	2	0	0	0	2
830-845	9	2	0	2	13
845-900	2	0	0	0	2
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	4	3	0	0	7
715-815	3	3	0	0	6
730-830	4	2	0	0	6
745-845	12	2	0	2	16
800-900	13	2	0	2	17

WILTEC

Phone: (626) 564-1944 Fax: (626) 564-0969

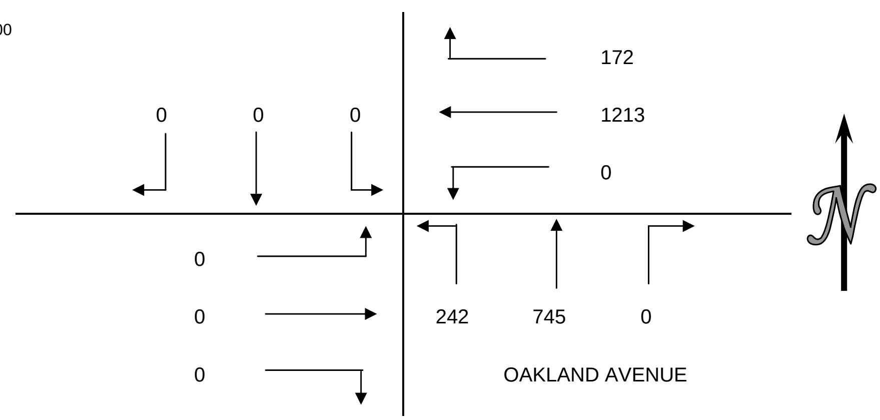
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT:		DOWLING ASSOCIATES
PROJECT:		1938 BROADWAY TRAFFIC COUNTS
DATE:		WEDNESDAY OCTOBER 29, 2008
PERIOD"		4:00 PM TO 6:00 PM
INTERSECTION:	N/S	OAKLAND AVENUE
	E/W	SANTA CLARA AVENUE
CITY:		OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	0	0	0	34	344	0	0	134	73	0	0	0	585
415-430	0	0	0	33	292	0	0	135	48	0	0	0	508
430-445	0	0	0	42	270	0	0	149	62	0	0	0	523
445-500	0	0	0	35	254	0	0	160	50	0	0	0	499
500-515	0	0	0	46	280	0	0	182	65	0	0	0	573
515-530	0	0	0	46	312	0	0	198	61	0	0	0	617
530-545	0	0	0	47	316	0	0	193	69	0	0	0	625
545-600	0	0	0	33	305	0	0	172	47	0	0	0	557
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	0	0	0	144	1160	0	0	578	233	0	0	0	2115
415-515	0	0	0	156	1096	0	0	626	225	0	0	0	2103
430-530	0	0	0	169	1116	0	0	689	238	0	0	0	2212
445-545	0	0	0	174	1162	0	0	733	245	0	0	0	2314
500-600	0	0	0	172	1213	0	0	745	242	0	0	0	2372
PHF				0.914894	0.959652			0.940657	0.876812				

AM PEAK HOUR: 500-600



SANTA CLARA AVENUE

PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	12	10	0	0	22
415-430	6	7	0	0	13
430-445	2	2	0	0	4
445-500	7	7	0	0	14
500-515	2	4	0	0	6
515-530	7	6	0	0	13
530-545	2	7	0	0	9
545-600	2	6	0	0	8
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	27	26	0	0	53
415-515	17	20	0	0	37
430-530	18	19	0	0	37
445-545	18	24	0	0	42
500-600	13	23	0	0	36

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	3	1	0	0	4
415-430	2	1	0	0	3
430-445	2	1	0	0	3
445-500	2	0	0	0	2
500-515	3	1	0	0	4
515-530	3	0	0	0	3
530-545	1	0	0	0	1
545-600	3	0	0	0	3
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	9	3	0	0	12
415-515	9	3	0	0	12
430-530	10	2	0	0	12
445-545	9	1	0	0	10
500-600	10	1	0	0	11

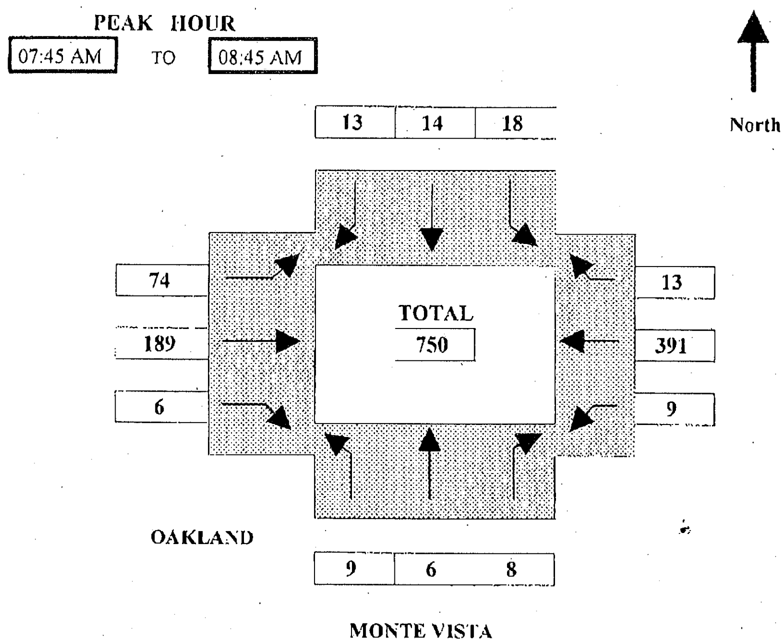
File Name: C:\Documents and Settings\Administrator\Desktop\09-7021 OAKLAND-F\09-7021-002 HARRISON-SANTA CLARA-F.ppd
Start Date: 13/01/2009
Start Time: 7:15:00 AM
Site Code: 00000000
Comment 1: OAKLAND
Comment 2:
Comment 3:
Comment 4:

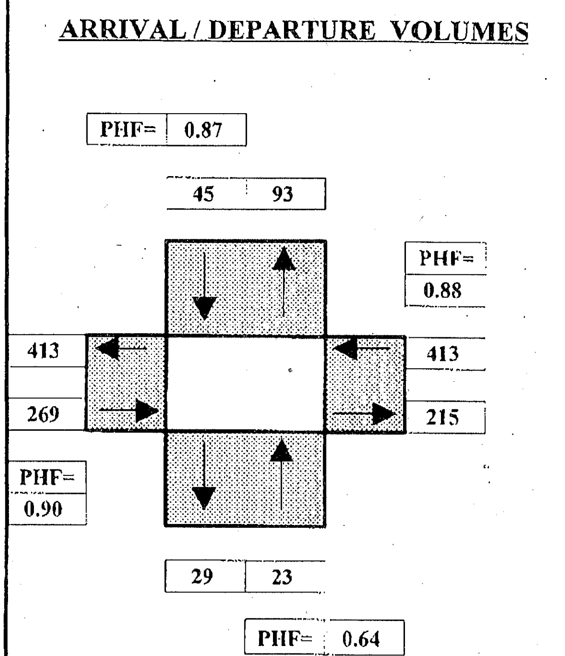
	HARRISON ST. Southbound					SANTA CLARA AVE. Westbound					HARRISON ST. Northbound					SANTA CLARA AVE. Northeastbound					MACARTHUR BLVD. Eastbound				
Start Time	Left	Thru	Bear Right	Right	Peds	Left	Bear Left	Thru	Right	Peds	Hard Left	Left	Thru	Right	Peds	Hard Left	Bear Left	Bear Right	Hard Right	Peds	Left	Thru	Right	Hard Right	Peds
07:15	0	153	3	13	4	202	1	283	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	7
07:30	0	213	1	7	9	241	2	323	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	5
07:45	0	241	2	7	8	226	3	355	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	9
08:00	0	263	2	4	1	240	4	358	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	5
08:15	0	232	1	9	2	244	3	383	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	6
08:30	0	241	0	6	4	252	2	336	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	6
08:45	0	254	0	8	6	237	5	327	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	10
09:00	0	191	0	7	3	221	7	312	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	0	4
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	121	0	4	3	109	6	240	0	1	0	0	0	0	0	0	0	0	22	0	0	0	0	0	2
16:30	0	156	1	9	6	101	7	241	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	3
16:45	0	144	3	6	7	82	4	258	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	6
17:00	0	144	0	11	4	94	3	243	0	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	10
17:15	0	118	2	12	5	132	4	250	0	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	11
17:30	0	146	2	12	3	128	5	255	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	10
17:45	0	118	1	8	4	121	6	242	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	8
18:00	0	126	0	6	2	108	9	232	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	12

BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT: 412 COURT ST. TS	SURVEY DATE: 7 / 31 / 2007		DAY: TUESDAY
N-S Approach: MONTE VISTA	SURVEY TIME: 7:00 AM	TO 9:00 AM	
E-W Approach: OAKLAND	CITY: OAKLAND		FILE: OLMVOLAM





TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
07:00 AM	---	07:15 AM	1	2	1	4	4	1	11	21	1	0	43	1	*90*
07:15 AM	---	07:30 AM	2	5	2	5	6	3	28	52	2	3	98	3	*209*
07:30 AM	---	07:45 AM	3	9	3	7	9	5	43	85	2	4	183	4	*357*
07:45 AM	---	08:00 AM	6	12	6	10	12	10	63	125	3	7	279	8	*541*
08:00 AM	---	08:15 AM	7	14	7	15	16	12	81	175	5	10	391	10	*743*
08:15 AM	---	08:30 AM	10	15	10	19	18	16	96	221	7	12	489	13	*926*
08:30 AM	---	08:45 AM	12	15	11	25	23	18	117	274	8	13	574	17	*1,107*
08:45 AM	---	09:00 AM	14	17	13	28	25	21	134	313	8	15	646	20	*1,254*
TOTAL BY PERIOD															
07:00 AM	---	07:15 AM	1	2	1	4	4	1	11	21	1	0	43	1	*90*
07:15 AM	---	07:30 AM	1	3	1	1	2	2	17	31	1	3	55	2	*119*
07:30 AM	---	07:45 AM	1	4	1	2	3	2	15	33	0	1	85	1	*148*
07:45 AM	---	08:00 AM	3	3	3	3	3	5	20	40	1	3	96	4	*184*
08:00 AM	---	08:15 AM	1	2	1	5	4	2	18	50	2	3	112	2	*202*
08:15 AM	---	08:30 AM	3	1	3	4	2	4	15	46	2	2	98	3	*183*
08:30 AM	---	08:45 AM	2	0	1	6	5	2	21	53	1	1	85	4	*181*
08:45 AM	---	09:00 AM	2	2	2	3	2	3	17	39	0	2	72	3	*147*
HOURLY TOTALS															
07:00 AM	---	08:00 AM	6	12	6	10	12	10	63	125	3	7	279	8	*541*
07:15 AM	---	08:15 AM	6	12	6	11	12	11	70	154	4	10	348	9	*653*
07:30 AM	---	08:30 AM	8	10	8	14	12	13	68	169	5	9	391	10	*717*
07:45 AM	---	08:45 AM	9	6	8	18	14	13	74	189	6	9	391	13	*750*
08:00 AM	---	09:00 AM	8	5	7	18	13	11	71	188	5	8	367	12	*713*

Tel : (510) 232-1271 *Fax: (510) 232-1272*

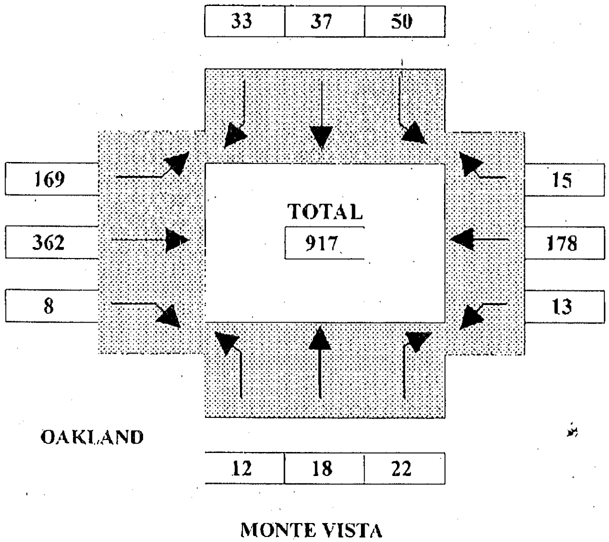
BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

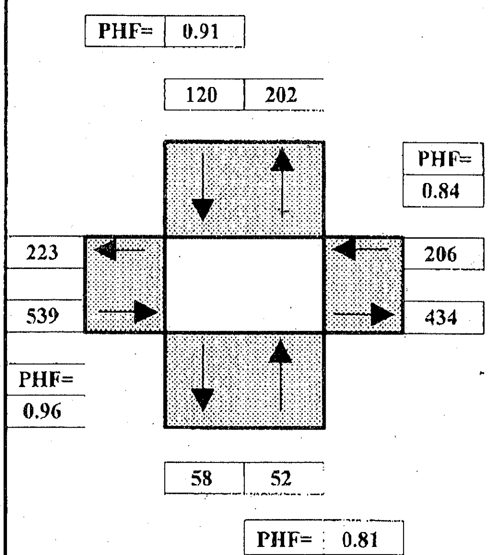
PROJECT: 412 COURT ST. TS		SURVEY DATE: 7 / 31 / 2007	DAY: TUESDAY
N-S Approach: MONTE VISTA		SURVEY TIME: 4:00 PM	TO 6:00 PM
E-W Approach: OAKLAND		CITY: OAKLAND	FILE: OLMVOLPM

PEAK HOUR

05:00 PM TO 06:00 PM



ARRIVAL / DEPARTURE VOLUMES



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
04:00 PM	---	04:15 PM	0	1	3	7	5	4	25	59	2	2	56	3	*167*
04:15 PM	---	04:30 PM	2	1	10	17	13	10	55	127	3	5	107	5	*355*
04:30 PM	---	04:45 PM	3	2	15	29	24	15	79	199	3	9	155	10	*543*
04:45 PM	---	05:00 PM	3	4	23	39	33	22	114	284	7	11	207	14	*761*
05:00 PM	---	05:15 PM	7	10	29	53	45	25	156	380	10	15	247	20	*997*
05:15 PM	---	05:30 PM	10	13	36	70	53	33	203	468	13	17	300	22	*1,238*
05:30 PM	---	05:45 PM	13	18	40	81	60	43	241	553	13	20	344	25	*1,451*
05:45 PM	---	06:00 PM	15	22	45	89	70	55	283	646	15	24	385	29	*1,678*
TOTAL BY PERIOD															
04:00 PM	---	04:15 PM	0	1	3	7	5	4	25	59	2	2	56	3	*167*
04:15 PM	---	04:30 PM	2	0	7	10	8	6	30	68	1	3	51	2	*188*
04:30 PM	---	04:45 PM	1	1	5	12	11	5	24	72	0	4	48	5	*188*
04:45 PM	---	05:00 PM	0	2	8	10	9	7	35	85	4	2	52	4	*218*
05:00 PM	---	05:15 PM	4	6	6	14	12	3	42	96	3	4	40	6	*236*
05:15 PM	---	05:30 PM	3	3	7	17	8	8	47	88	3	2	53	2	*241*
05:30 PM	---	05:45 PM	3	5	4	11	7	10	38	85	0	3	44	3	*213*
05:45 PM	---	06:00 PM	2	4	5	8	10	12	42	93	2	4	41	4	*227*
HOURLY TOTALS															
04:00 PM	---	05:00 PM	3	4	23	39	33	22	114	284	7	11	207	14	*761*
04:15 PM	---	05:15 PM	7	9	26	46	40	21	131	321	8	13	191	17	*830*
04:30 PM	---	05:30 PM	8	12	26	53	40	23	148	341	10	12	193	17	*883*
04:45 PM	---	05:45 PM	10	16	25	52	36	28	162	354	10	11	189	15	*908*
05:00 PM	---	06:00 PM	12	18	22	50	37	33	169	362	8	13	178	15	*917*

Tel : (510) 232-1271 *Fax: (510) 232-1272*

APPENDIX G.2

Intersection LOS Calculation Worksheets

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      5.3       Worst Case Level Of Service: C[ 16.9]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0  867     0     0    0   402     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0  867     0     0    0   402     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0  867     0     0    0   402     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.91  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0  953     0     0    0   432     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0  953     0     0    0   432     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   318  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   728  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   728  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.59  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   4.0  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  16.9 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     C     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx            16.9            xxxxxx
ApproachLOS:         *                *               C                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	383	135	821	345	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1733	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1733	3539	1583	
Peak-hour factor, PHF	0.97	0.83	0.89	0.91	0.58
Adj. Flow (vph)	395	163	922	379	40
RTOR Reduction (vph)	119	48	0	0	0
Lane Group Flow (vph)	157	234	922	419	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	11.8	11.8	40.7	17.7	
Effective Green, g (s)	11.8	11.8	40.7	17.7	
Actuated g/C Ratio	0.20	0.20	0.68	0.30	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	331	341	2401	467	
v/s Ratio Prot			c0.26	c0.26	
v/s Ratio Perm	0.09	0.13			
v/c Ratio	0.47	0.69	0.38	0.90	
Uniform Delay, d1	21.4	22.4	4.2	20.3	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	4.5	0.5	19.1	
Delay (s)	21.7	26.9	4.7	39.4	
Level of Service	C	C	A	D	
Approach Delay (s)		24.3	15.5		
Approach LOS		C	B		

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	32	94	63	17	38	13	128	114	12	200	261	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.94			1.00	1.00	0.91		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1480			1770	1863	1448		3433	3495	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1480			1770	1863	1448		3433	3495	
Peak-hour factor, PHF	0.67	0.65	0.88	0.53	0.56	0.65	0.70	0.95	0.60	0.81	0.75	0.79
Adj. Flow (vph)	48	145	72	32	68	20	183	120	20	247	348	28
RTOR Reduction (vph)	0	0	20	0	0	0	0	99	0	0	5	0
Lane Group Flow (vph)	48	145	84	0	0	88	183	21	0	267	371	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	5.5	13.3	13.3			8.0	15.8	15.8		12.2	43.3	
Effective Green, g (s)	5.5	13.3	13.3			8.0	15.8	15.8		12.2	43.3	
Actuated g/C Ratio	0.06	0.15	0.15			0.09	0.18	0.18		0.14	0.48	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	108	523	219			157	327	254		465	1681	
v/s Ratio Prot	0.03	0.04				0.05	c0.10			c0.08	c0.11	
v/s Ratio Perm			c0.06					0.01				
v/c Ratio	0.44	0.28	0.38			0.56	0.56	0.08		0.57	0.22	
Uniform Delay, d1	40.8	34.1	34.6			39.3	33.9	31.0		36.5	13.6	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.3	1.1			4.5	2.1	0.1		1.7	0.3	
Delay (s)	43.7	34.4	35.7			43.8	36.0	31.2		38.2	13.9	
Level of Service	D	C	D			D	D	C		D	B	
Approach Delay (s)		36.4					36.3				24.0	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	27.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	82	798	81	80
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3441		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3441		
Peak-hour factor, PHF	0.76	0.89	0.84	0.74
Adj. Flow (vph)	108	897	96	108
RTOR Reduction (vph)	0	7	0	0
Lane Group Flow (vph)	108	1094	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	9.4	40.5		
Effective Green, g (s)	9.4	40.5		
Actuated g/C Ratio	0.10	0.45		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	185	1548		
v/s Ratio Prot	0.06	c0.32		
v/s Ratio Perm				
v/c Ratio	0.58	0.71		
Uniform Delay, d1	38.4	20.0		
Progression Factor	1.00	1.00		
Incremental Delay, d2	4.6	2.7		
Delay (s)	43.1	22.7		
Level of Service	D	C		
Approach Delay (s)		24.5		
Approach LOS		C		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	137	66	28	239	247	41	387	31	80	433	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.91			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4773			3506	1543	1758	3481		1765	3472	
Flt Permitted		0.79			0.85	1.00	0.41	1.00		0.48	1.00	
Satd. Flow (perm)		3835			3020	1543	766	3481		895	3472	
Peak-hour factor, PHF	0.60	0.93	0.92	0.58	0.95	0.85	0.68	0.97	0.86	0.71	0.91	0.60
Adj. Flow (vph)	80	147	72	48	252	291	60	399	36	113	476	60
RTOR Reduction (vph)	0	42	0	0	0	168	0	8	0	0	12	0
Lane Group Flow (vph)	0	257	0	0	300	123	60	427	0	113	524	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio		0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)		1624			1279	654	342	1556		400	1552	
v/s Ratio Prot								0.12			c0.15	
v/s Ratio Perm		0.07			c0.10	0.08	0.08			0.13		
v/c Ratio		0.16			0.23	0.19	0.18	0.27		0.28	0.34	
Uniform Delay, d1		15.1			15.7	15.3	14.1	14.8		14.9	15.3	
Progression Factor		0.80			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.4	0.6	1.1	0.4		1.8	0.6	
Delay (s)		12.3			16.1	16.0	15.2	15.2		16.6	15.9	
Level of Service		B			B	B	B	B		B	B	
Approach Delay (s)		12.3			16.1			15.2			16.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	293	302	114	37	208	91	69	305	19	39	277	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3388		1766	3368		1760	3483		1764	3343	
Flt Permitted	0.47	1.00		0.48	1.00		0.30	1.00		0.43	1.00	
Satd. Flow (perm)	880	3388		892	3368		547	3483		797	3343	
Peak-hour factor, PHF	0.81	0.86	0.92	0.84	0.79	0.88	0.96	0.91	0.68	0.70	0.87	0.76
Adj. Flow (vph)	362	351	124	44	263	103	72	335	28	56	318	149
RTOR Reduction (vph)	0	23	0	0	33	0	0	10	0	0	88	0
Lane Group Flow (vph)	362	452	0	44	333	0	72	353	0	56	379	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	61.5	53.6		48.9	45.5		14.5	14.5		14.5	14.5	
Effective Green, g (s)	61.5	53.6		48.9	45.5		14.5	14.5		14.5	14.5	
Actuated g/C Ratio	0.72	0.63		0.58	0.54		0.17	0.17		0.17	0.17	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	757	2136		548	1803		93	594		136	570	
v/s Ratio Prot	c0.06	0.13		0.00	0.10			0.10			0.11	
v/s Ratio Perm	c0.28			0.04			c0.13			0.07		
v/c Ratio	0.48	0.21		0.08	0.18		0.77	0.59		0.41	0.67	
Uniform Delay, d1	4.4	6.7		7.9	10.2		33.7	32.5		31.4	33.0	
Progression Factor	1.00	1.00		0.63	0.72		0.91	0.90		1.00	1.00	
Incremental Delay, d2	0.2	0.2		0.0	0.2		28.8	1.0		0.7	2.3	
Delay (s)	4.6	6.9		5.0	7.5		59.3	30.3		32.2	35.3	
Level of Service	A	A		A	A		E	C		C	D	
Approach Delay (s)		5.9			7.2			35.1			34.9	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	18.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	132	702	0	0	127	244	4	219	21	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.92	0.85		0.98				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1520	4801			4426	1362		4973				
Flt Permitted	0.54	0.93			1.00	1.00		1.00				
Satd. Flow (perm)	871	4478			4426	1362		4973				
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.86	0.74	0.50	0.88	0.58	0.92	0.92	0.92
Adj. Flow (vph)	148	789	0	0	148	330	8	249	36	0	0	0
RTOR Reduction (vph)	0	0	0	0	99	99	0	22	0	0	0	0
Lane Group Flow (vph)	133	804	0	0	214	66	0	271	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	348	1791			1770	545		1989				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.15	c0.18				0.05		0.05				
v/c Ratio	0.38	0.45			0.12	0.12		0.14				
Uniform Delay, d1	8.5	8.8			7.6	7.6		7.6				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	3.2	0.8			0.1	0.5		0.1				
Delay (s)	11.7	9.6			7.7	8.0		7.8				
Level of Service	B	A			A	A		A				
Approach Delay (s)		9.9			7.8			7.8			0.0	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	239	23	9	135	0	0	0	0	577	838	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0					4.0	4.0	4.0
Lane Util. Factor		0.91			0.91					0.91	0.91	1.00
Frpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.98			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	0.99	1.00
Satd. Flow (prot)		4984			5060					1610	3366	1583
Flt Permitted		1.00			0.91					0.95	0.99	1.00
Satd. Flow (perm)		4984			4613					1610	3366	1583
Peak-hour factor, PHF	0.92	0.91	0.64	0.56	0.82	0.92	0.92	0.92	0.92	0.88	0.93	0.77
Adj. Flow (vph)	0	263	36	16	165	0	0	0	0	656	901	386
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	0	187
Lane Group Flow (vph)	0	276	0	0	181	0	0	0	0	505	1052	199
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type				Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		21.0			21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0			21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35			0.35					0.52	0.52	0.52
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1744			1615					832	1739	818
v/s Ratio Prot		c0.06										
v/s Ratio Perm					0.04					c0.31	0.31	0.13
v/c Ratio		0.16			0.11					0.61	0.60	0.24
Uniform Delay, d1		13.4			13.2					10.2	10.2	8.0
Progression Factor		1.00			1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2			0.1					3.3	1.6	0.7
Delay (s)		13.6			13.3					13.5	11.8	8.7
Level of Service		B			B					B	B	A
Approach Delay (s)		13.6			13.3			0.0			11.6	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	166	483	568	104	648	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3419		3431	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3419		3431	1414
Peak-hour factor, PHF	0.91	0.86	0.89	0.70	0.90	0.89
Adj. Flow (vph)	182	562	638	149	720	188
RTOR Reduction (vph)	0	0	21	0	3	123
Lane Group Flow (vph)	182	562	766	0	736	46
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	50.3	34.3		21.7	21.7
Effective Green, g (s)	12.0	50.3	34.3		21.7	21.7
Actuated g/C Ratio	0.15	0.63	0.43		0.27	0.27
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	266	2225	1466		931	384
v/s Ratio Prot	c0.10	0.16	c0.22		c0.21	
v/s Ratio Perm						0.03
v/c Ratio	0.68	0.25	0.52		0.79	0.12
Uniform Delay, d1	32.2	6.6	16.8		27.0	22.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.7	0.3	1.3		4.3	0.1
Delay (s)	37.9	6.8	18.2		31.4	22.0
Level of Service	D	A	B		C	C
Approach Delay (s)		14.4	18.2		29.6	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	659	303	58	356	55	170	217	26	73	300	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1766	3427	1553	1767	3339		1768	3448		1756	3414	
Flt Permitted	0.33	1.00	1.00	0.19	1.00		0.45	1.00		0.59	1.00	
Satd. Flow (perm)	615	3427	1553	361	3339		839	3448		1084	3414	
Peak-hour factor, PHF	0.77	0.96	0.85	0.85	0.83	0.72	0.82	0.95	0.65	0.87	0.92	0.77
Adj. Flow (vph)	119	686	356	68	429	76	207	228	40	84	326	84
RTOR Reduction (vph)	0	0	258	0	17	0	0	16	0	0	24	0
Lane Group Flow (vph)	119	686	98	68	488	0	207	252	0	84	386	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	23.5	23.5	23.5	23.5	23.5		51.0	51.0		37.5	37.5	
Effective Green, g (s)	23.5	23.5	23.5	23.5	23.5		51.0	51.0		37.5	37.5	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.60	0.60		0.44	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	170	947	429	100	923		602	2069		478	1506	
v/s Ratio Prot		c0.20			0.15		c0.04	0.07			0.11	
v/s Ratio Perm	0.19		0.06	0.19			c0.17			0.08		
v/c Ratio	0.70	0.72	0.23	0.68	0.53		0.34	0.12		0.18	0.26	
Uniform Delay, d1	27.6	27.8	23.8	27.4	26.1		7.9	7.3		14.4	15.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.08	1.10	
Incremental Delay, d2	21.3	4.8	1.2	31.4	2.2		0.1	0.1		0.8	0.4	
Delay (s)	48.9	32.6	25.0	58.8	28.2		8.0	7.5		16.4	16.9	
Level of Service	D	C	C	E	C		A	A		B	B	
Approach Delay (s)		32.0			31.9			7.7			16.8	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM Average Control Delay	24.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	555	53	80	411	61	85	352	76	51	305	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99			0.99		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.98			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3355			3321		1762	3539	1532	1760	3424	
Flt Permitted	0.27	1.00			0.64		0.49	1.00	1.00	0.52	1.00	
Satd. Flow (perm)	501	3355			2152		917	3539	1532	968	3424	
Peak-hour factor, PHF	0.71	0.92	0.74	0.83	0.90	0.90	0.63	0.92	0.66	0.55	0.88	0.83
Adj. Flow (vph)	104	603	72	96	457	68	135	383	115	93	347	80
RTOR Reduction (vph)	0	14	0	0	14	0	0	0	48	0	18	0
Lane Group Flow (vph)	104	661	0	0	607	0	135	383	67	93	409	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	25.6	25.6			25.6		46.4	46.4	46.4	46.4	46.4	
Effective Green, g (s)	25.6	25.6			25.6		46.4	46.4	46.4	46.4	46.4	
Actuated g/C Ratio	0.32	0.32			0.32		0.58	0.58	0.58	0.58	0.58	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	160	1074			689		532	2053	889	561	1986	
v/s Ratio Prot		0.20						0.11			0.12	
v/s Ratio Perm	0.21				c0.28		c0.15		0.04	0.10		
v/c Ratio	0.65	0.62			0.88		0.25	0.19	0.08	0.17	0.21	
Uniform Delay, d1	23.4	23.0			25.8		8.3	7.9	7.4	7.8	8.0	
Progression Factor	1.00	1.00			1.07		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.0	0.7			12.2		1.1	0.2	0.2	0.6	0.2	
Delay (s)	30.4	23.8			39.7		9.4	8.1	7.5	8.4	8.2	
Level of Service	C	C			D		A	A	A	A	A	
Approach Delay (s)		24.7			39.7			8.3			8.3	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	328	265	101	373	0	0	0	0	8	127	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.98	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.93		1.00	1.00						0.98	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		3114		1765	3427						3370	
Flt Permitted		1.00		0.27	1.00						1.00	
Satd. Flow (perm)		3114		510	3427						3370	
Peak-hour factor, PHF	0.25	0.93	0.92	0.84	0.91	0.25	0.92	0.92	0.92	0.50	0.91	0.63
Adj. Flow (vph)	0	353	288	120	410	0	0	0	0	16	140	24
RTOR Reduction (vph)	0	172	0	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	469	0	120	410	0	0	0	0	0	165	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.8		43.0	43.0						29.0	
Effective Green, g (s)		31.8		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1238		371	1842						1222	
v/s Ratio Prot		c0.15		c0.03	0.12							
v/s Ratio Perm				0.15							0.05	
v/c Ratio		0.38		0.32	0.22						0.13	
Uniform Delay, d1		17.1		10.2	9.7						17.1	
Progression Factor		2.78		1.00	1.00						1.00	
Incremental Delay, d2		0.8		0.2	0.3						0.2	
Delay (s)		48.4		10.4	10.0						17.3	
Level of Service		D		B	A						B	
Approach Delay (s)		48.4			10.1			0.0			17.3	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	126	65	345	465	101	103	630	290	28	583	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	3539	1479	3433	3539	1485		5032	1419		4940	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.80	
Satd. Flow (perm)	3433	3539	1479	3433	3539	1485		3506	1419		3947	
Peak-hour factor, PHF	0.74	0.81	0.65	0.89	0.80	0.52	0.83	0.88	0.82	0.50	0.93	0.79
Adj. Flow (vph)	72	156	100	388	581	194	124	716	354	56	627	96
RTOR Reduction (vph)	0	0	48	0	0	108	0	0	227	0	19	0
Lane Group Flow (vph)	72	156	52	388	581	86	0	840	127	0	760	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	5.6	34.5	34.5	14.5	44.4	44.4		36.0	36.0		36.0	
Effective Green, g (s)	5.6	34.5	34.5	14.5	44.4	44.4		36.0	36.0		36.0	
Actuated g/C Ratio	0.06	0.34	0.34	0.14	0.44	0.44		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	192	1221	510	498	1571	659		1262	511		1421	
v/s Ratio Prot	0.02	0.04		c0.11	c0.16							
v/s Ratio Perm			0.04			0.06		c0.24	0.09		0.19	
v/c Ratio	0.38	0.13	0.10	0.78	0.37	0.13		0.67	0.25		0.54	
Uniform Delay, d1	45.5	22.4	22.2	41.2	18.5	16.4		26.9	22.5		25.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.2	0.4	6.9	0.7	0.4		2.8	1.2		1.4	
Delay (s)	46.0	22.7	22.6	48.1	19.2	16.8		29.7	23.7		26.8	
Level of Service	D	C	C	D	B	B		C	C		C	
Approach Delay (s)		27.8			28.4			27.9			26.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	50	32	84	805	925	266
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.97		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.94		1.00	1.00	0.97	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3208		1762	3725	6190	
Flt Permitted	0.97		0.18	1.00	1.00	
Satd. Flow (perm)	3208		334	3725	6190	
Peak-hour factor, PHF	0.83	0.89	0.84	0.96	0.93	0.91
Adj. Flow (vph)	60	36	100	839	995	292
RTOR Reduction (vph)	33	0	0	0	29	0
Lane Group Flow (vph)	63	0	100	839	1258	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	6.0		60.5	54.7	54.7	
Effective Green, g (s)	6.0		60.5	54.7	54.7	
Actuated g/C Ratio	0.08		0.76	0.68	0.68	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	241		356	2547	4232	
v/s Ratio Prot	c0.02		c0.02	c0.23	0.20	
v/s Ratio Perm			0.19			
v/c Ratio	0.26		0.28	0.33	0.30	
Uniform Delay, d1	34.9		2.6	5.2	5.0	
Progression Factor	1.00		1.97	1.18	1.00	
Incremental Delay, d2	0.6		0.4	0.3	0.2	
Delay (s)	35.5		5.5	6.4	5.2	
Level of Service	D		A	A	A	
Approach Delay (s)	35.5			6.3	5.2	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	81	29	85	263	1	1
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.66	0.82	0.83	0.25	0.25
Hourly flow rate (vph)	96	44	104	317	4	4
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			142		652	127
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			142		652	127
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		99	100
cM capacity (veh/h)			1438		399	916

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	140	421	8
Volume Left	0	104	4
Volume Right	44	0	4
cSH	1700	1438	555
Volume to Capacity	0.08	0.07	0.01
Queue Length 95th (ft)	0	6	1
Control Delay (s)	0.0	2.4	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	2.4	11.6
Approach LOS			B

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	108	100	124	140	2	2
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.83	0.88	0.76	0.50	0.50
Hourly flow rate (vph)	144	120	141	184	4	4
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			266		696	230
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			266		696	230
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		99	99
cM capacity (veh/h)			1295		355	791

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	264	325	8
Volume Left	0	141	4
Volume Right	120	0	4
cSH	1700	1295	490
Volume to Capacity	0.16	0.11	0.02
Queue Length 95th (ft)	0	9	1
Control Delay (s)	0.0	4.1	12.5
Lane LOS		A	B
Approach Delay (s)	0.0	4.1	12.5
Approach LOS			B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	75	8	38	319	24	15
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	1.00	0.73	0.85	0.86	0.75
Hourly flow rate (vph)	88	8	52	375	28	20
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked						
vC, conflicting volume			98		590	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			98		590	110
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		94	98
cM capacity (veh/h)			1492		447	929

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	96	427	14	14	10	10
Volume Left	0	52	14	14	0	0
Volume Right	8	0	0	0	10	10
cSH	1700	1492	447	447	929	929
Volume to Capacity	0.06	0.03	0.03	0.03	0.01	0.01
Queue Length 95th (ft)	0	3	2	2	1	1
Control Delay (s)	0.0	1.2	13.3	13.3	8.9	8.9
Lane LOS		A	B	B	A	A
Approach Delay (s)	0.0	1.2	11.5			
Approach LOS			B			

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	153	45	40	41	0	0	0	0	124	322	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.93						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.97						0.99	
Satd. Flow (prot)		1863	1340		1695						4787	
Flt Permitted		1.00	1.00		0.65						0.99	
Satd. Flow (perm)		1863	1340		1130						4787	
Peak-hour factor, PHF	0.92	0.87	0.80	0.77	0.85	0.92	0.92	0.92	0.92	0.91	0.90	0.75
Adj. Flow (vph)	0	176	56	52	48	0	0	0	0	136	358	32
RTOR Reduction (vph)	0	0	47	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	176	9	0	100	0	0	0	0	0	523	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		13.2	13.2		13.2						58.8	
Effective Green, g (s)		13.2	13.2		13.2						58.8	
Actuated g/C Ratio		0.16	0.16		0.16						0.74	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		307	221		186						3518	
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.01		0.09						0.11	
v/c Ratio		0.57	0.04		0.54						0.15	
Uniform Delay, d1		30.8	28.1		30.6						3.2	
Progression Factor		1.00	1.00		1.00						0.57	
Incremental Delay, d2		2.6	0.1		3.0						0.1	
Delay (s)		33.4	28.2		33.6						1.9	
Level of Service		C	C		C						A	
Approach Delay (s)		32.1			33.6			0.0			1.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	146	3	0	33	29	8	163	65	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		0.99			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		0.99			0.94			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1824			1652			3501	1376			
Flt Permitted		0.99			1.00			1.00	1.00			
Satd. Flow (perm)		1809			1652			3501	1376			
Peak-hour factor, PHF	0.50	0.89	0.25	0.92	0.75	0.81	0.50	0.77	0.86	0.92	0.92	0.92
Adj. Flow (vph)	12	164	12	0	44	36	16	212	76	0	0	0
RTOR Reduction (vph)	0	3	0	0	12	0	0	0	64	0	0	0
Lane Group Flow (vph)	0	185	0	0	68	0	0	228	12	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		29.7			29.7			7.3	7.3			
Effective Green, g (s)		29.7			29.7			7.3	7.3			
Actuated g/C Ratio		0.66			0.66			0.16	0.16			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1194			1090			568	223			
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.10						0.07	0.01			
v/c Ratio		0.15			0.06			0.40	0.06			
Uniform Delay, d1		2.9			2.7			16.9	15.9			
Progression Factor		0.74			1.00			1.00	1.00			
Incremental Delay, d2		0.3			0.1			0.2	0.0			
Delay (s)		2.4			2.8			17.1	16.0			
Level of Service		A			A			B	B			
Approach Delay (s)		2.4			2.8			16.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	92	14	19	0	28	0	257	31	34	285	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			1.00	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1751	1818			1647			3446			3505	
Flt Permitted	0.72	1.00			0.90			1.00			0.89	
Satd. Flow (perm)	1323	1818			1515			3446			3128	
Peak-hour factor, PHF	0.56	0.92	0.88	0.79	0.92	0.78	0.92	0.85	0.78	0.85	0.89	0.92
Adj. Flow (vph)	16	100	16	24	0	36	0	302	40	40	320	0
RTOR Reduction (vph)	0	9	0	0	21	0	0	23	0	0	0	0
Lane Group Flow (vph)	16	107	0	0	39	0	0	319	0	0	360	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	559	768			640			1302			1182	
v/s Ratio Prot		c0.06						0.09				
v/s Ratio Perm	0.01				0.03						c0.12	
v/c Ratio	0.03	0.14			0.06			0.24			0.30	
Uniform Delay, d1	7.6	8.0			7.7			9.6			9.8	
Progression Factor	1.00	1.00			1.31			1.00			1.00	
Incremental Delay, d2	0.1	0.4			0.2			0.4			0.7	
Delay (s)	7.7	8.4			10.3			10.0			10.5	
Level of Service	A	A			B			B			B	
Approach Delay (s)		8.3			10.3			10.0			10.5	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	62	16	10	158	80	27	369	19	127	131	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.94			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3403			3295			3489		1768	3385	
Flt Permitted		0.86			0.94			0.91		0.43	1.00	
Satd. Flow (perm)		2957			3101			3185		805	3385	
Peak-hour factor, PHF	0.75	0.78	0.80	0.83	0.94	0.74	0.61	0.98	0.79	0.91	0.76	0.78
Adj. Flow (vph)	20	79	20	12	168	108	44	377	24	140	172	60
RTOR Reduction (vph)	0	17	0	0	92	0	0	5	0	0	18	0
Lane Group Flow (vph)	0	102	0	0	196	0	0	440	0	140	214	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		8.9			8.9			31.6		42.1	42.1	
Effective Green, g (s)		8.9			8.9			31.6		42.1	42.1	
Actuated g/C Ratio		0.15			0.15			0.53		0.70	0.70	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		439			460			1677		661	2375	
v/s Ratio Prot										c0.02	0.06	
v/s Ratio Perm		0.03			c0.06			c0.14		0.13		
v/c Ratio		0.23			0.43			0.26		0.21	0.09	
Uniform Delay, d1		22.5			23.2			7.8		3.1	2.9	
Progression Factor		1.00			0.97			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.6			0.4		0.2	0.1	
Delay (s)		22.8			23.1			8.2		3.3	2.9	
Level of Service		C			C			A		A	A	
Approach Delay (s)		22.8			23.1			8.2			3.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	129	52	41	130	94	51	405	58	53	350	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.96			0.95			0.98			0.99	
Flt Protected		1.00			0.99			0.99			0.99	
Satd. Flow (prot)		3308			3143			3409			4967	
Flt Permitted		0.94			0.87			0.88			0.81	
Satd. Flow (perm)		3128			2768			3004			4034	
Peak-hour factor, PHF	0.88	0.81	0.76	0.79	0.90	0.87	0.91	0.93	0.91	0.78	0.89	0.79
Adj. Flow (vph)	8	159	68	52	144	108	56	435	64	68	393	28
RTOR Reduction (vph)	0	43	0	0	68	0	0	17	0	0	11	0
Lane Group Flow (vph)	0	192	0	0	236	0	0	538	0	0	478	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1147			1015			1499			1210	
v/s Ratio Prot								c0.04				
v/s Ratio Perm		0.06			c0.09			c0.13			0.12	
v/c Ratio		0.17			0.23			0.36			0.39	
Uniform Delay, d1		12.8			13.2			9.7			16.7	
Progression Factor		0.83			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.5			0.7			1.0	
Delay (s)		11.0			13.7			10.4			17.6	
Level of Service		B			B			B			B	
Approach Delay (s)		11.0			13.7			10.4			17.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	223	0	0	203	69	26	153	76	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3511			3364	1337		5006	1456			
Flt Permitted		0.92			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3257			3364	1337		5006	1456			
Peak-hour factor, PHF	0.96	0.91	0.92	0.92	0.92	0.91	0.72	0.74	0.91	0.92	0.92	0.92
Adj. Flow (vph)	24	245	0	0	221	76	36	207	84	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	14	0	0	74	0	0	0
Lane Group Flow (vph)	0	269	0	0	228	54	0	243	10	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		63.7			63.7	63.7		9.3	9.3			
Effective Green, g (s)		63.7			63.7	63.7		9.3	9.3			
Actuated g/C Ratio		0.80			0.80	0.80		0.12	0.12			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2593			2679	1065		582	169			
v/s Ratio Prot					0.07							
v/s Ratio Perm		c0.08				0.04		0.05	0.01			
v/c Ratio		0.10			0.09	0.05		0.42	0.06			
Uniform Delay, d1		1.8			1.8	1.7		32.8	31.5			
Progression Factor		1.00			0.72	0.46		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.5	0.1			
Delay (s)		1.9			1.3	0.9		33.3	31.6			
Level of Service		A			A	A		C	C			
Approach Delay (s)		1.9			1.2			32.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	182	121	127	201	0	0	0	0	54	274	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.94	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1422	1610	3354						4397	
Flt Permitted		1.00	1.00	0.95	0.95						0.99	
Satd. Flow (perm)		3539	1422	1610	3184						4397	
Peak-hour factor, PHF	0.92	0.83	0.95	0.91	0.88	0.25	0.92	0.92	0.92	0.84	0.91	0.78
Adj. Flow (vph)	0	219	127	140	228	0	0	0	0	64	301	92
RTOR Reduction (vph)	0	0	94	0	0	0	0	0	0	0	55	0
Lane Group Flow (vph)	0	219	33	119	249	0	0	0	0	0	402	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1666						1704	
v/s Ratio Prot		c0.06		c0.07	0.03							
v/s Ratio Perm			0.02		0.05						0.09	
v/c Ratio		0.24	0.09	0.37	0.15						0.24	
Uniform Delay, d1		23.2	22.3	27.6	10.3						16.5	
Progression Factor		1.10	1.82	0.96	0.95						1.02	
Incremental Delay, d2		0.6	0.5	0.3	0.0						0.0	
Delay (s)		26.2	41.0	26.9	9.8						16.9	
Level of Service		C	D	C	A						B	
Approach Delay (s)		31.6			15.3			0.0			16.9	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBT	NBR	SBT	SBR
Lane Configurations												
Volume (vph)	83	31	122	11	104	34	50	29	249	15	311	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0				4.0		4.0	4.0
Lane Util. Factor	0.91	0.91		1.00	0.95				0.95		0.91	0.91
Frpb, ped/bikes	1.00	1.00		1.00	1.00				1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00				1.00		1.00	1.00
Frt	1.00	0.89		1.00	0.96				0.99		0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00				0.99		1.00	1.00
Satd. Flow (prot)	3221	1500		1770	3410				3470		3366	1441
Flt Permitted	0.95	1.00		0.95	1.00				0.99		1.00	1.00
Satd. Flow (perm)	3221	1500		1770	3410				3470		3366	1441
Peak-hour factor, PHF	0.79	0.82	0.83	0.69	0.84	0.84	0.94	0.94	0.96	0.75	0.85	0.96
Adj. Flow (vph)	105	38	147	16	124	40	53	31	259	20	366	175
RTOR Reduction (vph)	0	116	0	0	0	0	0	0	6	0	0	0
Lane Group Flow (vph)	94	80	0	16	164	0	0	0	357	0	384	157
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)		2							6			
Turn Type	custom			Split			Split	Split				custom
Protected Phases	1	1		7	7		8	8	8		2	6
Permitted Phases	1											6
Actuated Green, G (s)	16.6	16.6		7.4	7.4				24.0		16.0	36.6
Effective Green, g (s)	16.6	16.6		7.4	7.4				24.0		16.0	36.6
Actuated g/C Ratio	0.21	0.21		0.09	0.09				0.30		0.20	0.46
Clearance Time (s)	4.0	4.0		4.0	4.0				4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0				2.0		2.0	2.0
Lane Grp Cap (vph)	668	311		164	315				1041		673	659
v/s Ratio Prot	0.03	0.05		0.01	c0.05				c0.10		c0.11	c0.11
v/s Ratio Perm												
v/c Ratio	0.14	0.26		0.10	0.52				0.34		0.57	0.24
Uniform Delay, d1	25.9	26.5		33.2	34.6				21.9		28.9	13.2
Progression Factor	0.97	0.94		1.22	1.11				1.00		0.84	0.62
Incremental Delay, d2	0.4	2.0		0.1	0.7				0.1		0.7	0.8
Delay (s)	25.5	26.8		40.7	39.2				21.9		24.9	9.1
Level of Service	C	C		D	D				C		C	A
Approach Delay (s)		26.4			39.3				21.9		19.6	
Approach LOS		C			D				C		B	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR2
Lane Configurations	
Volume (vph)	23
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	1.00
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.96
Adj. Flow (vph)	24
RTOR Reduction (vph)	13
Lane Group Flow (vph)	11
Confl. Peds. (#/hr)	102
Confl. Bikes (#/hr)	10
Turn Type	custom
Protected Phases	6
Permitted Phases	
Actuated Green, G (s)	36.6
Effective Green, g (s)	36.6
Actuated g/C Ratio	0.46
Clearance Time (s)	4.0
Vehicle Extension (s)	2.0
Lane Grp Cap (vph)	724
v/s Ratio Prot	0.01
v/s Ratio Perm	
v/c Ratio	0.02
Uniform Delay, d1	11.9
Progression Factor	0.28
Incremental Delay, d2	0.0
Delay (s)	3.4
Level of Service	A
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	27	236	321	0	0	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.25	0.92	0.92	0.47
Hourly flow rate (vph)	108	944	1284	0	0	77
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		431	98			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	1284				1815	642
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1236				1781	576
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	80				100	83
cM capacity (veh/h)	544				57	448

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	108	315	315	315	642	642	77
Volume Left	108	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	77
cSH	544	1700	1700	1700	1700	1700	448
Volume to Capacity	0.20	0.19	0.19	0.19	0.38	0.38	0.17
Queue Length 95th (ft)	18	0	0	0	0	0	15
Control Delay (s)	13.2	0.0	0.0	0.0	0.0	0.0	14.7
Lane LOS	B						B
Approach Delay (s)	1.4				0.0		14.7
Approach LOS							B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	18.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	332	0	0	654	378	499
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0	4.0	4.0
Lane Util. Factor	0.94			0.91	0.95	0.76
Frpb, ped/bikes	1.00			1.00	1.00	0.97
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	4990			5085	3539	3510
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	4990			5085	3539	3510
Peak-hour factor, PHF	0.90	0.92	0.92	0.97	0.96	0.90
Adj. Flow (vph)	369	0	0	674	394	554
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	369	0	0	674	394	554
Confl. Peds. (#/hr)						14
Confl. Bikes (#/hr)						2
Turn Type						Free
Protected Phases	1			2	2	
Permitted Phases						Free
Actuated Green, G (s)	11.4			59.6	59.6	80.0
Effective Green, g (s)	11.4			59.6	59.6	80.0
Actuated g/C Ratio	0.14			0.74	0.74	1.00
Clearance Time (s)	5.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	711			3788	2637	3510
v/s Ratio Prot	c0.07			c0.13	0.11	
v/s Ratio Perm						0.16
v/c Ratio	0.52			0.18	0.15	0.16
Uniform Delay, d1	31.8			3.0	2.9	0.0
Progression Factor	0.75			1.00	0.98	1.00
Incremental Delay, d2	0.6			0.1	0.1	0.1
Delay (s)	24.4			3.1	3.0	0.1
Level of Service	C			A	A	A
Approach Delay (s)	24.4			3.1	1.3	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	27.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Volume (vph)	149	654	378	0	0	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	0.94	0.95	0.95			0.88
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	4990	3539	3539			2787
Flt Permitted	0.94	1.00	1.00			1.00
Satd. Flow (perm)	4938	3539	3539			2787
Peak-hour factor, PHF	0.85	0.94	0.82	0.92	0.92	0.88
Adj. Flow (vph)	175	696	461	0	0	60
RTOR Reduction (vph)	0	0	0	0	0	17
Lane Group Flow (vph)	175	696	461	0	0	43
Confl. Bikes (#/hr)				8		4
Turn Type	Perm					custom
Protected Phases		2	1			2
Permitted Phases	2	1				2
Actuated Green, G (s)	57.7	74.0	16.3			57.7
Effective Green, g (s)	57.7	74.0	16.3			57.7
Actuated g/C Ratio	0.72	0.92	0.20			0.72
Clearance Time (s)	3.0	3.0	3.0			3.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	3562	3539	721			2010
v/s Ratio Prot		c0.14	c0.13			0.02
v/s Ratio Perm	0.04	0.05				
v/c Ratio	0.05	0.20	0.64			0.02
Uniform Delay, d1	3.2	0.3	29.2			3.2
Progression Factor	1.00	1.00	1.06			1.00
Incremental Delay, d2	0.0	0.0	1.9			0.0
Delay (s)	3.2	0.3	32.9			3.2
Level of Service	A	A	C			A
Approach Delay (s)		0.9	32.9		3.2	
Approach LOS		A	C		A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	110	0	0	0	0	0	2315	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6398	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6398	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.83	0.92	0.92	0.92	0.92	0.92	0.96	0.45
Adj. Flow (vph)	0	0	0	88	133	0	0	0	0	0	2411	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	133	0	0	0	0	0	2431	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4845	
v/s Ratio Prot					0.04						c0.38	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.31						0.50	
Uniform Delay, d1				30.4	30.0						3.6	
Progression Factor				1.00	1.00						0.92	
Incremental Delay, d2				5.5	1.8						0.1	
Delay (s)				35.9	31.8						3.4	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.4			0.0			3.4	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1172	410	53	377	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4946		3372	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4946		3372	
Peak-hour factor, PHF	0.86	0.96	0.95	0.74	0.94	0.86
Adj. Flow (vph)	255	1221	432	72	401	97
RTOR Reduction (vph)	81	0	37	0	0	0
Lane Group Flow (vph)	174	1221	467	0	498	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	35.6	35.6	12.6		14.8	
Effective Green, g (s)	35.6	35.6	12.6		14.8	
Actuated g/C Ratio	0.47	0.47	0.17		0.20	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	840	2414	831		665	
v/s Ratio Prot		c0.24	c0.09		c0.15	
v/s Ratio Perm	0.10					
v/c Ratio	0.21	0.51	0.56		0.75	
Uniform Delay, d1	11.5	13.6	28.7		28.3	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.6	0.8	0.9		4.6	
Delay (s)	12.0	14.4	29.5		33.0	
Level of Service	B	B	C		C	
Approach Delay (s)		14.0	29.5		33.0	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	128	200	272	273	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3141	1423	1425	5920				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3141	1423	1425	5920				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.89	0.87	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	136	225	313	297	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	42	41	124	125	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	207	71	32	329	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.8	37.8	12.2	12.2				
Effective Green, g (s)					37.8	37.8	12.2	12.2				
Actuated g/C Ratio					0.63	0.63	0.20	0.20				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1979	896	290	1204				
v/s Ratio Prot					c0.07							
v/s Ratio Perm						0.05	0.02	0.06				
v/c Ratio					0.10	0.08	0.11	0.27				
Uniform Delay, d1					4.4	4.3	19.5	20.2				
Progression Factor					4.38	7.63	1.00	1.00				
Incremental Delay, d2					0.1	0.1	0.2	0.1				
Delay (s)					19.3	33.1	19.6	20.3				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			23.6			20.1			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	141	31	0	0	0	0	0	0	954	1071	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		0.99								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.96								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3393								1522	4717	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3393								1522	4717	
Peak-hour factor, PHF	0.92	0.93	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.90	0.75
Adj. Flow (vph)	0	152	48	0	0	0	0	0	0	1109	1190	40
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	337	67	0
Lane Group Flow (vph)	0	189	0	0	0	0	0	0	0	240	1696	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1753								634	1965	
v/s Ratio Prot		c0.06										
v/s Ratio Perm										0.16	0.36	
v/c Ratio		0.11								0.38	0.86	
Uniform Delay, d1		14.8								24.2	31.9	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.1								1.7	5.3	
Delay (s)		15.0								26.0	37.2	
Level of Service		B								C	D	
Approach Delay (s)		15.0			0.0			0.0			34.4	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	261	0	0	547	480	116	505	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3513			3539	1548		3488	1531			
Flt Permitted		0.83			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2945			3539	1548		3488	1531			
Peak-hour factor, PHF	0.85	0.89	0.92	0.96	0.88	0.96	0.85	0.96	0.72	0.92	0.92	0.92
Adj. Flow (vph)	40	293	0	0	622	500	136	526	32	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	186	0	0	15	0	0	0
Lane Group Flow (vph)	0	333	0	0	622	314	0	662	17	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		884			1062	464		1860	817			
v/s Ratio Prot					0.18							
v/s Ratio Perm		0.11				c0.20		0.19	0.01			
v/c Ratio		0.38			0.59	0.68		0.36	0.02			
Uniform Delay, d1		16.6			17.8	18.4		8.1	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.2			2.4	7.7		0.5	0.0			
Delay (s)		17.8			20.2	26.1		8.6	6.7			
Level of Service		B			C	C		A	A			
Approach Delay (s)		17.8			22.8			8.5			0.0	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	233	39	21	621	0	0	0	0	50	308	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3435			3529					1746	3496	
Flt Permitted		1.00			0.93					0.95	1.00	
Satd. Flow (perm)		3435			3292					1746	3496	
Peak-hour factor, PHF	0.92	0.75	0.70	0.66	0.96	0.92	0.92	0.92	0.92	0.74	0.96	0.71
Adj. Flow (vph)	0	311	56	32	647	0	0	0	0	68	321	24
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	335	0	0	679	0	0	0	0	68	333	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1450			1390					737	1476	
v/s Ratio Prot		0.10									c0.10	
v/s Ratio Perm					c0.21					0.04		
v/c Ratio		0.23			0.49					0.09	0.23	
Uniform Delay, d1		8.3			9.5					7.8	8.3	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.4			1.2					0.2	0.4	
Delay (s)		8.7			10.7					8.1	8.7	
Level of Service		A			B					A	A	
Approach Delay (s)		8.7			10.7			0.0			8.6	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	141	10	7	340	84	56	353	23	25	63	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3424			3364			3439			3358	
Flt Permitted		0.85			0.95			0.89			0.80	
Satd. Flow (perm)		2923			3202			3068			2734	
Peak-hour factor, PHF	0.79	0.80	0.36	0.88	0.91	0.75	0.74	0.90	0.52	0.63	0.72	0.86
Adj. Flow (vph)	48	176	28	8	374	112	76	392	44	40	88	28
RTOR Reduction (vph)	0	13	0	0	51	0	0	18	0	0	19	0
Lane Group Flow (vph)	0	239	0	0	443	0	0	494	0	0	137	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.6			23.6			13.9			13.9	
Effective Green, g (s)		23.6			23.6			13.9			13.9	
Actuated g/C Ratio		0.52			0.52			0.31			0.31	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1533			1679			948			845	
v/s Ratio Prot												
v/s Ratio Perm		0.08			c0.14			c0.16			0.05	
v/c Ratio		0.16			0.26			0.52			0.16	
Uniform Delay, d1		5.5			5.9			12.8			11.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.4			0.5			0.1	
Delay (s)		5.8			6.3			13.3			11.4	
Level of Service		A			A			B			B	
Approach Delay (s)		5.8			6.3			13.3			11.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	353	1277	0	0	0	0	0	316	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6290						4893	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6290						4893	
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.81
Adj. Flow (vph)	0	0	0	388	1316	0	0	0	0	0	322	80
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	0	1616	0	0	0	0	0	394	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2161	
v/s Ratio Prot											c0.08	
v/s Ratio Perm					0.26							
v/c Ratio					0.59						0.18	
Uniform Delay, d1					13.0						10.2	
Progression Factor					0.48						1.00	
Incremental Delay, d2					0.8						0.2	
Delay (s)					7.1						10.4	
Level of Service					A						B	
Approach Delay (s)		0.0			7.1			0.0			10.4	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1431	66	275	668	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6338			6163				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6338			6163				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.87	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1475	76	296	726	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	12	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1539	0	0	1014	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3158			2116				
v/s Ratio Prot					c0.24							
v/s Ratio Perm								0.16				
v/c Ratio					0.49			0.48				
Uniform Delay, d1					10.0			15.5				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.5			0.8				
Delay (s)					10.5			16.3				
Level of Service					B			B				
Approach Delay (s)		0.0			10.5			16.3			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	56	0	0	903	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	64	0	0	912	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	240	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	240	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	100	100			
cM capacity (veh/h)	720	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	64	228	228	228	228
Volume Left	64	0	0	0	0
Volume Right	0	0	0	0	0
cSH	720	1700	1700	1700	1700
Volume to Capacity	0.09	0.13	0.13	0.13	0.13
Queue Length 95th (ft)	7	0	0	0	0
Control Delay (s)	10.5	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.5	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	338	121	0	0	0	0	0	0	22	656	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6067									5067	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6067									5067	
Peak-hour factor, PHF	0.92	0.86	0.84	0.92	0.92	0.92	0.92	0.92	0.92	0.55	0.95	0.92
Adj. Flow (vph)	0	393	144	0	0	0	0	0	0	40	691	0
RTOR Reduction (vph)	0	74	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	463	0	0	0	0	0	0	0	0	720	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2326									2196	
v/s Ratio Prot		c0.08										
v/s Ratio Perm											0.14	
v/c Ratio		0.20									0.33	
Uniform Delay, d1		12.4									11.2	
Progression Factor		0.77									1.21	
Incremental Delay, d2		0.2									0.4	
Delay (s)		9.7									14.0	
Level of Service		A									B	
Approach Delay (s)		9.7			0.0			0.0			14.0	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	342	0	0	0	0	0	279	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6292						6249				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6292						6249				
Peak-hour factor, PHF	0.79	0.93	0.92	0.92	0.92	0.92	0.92	0.74	0.83	0.92	0.92	0.92
Adj. Flow (vph)	92	368	0	0	0	0	0	377	60	0	0	0
RTOR Reduction (vph)	0	80	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	380	0	0	0	0	0	422	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		8.1						44.9				
Effective Green, g (s)		8.1						44.9				
Actuated g/C Ratio		0.13						0.75				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		849						4676				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.06										
v/c Ratio		0.45						0.09				
Uniform Delay, d1		23.9						2.0				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.1						0.0				
Delay (s)		24.0						2.1				
Level of Service		C						A				
Approach Delay (s)		24.0			0.0			2.1			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	483	0	0	0	0	0	938	247	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6328						4877				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6328						4877				
Peak-hour factor, PHF	0.93	0.91	0.92	0.92	0.92	0.92	0.92	0.85	0.71	0.92	0.92	0.92
Adj. Flow (vph)	124	531	0	0	0	0	0	1104	348	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	99	0	0	0	0
Lane Group Flow (vph)	0	641	0	0	0	0	0	1353	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2531						1951				
v/s Ratio Prot								c0.28				
v/s Ratio Perm		0.10										
v/c Ratio		0.25						0.69				
Uniform Delay, d1		9.0						11.2				
Progression Factor		0.81						0.75				
Incremental Delay, d2		0.2						1.8				
Delay (s)		7.5						10.2				
Level of Service		A						B				
Approach Delay (s)		7.5			0.0			10.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	469	240	0	0	0	0	0	0	125	524	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6035									5025	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6035									5025	
Peak-hour factor, PHF	0.92	0.92	0.86	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.98	0.92
Adj. Flow (vph)	0	510	279	0	0	0	0	0	0	140	535	0
RTOR Reduction (vph)	0	127	0	0	0	0	0	0	0	0	78	0
Lane Group Flow (vph)	0	662	0	0	0	0	0	0	0	0	597	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2414									2233	
v/s Ratio Prot		c0.11										
v/s Ratio Perm											0.12	
v/c Ratio		0.27									0.27	
Uniform Delay, d1		9.1									7.9	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.3									0.3	
Delay (s)		9.4									8.2	
Level of Service		A									A	
Approach Delay (s)		9.4			0.0			0.0			8.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	20	296	45	192	240	0	0	142	1510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1820			1863	1558
Flt Permitted				0.95	1.00	1.00		0.77			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1435			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.71	0.96	0.87	0.84	0.87	0.92	0.92	0.81	0.95
Adj. Flow (vph)	0	0	0	28	308	52	229	276	0	0	175	1589
RTOR Reduction (vph)	0	0	0	0	0	39	0	0	0	0	0	118
Lane Group Flow (vph)	0	0	0	28	308	13	0	505	0	0	175	1471
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				11.6	11.6	11.6		22.4			22.4	22.4
Effective Green, g (s)				11.6	11.6	11.6		22.4			22.4	22.4
Actuated g/C Ratio				0.26	0.26	0.26		0.50			0.50	0.50
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				448	480	387		714			927	776
v/s Ratio Prot					c0.17						0.09	
v/s Ratio Perm				0.02		0.01		0.35				c0.94
v/c Ratio				0.06	0.64	0.03		0.71			0.19	1.90
Uniform Delay, d1				12.6	14.9	12.5		8.8			6.3	11.3
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.1	2.9	0.0		5.8			0.5	408.2
Delay (s)				12.7	17.8	12.5		14.6			6.7	419.5
Level of Service				B	B	B		B			A	F
Approach Delay (s)		0.0			16.7			14.6			378.5	
Approach LOS		A			B			B			F	

Intersection Summary			
HCM Average Control Delay	256.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	146.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	123	429	120	48	737
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3491		3201	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3491		3201	1441
Peak-hour factor, PHF	0.92	0.75	0.96	0.77	0.86	0.89
Adj. Flow (vph)	0	164	447	156	56	828
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	611	0	626	414
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1265		1152	519
v/s Ratio Prot						
v/s Ratio Perm			0.18		0.20	c0.29
v/c Ratio			0.48		0.54	0.80
Uniform Delay, d1			11.1		11.5	12.9
Progression Factor			0.81		1.00	1.00
Incremental Delay, d2			0.6		1.8	12.1
Delay (s)			9.6		13.3	25.0
Level of Service			A		B	C
Approach Delay (s)			9.6		18.0	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	303	551	152	0	0	0	0	230	68	3	117	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.97						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4847						1795			1858	
Flt Permitted		0.99						1.00			0.98	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.89	0.81	0.92	0.92	0.92	0.92	0.82	0.74	0.38	0.77	0.92
Adj. Flow (vph)	319	619	188	0	0	0	0	280	92	8	152	0
RTOR Reduction (vph)	0	67	0	0	0	0	0	26	0	0	0	0
Lane Group Flow (vph)	0	1059	0	0	0	0	0	346	0	0	160	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						618			551	
v/s Ratio Prot								c0.19				
v/s Ratio Perm		c0.57									0.10	
v/c Ratio		1.14						0.56			0.29	
Uniform Delay, d1		11.2						12.0			10.7	
Progression Factor		1.00						1.00			0.98	
Incremental Delay, d2		78.0						3.6			1.1	
Delay (s)		89.3						15.6			11.7	
Level of Service		F						B			B	
Approach Delay (s)		89.3			0.0			15.6			11.7	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	65.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	443	302	459	292	155	1088
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3340		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3340		1770	3539
Peak-hour factor, PHF	0.89	0.92	0.83	0.88	0.90	0.85
Adj. Flow (vph)	498	328	553	332	172	1280
RTOR Reduction (vph)	0	233	94	0	0	0
Lane Group Flow (vph)	498	95	791	0	172	1280
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	26.0	26.0	38.7		13.3	56.0
Effective Green, g (s)	26.0	26.0	38.7		13.3	56.0
Actuated g/C Ratio	0.29	0.29	0.43		0.15	0.62
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	511	457	1436		262	2202
v/s Ratio Prot	c0.28		0.24		c0.10	c0.36
v/s Ratio Perm		0.06				
v/c Ratio	0.97	0.21	0.55		0.66	0.58
Uniform Delay, d1	31.7	24.2	19.2		36.2	10.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	33.0	0.2	1.5		12.2	1.1
Delay (s)	64.7	24.4	20.7		48.4	11.2
Level of Service	E	C	C		D	B
Approach Delay (s)	48.7		20.7			15.6
Approach LOS	D		C			B

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	471	447	572	262	180	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3370		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3370		1770	1583
Peak-hour factor, PHF	0.94	0.92	0.91	0.89	0.85	0.92
Adj. Flow (vph)	501	486	629	294	212	284
RTOR Reduction (vph)	0	0	79	0	0	219
Lane Group Flow (vph)	501	486	844	0	212	65
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.1	33.2	15.1		12.2	12.2
Effective Green, g (s)	14.1	33.2	15.1		12.2	12.2
Actuated g/C Ratio	0.26	0.62	0.28		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	467	2200	953		404	362
v/s Ratio Prot	c0.28	0.14	c0.25		c0.12	
v/s Ratio Perm						0.04
v/c Ratio	1.07	0.22	0.89		0.52	0.18
Uniform Delay, d1	19.6	4.4	18.3		18.1	16.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	62.5	0.1	9.9		1.2	0.2
Delay (s)	82.2	4.5	28.2		19.3	16.8
Level of Service	F	A	C		B	B
Approach Delay (s)		43.9	28.2		17.9	
Approach LOS		D	C		B	

Intersection Summary			
HCM Average Control Delay	32.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	395	626	270	0	571	182	277	980	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.96			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4877			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4877			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.78	0.88	0.69	0.92	0.93	0.76	0.80	0.84	0.92
Adj. Flow (vph)	0	0	506	711	391	0	614	239	346	1167	0
RTOR Reduction (vph)	0	0	0	48	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	0	0	1560	0	0	614	72	346	1167	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1679			584	261	651	2020	
v/s Ratio Prot				c0.32			c0.17		0.20	c0.33	
v/s Ratio Perm								0.05			
v/c Ratio				0.93			1.05	0.28	0.53	0.58	
Uniform Delay, d1				33.5			44.3	38.7	26.3	14.6	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				9.5			51.5	2.6	3.1	1.2	
Delay (s)				43.0			95.7	41.3	29.4	15.8	
Level of Service				D			F	D	C	B	
Approach Delay (s)	0.0			43.0			80.5			18.9	
Approach LOS	A			D			F			B	

Intersection Summary			
HCM Average Control Delay	41.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	260	443	196	184	340	259	30	229	31	654
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95				1.00	0.95
Frt	1.00	0.99	0.85	0.85	0.93				1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)	1610	3173	1441	1583	3282				1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)	1610	3173	1441	1583	3282				1770	3539
Peak-hour factor, PHF	0.81	0.88	0.89	0.88	0.94	0.85	0.83	0.91	0.78	0.82
Adj. Flow (vph)	321	503	220	209	362	305	36	252	40	798
RTOR Reduction (vph)	0	0	0	76	3	0	0	0	0	0
Lane Group Flow (vph)	276	570	198	133	700	0	0	0	292	798
Turn Type	Split		Prot	Perm				Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4						
Actuated Green, G (s)	28.8	28.8	28.8	28.8	42.0				22.7	68.2
Effective Green, g (s)	28.8	28.8	28.8	28.8	42.0				22.7	68.2
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.40				0.21	0.64
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	437	862	392	430	1300				379	2277
v/s Ratio Prot	0.17	c0.18	0.14		c0.21				c0.17	0.23
v/s Ratio Perm				0.08						
v/c Ratio	0.63	0.66	0.51	0.31	0.54				0.77	0.35
Uniform Delay, d1	33.9	34.3	32.6	30.7	24.6				39.2	8.7
Progression Factor	0.77	0.77	0.77	0.65	1.00				1.00	1.00
Incremental Delay, d2	1.9	1.2	0.7	0.3	1.6				9.3	0.4
Delay (s)	28.2	27.7	25.9	20.3	26.2				48.5	9.1
Level of Service	C	C	C	C	C				D	A
Approach Delay (s)		26.3			26.2					19.7
Approach LOS		C			C					B

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2104	103	381	333	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4789				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4789				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.78	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2192	132	410	351	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	69	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2192	63	0	760	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2035				
v/s Ratio Prot					c0.43							
v/s Ratio Perm						0.04		0.16				
v/c Ratio					0.91	0.08		0.37				
Uniform Delay, d1					19.4	11.5		15.7				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					6.4	0.2		0.5				
Delay (s)					25.7	11.7		16.2				
Level of Service					C	B		B				
Approach Delay (s)		0.0			24.9			16.2			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	973	1418	0	0	0	0	0	990	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4759						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4759						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1003	1541	0	0	0	0	0	1053	32
RTOR Reduction (vph)	0	0	0	6	6	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	616	1916	0	0	0	0	0	1082	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2736						1145	
v/s Ratio Prot											c0.31	
v/s Ratio Perm				c0.41	0.40							
v/c Ratio				0.70	0.70						0.95	
Uniform Delay, d1				12.1	12.1						26.3	
Progression Factor				1.45	1.48						1.00	
Incremental Delay, d2				2.6	0.8						16.3	
Delay (s)				20.3	18.7						42.6	
Level of Service				C	B						D	
Approach Delay (s)		0.0			19.1			0.0			42.6	
Approach LOS		A			B			A			D	

Intersection Summary			
HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	74	189	6	9	391	13	9	6	8	18	14	13
Peak Hour Factor	0.90	0.94	0.67	0.81	0.84	0.63	0.75	0.75	0.79	0.74	0.77	0.69
Hourly flow rate (vph)	82	201	9	11	465	21	12	8	10	24	18	19

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	82	210	497	30	61
Volume Left (vph)	82	0	11	12	24
Volume Right (vph)	0	9	21	10	19
Hadj (s)	0.53	0.00	0.01	-0.09	-0.07
Departure Headway (s)	5.7	5.2	4.6	5.7	5.7
Degree Utilization, x	0.13	0.30	0.64	0.05	0.10
Capacity (veh/h)	613	672	762	533	552
Control Delay (s)	8.4	9.2	15.5	9.0	9.3
Approach Delay (s)	9.0		15.5	9.0	9.3
Approach LOS	A		C	A	A

Intersection Summary			
Delay	12.7		
HCM Level of Service	B		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      4.0       Worst Case Level Of Service: B[ 11.9]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0  574     0     0    0   252     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0  574     0     0    0   252     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0  574     0     0    0   252     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.91  1.00  1.00 1.00  0.80  1.00 1.00  1.00
PHF Volume:     0    0     0     0  631     0     0    0   315     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0  631     0     0    0   315     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   210  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   835  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   835  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.38  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   1.8  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  11.9 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     B     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx              11.9           xxxxxx
ApproachLOS:         *                *                 B                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	543	257	915	549	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1740	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1740	3539	1583	
Peak-hour factor, PHF	0.88	0.83	0.89	0.92	0.75
Adj. Flow (vph)	617	310	1028	597	96
RTOR Reduction (vph)	86	31	0	9	0
Lane Group Flow (vph)	371	439	1028	684	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	464	2153	356	
v/s Ratio Prot			c0.29	c0.43	
v/s Ratio Perm	0.22	0.25			
v/c Ratio	0.83	0.95	0.48	1.92	
Uniform Delay, d1	20.7	21.6	6.5	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.4	28.2	0.8	424.5	
Delay (s)	32.1	49.8	7.2	447.8	
Level of Service	C	D	A	F	
Approach Delay (s)		41.1	184.6		
Approach LOS		D	F		

Intersection Summary			
HCM Average Control Delay	134.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	182	365	85	17	45	14	155	177	8	286	942	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1520		3433	3484	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1520		3433	3484	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.92
Adj. Flow (vph)	194	388	90	18	53	16	182	208	9	311	1024	93
RTOR Reduction (vph)	0	0	8	0	0	0	0	175	0	0	8	0
Lane Group Flow (vph)	194	388	100	0	0	69	182	33	0	320	1109	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	19.5	26.3	26.3			7.5	14.3	14.3		13.1	27.2	
Effective Green, g (s)	19.5	26.3	26.3			7.5	14.3	14.3		13.1	27.2	
Actuated g/C Ratio	0.22	0.29	0.29			0.08	0.16	0.16		0.15	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	1034	463			148	296	242		500	1053	
v/s Ratio Prot	c0.11	0.11				0.04	c0.10			0.09	c0.32	
v/s Ratio Perm			0.06					0.02				
v/c Ratio	0.51	0.38	0.22			0.47	0.61	0.14		0.64	1.05	
Uniform Delay, d1	31.0	25.3	24.1			39.3	35.3	32.5		36.2	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.2	0.2			2.3	3.8	0.3		2.8	42.9	
Delay (s)	32.1	25.5	24.3			41.7	39.0	32.8		39.0	74.3	
Level of Service	C	C	C			D	D	C		D	E	
Approach Delay (s)		27.2					36.6				66.5	
Approach LOS		C					D				E	

Intersection Summary			
HCM Average Control Delay	49.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	185	397	39	65
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3429		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3429		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	199	427	42	70
RTOR Reduction (vph)	0	13	0	0
Lane Group Flow (vph)	199	526	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	24.1		
Effective Green, g (s)	11.0	24.1		
Actuated g/C Ratio	0.12	0.27		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	918		
v/s Ratio Prot	c0.11	0.15		
v/s Ratio Perm				
v/c Ratio	0.92	0.57		
Uniform Delay, d1	39.1	28.5		
Progression Factor	1.00	1.00		
Incremental Delay, d2	40.0	2.6		
Delay (s)	79.0	31.1		
Level of Service	E	C		
Approach Delay (s)		44.0		
Approach LOS		D		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	202	63	29	330	237	139	580	30	144	579	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.91			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4790			3519	1536	1767	3502		1767	3453	
Flt Permitted		0.77			0.87	1.00	0.31	1.00		0.33	1.00	
Satd. Flow (perm)		3720			3073	1536	576	3502		623	3453	
Peak-hour factor, PHF	0.68	0.86	0.66	0.73	0.96	0.87	0.83	0.92	0.75	0.82	0.92	0.86
Adj. Flow (vph)	107	235	95	40	344	272	167	630	40	176	629	88
RTOR Reduction (vph)	0	55	0	0	0	96	0	6	0	0	13	0
Lane Group Flow (vph)	0	382	0	0	384	176	167	664	0	176	704	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio		0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)		1576			1302	651	258	1566		279	1544	
v/s Ratio Prot								0.19			0.20	
v/s Ratio Perm		0.10			c0.12	0.11	c0.29			0.28		
v/c Ratio		0.24			0.29	0.27	0.65	0.42		0.63	0.46	
Uniform Delay, d1		15.7			16.1	16.0	18.3	16.0		18.1	16.3	
Progression Factor		0.84			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.6	1.0	11.9	0.8		10.4	1.0	
Delay (s)		13.5			16.7	17.0	30.2	16.9		28.5	17.3	
Level of Service		B			B	B	C	B		C	B	
Approach Delay (s)		13.5			16.8			19.5			19.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	103.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	346	117	55	455	98	147	403	39	112	386	294
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.98		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3388		1769	3415		1761	3468		1762	3253	
Flt Permitted	0.26	1.00		0.45	1.00		0.25	1.00		0.39	1.00	
Satd. Flow (perm)	479	3388		831	3415		463	3468		731	3253	
Peak-hour factor, PHF	0.85	0.90	0.89	0.81	0.88	0.72	0.88	0.87	0.70	0.80	0.92	0.91
Adj. Flow (vph)	212	384	131	68	517	136	167	463	56	140	420	323
RTOR Reduction (vph)	0	34	0	0	26	0	0	12	0	0	172	0
Lane Group Flow (vph)	212	481	0	68	627	0	167	507	0	140	571	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	45.5	36.1		37.3	32.0		30.1	30.1		30.1	30.1	
Effective Green, g (s)	45.5	36.1		37.3	32.0		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.54	0.42		0.44	0.38		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	399	1439		423	1286		164	1228		259	1152	
v/s Ratio Prot	c0.06	0.14		0.01	0.18			0.15			0.18	
v/s Ratio Perm	c0.23			0.06			c0.36			0.19		
v/c Ratio	0.53	0.33		0.16	0.49		1.02	0.41		0.54	0.50	
Uniform Delay, d1	11.8	16.4		13.9	20.2		27.4	20.8		21.9	21.5	
Progression Factor	1.00	1.00		1.54	1.47		0.76	0.68		1.00	1.00	
Incremental Delay, d2	0.7	0.6		0.1	1.3		73.1	0.1		1.2	0.1	
Delay (s)	12.5	17.0		21.5	31.0		93.8	14.1		23.2	21.6	
Level of Service	B	B		C	C		F	B		C	C	
Approach Delay (s)		15.7			30.1			33.5			21.9	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	211	561	0	0	221	777	18	682	63	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.91	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1521	4783			4360	1362		5000				
Flt Permitted	0.38	0.84			1.00	1.00		1.00				
Satd. Flow (perm)	607	4043			4360	1362		5000				
Peak-hour factor, PHF	0.93	0.90	0.25	0.25	0.89	0.97	0.64	0.92	0.83	0.25	0.25	0.25
Adj. Flow (vph)	227	623	0	0	248	801	28	741	76	0	0	0
RTOR Reduction (vph)	0	0	0	0	55	55	0	29	0	0	0	0
Lane Group Flow (vph)	163	687	0	0	594	345	0	816	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	243	1617			1744	545		2000				
v/s Ratio Prot					0.14							
v/s Ratio Perm	c0.27	0.17				0.25		0.16				
v/c Ratio	0.67	0.42			0.34	0.63		0.41				
Uniform Delay, d1	9.8	8.7			8.3	9.6		8.6				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	13.8	0.8			0.5	5.5		0.6				
Delay (s)	23.6	9.5			8.9	15.2		9.2				
Level of Service	C	A			A	B		A				
Approach Delay (s)		12.2			11.3			9.2			0.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	423	33	10	209	0	0	0	0	340	242	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0					4.0	4.0	4.0
Lane Util. Factor		0.91			0.91					0.91	0.91	1.00
Frpb, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	0.98	1.00
Satd. Flow (prot)		5014			5069					1605	3328	1558
Flt Permitted		1.00			0.91					0.95	0.98	1.00
Satd. Flow (perm)		5014			4607					1605	3328	1558
Peak-hour factor, PHF	0.25	0.95	0.83	0.63	0.86	0.25	0.25	0.25	0.25	0.87	0.79	0.88
Adj. Flow (vph)	0	445	40	16	243	0	0	0	0	391	306	195
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	94
Lane Group Flow (vph)	0	467	0	0	259	0	0	0	0	227	470	101
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type				Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		21.0			21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0			21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35			0.35					0.52	0.52	0.52
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1755			1612					829	1719	805
v/s Ratio Prot		c0.09										
v/s Ratio Perm					0.06					c0.14	0.14	0.06
v/c Ratio		0.27			0.16					0.27	0.27	0.13
Uniform Delay, d1		14.0			13.4					8.2	8.2	7.5
Progression Factor		1.00			1.00					1.00	1.00	1.00
Incremental Delay, d2		0.4			0.2					0.8	0.4	0.3
Delay (s)		14.4			13.6					9.0	8.6	7.8
Level of Service		B			B					A	A	A
Approach Delay (s)		14.4			13.6			0.0			8.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	234	485	528	366	158	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3284		3424	1421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3284		3424	1421
Peak-hour factor, PHF	0.74	0.93	0.90	0.97	0.72	0.86
Adj. Flow (vph)	316	522	587	377	219	103
RTOR Reduction (vph)	0	0	101	0	5	82
Lane Group Flow (vph)	316	522	863	0	224	11
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.4	62.4	38.0		9.6	9.6
Effective Green, g (s)	20.4	62.4	38.0		9.6	9.6
Actuated g/C Ratio	0.26	0.78	0.48		0.12	0.12
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	451	2760	1560		411	171
v/s Ratio Prot	c0.18	0.15	c0.26		c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.70	0.19	0.55		0.54	0.07
Uniform Delay, d1	27.0	2.3	15.0		33.1	31.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.0	0.2	1.4		0.8	0.1
Delay (s)	31.0	2.4	16.4		33.9	31.3
Level of Service	C	A	B		C	C
Approach Delay (s)		13.2	16.4		33.2	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	579	27	16	693	99	80	447	28	115	361	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1765	3427	1532	1760	3342		1769	3493		1760	3378	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.40	1.00		0.44	1.00	
Satd. Flow (perm)	311	3427	1532	322	3342		751	3493		811	3378	
Peak-hour factor, PHF	0.64	0.80	0.61	0.57	0.92	0.85	0.87	0.85	0.64	0.87	0.95	0.72
Adj. Flow (vph)	36	724	44	28	753	116	92	526	44	132	380	124
RTOR Reduction (vph)	0	0	32	0	14	0	0	7	0	0	31	0
Lane Group Flow (vph)	36	724	12	28	855	0	92	563	0	132	473	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	23.9	23.9	23.9	23.9	23.9		50.6	50.6		40.7	40.7	
Effective Green, g (s)	23.9	23.9	23.9	23.9	23.9		50.6	50.6		40.7	40.7	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.60	0.60		0.48	0.48	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	87	964	431	91	940		512	2079		388	1617	
v/s Ratio Prot		0.21			c0.26		0.01	c0.16			0.14	
v/s Ratio Perm	0.12		0.01	0.09			0.10			c0.16		
v/c Ratio	0.41	0.75	0.03	0.31	0.91		0.18	0.27		0.34	0.29	
Uniform Delay, d1	24.9	27.8	22.1	24.0	29.5		7.6	8.3		13.8	13.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.12	1.16	
Incremental Delay, d2	13.9	5.4	0.1	8.6	14.2		0.1	0.3		2.2	0.4	
Delay (s)	38.7	33.2	22.3	32.6	43.7		7.7	8.6		17.7	16.0	
Level of Service	D	C	C	C	D		A	A		B	B	
Approach Delay (s)		32.9			43.4			8.5			16.3	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	390	31	90	293	29	208	523	145	43	420	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.98			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1764	3368			3320		1764	3539	1551	1746	3407	
Flt Permitted	0.32	1.00			0.64		0.42	1.00	1.00	0.43	1.00	
Satd. Flow (perm)	591	3368			2142		771	3539	1551	787	3407	
Peak-hour factor, PHF	0.72	0.91	0.65	0.63	0.90	0.52	0.87	0.95	0.79	0.57	0.90	0.84
Adj. Flow (vph)	96	429	48	143	326	56	239	551	184	75	467	108
RTOR Reduction (vph)	0	14	0	0	14	0	0	0	71	0	17	0
Lane Group Flow (vph)	96	463	0	0	511	0	239	551	113	75	558	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	23.0	23.0			23.0		49.0	49.0	49.0	49.0	49.0	
Effective Green, g (s)	23.0	23.0			23.0		49.0	49.0	49.0	49.0	49.0	
Actuated g/C Ratio	0.29	0.29			0.29		0.61	0.61	0.61	0.61	0.61	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	170	968			616		472	2168	950	482	2087	
v/s Ratio Prot		0.14						0.16			0.16	
v/s Ratio Perm	0.16				c0.24		c0.31		0.07	0.10		
v/c Ratio	0.56	0.48			0.83		0.51	0.25	0.12	0.16	0.27	
Uniform Delay, d1	24.2	23.5			26.7		8.7	7.1	6.5	6.6	7.2	
Progression Factor	1.00	1.00			1.05		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.5	0.1			8.6		3.8	0.3	0.3	0.7	0.3	
Delay (s)	26.8	23.7			36.6		12.6	7.4	6.7	7.3	7.5	
Level of Service	C	C			D		B	A	A	A	A	
Approach Delay (s)		24.2			36.6			8.5			7.5	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	570	163	100	319	2	0	0	0	62	192	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.96		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3135		1770	3413						3356	
Flt Permitted		0.95		0.21	1.00						0.99	
Satd. Flow (perm)		2972		393	3413						3356	
Peak-hour factor, PHF	0.42	0.99	0.87	0.93	0.88	0.25	0.25	0.25	0.25	0.74	0.94	0.69
Adj. Flow (vph)	12	576	187	108	362	8	0	0	0	84	204	80
RTOR Reduction (vph)	0	33	0	0	2	0	0	0	0	0	32	0
Lane Group Flow (vph)	0	742	0	108	368	0	0	0	0	0	336	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		32.0		43.0	43.0						29.0	
Effective Green, g (s)		32.0		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1189		315	1834						1217	
v/s Ratio Prot				c0.03	0.11							
v/s Ratio Perm		c0.25		0.16							0.10	
v/c Ratio		0.62		0.34	0.20						0.28	
Uniform Delay, d1		19.2		10.7	9.6						18.1	
Progression Factor		1.67		1.00	1.00						1.00	
Incremental Delay, d2		2.4		0.2	0.2						0.6	
Delay (s)		34.5		11.0	9.8						18.6	
Level of Service		C		B	A						B	
Approach Delay (s)		34.5			10.1			0.0			18.6	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	114	538	110	279	724	36	9	1086	707	2	504	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1484	3433	3539	1459		5081	1466		4912	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.93	
Satd. Flow (perm)	3433	3539	1484	3433	3539	1459		4709	1466		4580	
Peak-hour factor, PHF	0.63	0.92	0.83	0.98	0.93	0.75	0.56	0.92	0.86	0.50	0.96	0.50
Adj. Flow (vph)	181	585	133	285	778	48	16	1180	822	4	525	100
RTOR Reduction (vph)	0	0	74	0	0	29	0	0	262	0	28	0
Lane Group Flow (vph)	181	585	59	285	778	19	0	1196	560	0	601	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	9.6	36.5	36.5	12.5	40.4	40.4		36.0	36.0		36.0	
Effective Green, g (s)	9.6	36.5	36.5	12.5	40.4	40.4		36.0	36.0		36.0	
Actuated g/C Ratio	0.10	0.36	0.36	0.12	0.40	0.40		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	330	1292	542	429	1430	589		1695	528		1649	
v/s Ratio Prot	0.05	0.17		c0.08	c0.22							
v/s Ratio Perm			0.04			0.01		0.25	c0.38		0.13	
v/c Ratio	0.55	0.45	0.11	0.66	0.54	0.03		0.71	1.06		0.36	
Uniform Delay, d1	43.1	24.2	21.0	41.7	22.8	18.0		27.5	32.0		23.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	1.0	1.1	0.4	3.0	1.5	0.1		2.5	56.0		0.6	
Delay (s)	44.1	25.3	21.4	44.7	24.3	18.1		30.0	88.0		24.2	
Level of Service	D	C	C	D	C	B		C	F		C	
Approach Delay (s)		28.5			29.2			53.6			24.2	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM Average Control Delay	39.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	258	69	84	1263	766	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.99	1.00	1.00	
Frt	0.93		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	3204		1748	3725	6321	
Flt Permitted	0.98		0.27	1.00	1.00	
Satd. Flow (perm)	3204		496	3725	6321	
Peak-hour factor, PHF	0.90	0.25	0.91	0.96	0.90	0.88
Adj. Flow (vph)	287	276	92	1316	851	84
RTOR Reduction (vph)	229	0	0	0	12	0
Lane Group Flow (vph)	334	0	92	1316	923	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	13.6		52.9	47.1	47.1	
Effective Green, g (s)	13.6		52.9	47.1	47.1	
Actuated g/C Ratio	0.17		0.66	0.59	0.59	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	545		419	2193	3721	
v/s Ratio Prot	c0.10		c0.02	c0.35	0.15	
v/s Ratio Perm			0.13			
v/c Ratio	0.61		0.22	0.60	0.25	
Uniform Delay, d1	30.8		4.9	10.5	7.9	
Progression Factor	1.00		0.58	0.88	1.00	
Incremental Delay, d2	2.0		0.3	1.2	0.2	
Delay (s)	32.8		3.1	10.3	8.1	
Level of Service	C		A	B	A	
Approach Delay (s)	32.8			9.9	8.1	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	232	10	21	139	11	54
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.63	0.66	0.91	0.69	0.84
Hourly flow rate (vph)	247	16	32	153	16	64
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			263		489	273
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			263		489	273
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	91
cM capacity (veh/h)			1302		517	754

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	263	185	80
Volume Left	0	32	16
Volume Right	16	0	64
cSH	1700	1302	691
Volume to Capacity	0.15	0.02	0.12
Queue Length 95th (ft)	0	2	10
Control Delay (s)	0.0	1.5	10.9
Lane LOS		A	B
Approach Delay (s)	0.0	1.5	10.9
Approach LOS			B

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	182	9	9	141	29	60
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.75	0.31	0.83	0.73	0.75
Hourly flow rate (vph)	202	12	29	170	40	80
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			214		463	235
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			214		463	235
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		93	90
cM capacity (veh/h)			1356		533	786

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	214	199	120
Volume Left	0	29	40
Volume Right	12	0	80
cSH	1700	1356	679
Volume to Capacity	0.13	0.02	0.18
Queue Length 95th (ft)	0	2	16
Control Delay (s)	0.0	1.3	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	1.3	11.4
Approach LOS			B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	282	3	15	116	45	82
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.38	0.63	0.94	0.80	0.82
Hourly flow rate (vph)	291	8	24	123	56	100
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			299		486	315
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			197		400	215
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		90	87
cM capacity (veh/h)			1268		539	748

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	299	147	28	28	50	50
Volume Left	0	24	28	28	0	0
Volume Right	8	0	0	0	50	50
cSH	1700	1268	539	539	748	748
Volume to Capacity	0.18	0.02	0.05	0.05	0.07	0.07
Queue Length 95th (ft)	0	1	4	4	5	5
Control Delay (s)	0.0	1.4	12.0	12.0	10.2	10.2
Lane LOS		A	B	B	B	B
Approach Delay (s)	0.0	1.4	10.8			
Approach LOS			B			

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	157	79	58	131	0	0	0	0	39	402	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.98	
Flpb, ped/bikes		1.00	1.00		0.97						0.98	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.99	
Satd. Flow (prot)		1863	1434		1774						4808	
Flt Permitted		1.00	1.00		0.80						0.99	
Satd. Flow (perm)		1863	1434		1442						4808	
Peak-hour factor, PHF	0.92	0.91	0.79	0.76	0.84	0.92	0.25	0.25	0.25	0.75	0.97	0.69
Adj. Flow (vph)	0	173	100	76	156	0	0	0	0	52	414	32
RTOR Reduction (vph)	0	0	41	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	173	59	0	232	0	0	0	0	0	494	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		18.6	18.6		18.6						53.4	
Effective Green, g (s)		18.6	18.6		18.6						53.4	
Actuated g/C Ratio		0.23	0.23		0.23						0.67	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		433	333		335						3209	
v/s Ratio Prot		0.09										
v/s Ratio Perm			0.04		c0.16						0.10	
v/c Ratio		0.40	0.18		0.69						0.15	
Uniform Delay, d1		26.0	24.6		28.1						4.9	
Progression Factor		1.00	1.00		1.00						1.29	
Incremental Delay, d2		0.6	0.3		6.1						0.1	
Delay (s)		26.6	24.8		34.2						6.5	
Level of Service		C	C		C						A	
Approach Delay (s)		25.9			34.2			0.0			6.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	91	1	0	87	62	16	264	140	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.80			
Flpb, ped/bikes		0.99			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		0.99			1.00			1.00	1.00			
Satd. Flow (prot)		1827			1699			3502	1269			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1782			1699			3502	1269			
Peak-hour factor, PHF	0.69	0.84	0.25	0.25	0.87	0.82	0.80	0.93	0.88	0.25	0.25	0.25
Adj. Flow (vph)	16	108	4	0	100	76	20	284	159	0	0	0
RTOR Reduction (vph)	0	1	0	0	28	0	0	0	129	0	0	0
Lane Group Flow (vph)	0	127	0	0	148	0	0	304	30	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		28.6			28.6			8.4	8.4			
Effective Green, g (s)		28.6			28.6			8.4	8.4			
Actuated g/C Ratio		0.64			0.64			0.19	0.19			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1133			1080			654	237			
v/s Ratio Prot					c0.09							
v/s Ratio Perm		0.07						0.09	0.02			
v/c Ratio		0.11			0.14			0.46	0.13			
Uniform Delay, d1		3.2			3.3			16.3	15.2			
Progression Factor		0.44			1.00			1.00	1.00			
Incremental Delay, d2		0.2			0.3			0.2	0.1			
Delay (s)		1.6			3.5			16.5	15.3			
Level of Service		A			A			B	B			
Approach Delay (s)		1.6			3.5			16.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	36	17	49	0	49	0	423	35	25	368	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.98			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.95			0.93			0.99			1.00	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1746	1759			1651			3474			3519	
Flt Permitted	0.68	1.00			0.87			1.00			0.90	
Satd. Flow (perm)	1250	1759			1474			3474			3179	
Peak-hour factor, PHF	0.69	0.82	0.85	0.88	0.92	0.77	0.25	0.89	0.88	0.89	0.99	0.92
Adj. Flow (vph)	16	44	20	56	0	64	0	475	40	28	372	0
RTOR Reduction (vph)	0	12	0	0	37	0	0	14	0	0	0	0
Lane Group Flow (vph)	16	52	0	0	83	0	0	501	0	0	400	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	528	743			622			1312			1201	
v/s Ratio Prot		0.03						c0.14				
v/s Ratio Perm	0.01				c0.06						0.13	
v/c Ratio	0.03	0.07			0.13			0.38			0.33	
Uniform Delay, d1	7.6	7.7			8.0			10.2			10.0	
Progression Factor	1.00	1.00			1.17			1.00			1.00	
Incremental Delay, d2	0.1	0.2			0.4			0.8			0.7	
Delay (s)	7.7	7.9			9.8			11.0			10.7	
Level of Service	A	A			A			B			B	
Approach Delay (s)		7.9			9.8			11.0			10.7	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	127	23	9	151	149	20	507	21	31	139	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.93			0.99		1.00	0.94	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3374			3208			3495		1766	3281	
Flt Permitted		0.75			0.94			0.93		0.35	1.00	
Satd. Flow (perm)		2541			3013			3273		654	3281	
Peak-hour factor, PHF	0.55	0.84	0.52	0.56	0.70	0.65	0.71	0.91	0.66	0.97	0.85	0.44
Adj. Flow (vph)	40	151	44	16	216	229	28	557	32	32	164	111
RTOR Reduction (vph)	0	36	0	0	187	0	0	5	0	0	37	0
Lane Group Flow (vph)	0	199	0	0	274	0	0	613	0	32	238	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.9			10.9			33.0		40.1	40.1	
Effective Green, g (s)		10.9			10.9			33.0		40.1	40.1	
Actuated g/C Ratio		0.18			0.18			0.55		0.67	0.67	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		462			547			1800		485	2193	
v/s Ratio Prot										0.00	c0.07	
v/s Ratio Perm		0.08			c0.09			c0.19		0.04		
v/c Ratio		0.43			0.50			0.34		0.07	0.11	
Uniform Delay, d1		21.8			22.1			7.5		3.7	3.6	
Progression Factor		1.00			0.85			1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.7			0.5		0.1	0.1	
Delay (s)		22.4			19.5			8.0		3.7	3.7	
Level of Service		C			B			A		A	A	
Approach Delay (s)		22.4			19.5			8.0			3.7	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	128	80	51	199	86	92	675	95	37	466	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.96			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3216			3209			3411			4956	
Flt Permitted		0.91			0.87			0.78			0.81	
Satd. Flow (perm)		2937			2828			2672			4024	
Peak-hour factor, PHF	0.79	0.82	0.83	0.91	0.89	0.80	0.92	0.92	0.95	0.71	0.88	0.63
Adj. Flow (vph)	24	156	96	56	224	108	100	734	100	52	530	52
RTOR Reduction (vph)	0	61	0	0	65	0	0	16	0	0	18	0
Lane Group Flow (vph)	0	215	0	0	323	0	0	919	0	0	617	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1077			1037			1378			1207	
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.07			c0.11			c0.24			0.15	
v/c Ratio		0.20			0.31			0.67			0.51	
Uniform Delay, d1		13.0			13.6			11.8			17.4	
Progression Factor		1.92			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.8			2.6			1.5	
Delay (s)		25.3			14.4			14.4			18.9	
Level of Service		C			B			B			B	
Approach Delay (s)		25.3			14.4			14.4			18.9	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	255	0	0	300	75	50	302	198	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3500			3371	1319		4998	1456			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3103			3371	1319		4998	1456			
Peak-hour factor, PHF	0.66	0.87	0.92	0.92	0.92	0.94	0.83	0.91	0.93	0.92	0.92	0.92
Adj. Flow (vph)	44	293	0	0	326	80	60	332	213	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	17	0	0	181	0	0	0
Lane Group Flow (vph)	0	337	0	0	333	55	0	392	32	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		60.8			60.8	60.8		12.2	12.2			
Effective Green, g (s)		60.8			60.8	60.8		12.2	12.2			
Actuated g/C Ratio		0.76			0.76	0.76		0.15	0.15			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2358			2562	1002		762	222			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.11				0.04		0.08	0.02			
v/c Ratio		0.14			0.13	0.05		0.51	0.15			
Uniform Delay, d1		2.6			2.6	2.4		31.2	29.4			
Progression Factor		1.00			0.72	0.36		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.6	0.3			
Delay (s)		2.7			1.9	1.0		31.8	29.7			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.7			1.8			31.0			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	315	137	109	282	0	0	0	0	63	403	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3372						4487	
Flt Permitted		1.00	1.00	0.95	0.95						0.99	
Satd. Flow (perm)		3539	1439	1610	3200						4487	
Peak-hour factor, PHF	0.92	0.88	0.90	0.83	0.92	0.25	0.25	0.25	0.25	0.72	0.92	0.92
Adj. Flow (vph)	0	358	152	131	307	0	0	0	0	88	438	100
RTOR Reduction (vph)	0	0	59	0	0	0	0	0	0	0	35	0
Lane Group Flow (vph)	0	358	93	118	320	0	0	0	0	0	591	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1702						1683	
v/s Ratio Prot		c0.10		c0.07	0.02							
v/s Ratio Perm			0.06		0.08						0.13	
v/c Ratio		0.29	0.18	0.59	0.19						0.35	
Uniform Delay, d1		18.8	18.1	33.1	10.0						18.0	
Progression Factor		1.16	1.34	0.97	0.93						1.25	
Incremental Delay, d2		0.6	0.8	2.8	0.0						0.0	
Delay (s)		22.5	25.0	34.9	9.3						22.6	
Level of Service		C	C	C	A						C	
Approach Delay (s)		23.2			16.2			0.0			22.6	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBT	NBR	SBT	SBR
Lane Configurations												
Volume (vph)	256	89	35	7	111	14	75	21	629	20	138	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0				4.0		4.0	4.0
Lane Util. Factor	0.91	0.91		1.00	0.95				0.95		0.91	0.91
Frpb, ped/bikes	1.00	1.00		1.00	1.00				1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00				1.00		1.00	1.00
Frt	1.00	0.96		1.00	0.98				1.00		0.98	0.85
Flt Protected	0.95	0.99		0.95	1.00				0.99		1.00	1.00
Satd. Flow (prot)	3221	1614		1770	3481				3495		3334	1441
Flt Permitted	0.95	0.99		0.95	1.00				0.99		1.00	1.00
Satd. Flow (perm)	3221	1614		1770	3481				3495		3334	1441
Peak-hour factor, PHF	0.91	0.86	0.73	0.63	0.86	0.86	0.71	0.71	0.88	0.71	0.78	0.89
Adj. Flow (vph)	281	103	48	11	129	16	106	30	715	28	177	108
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	3	0	0	0
Lane Group Flow (vph)	253	164	0	11	145	0	0	0	876	0	199	86
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)		12							7			
Turn Type	custom			Split			Split	Split				custom
Protected Phases	1	1		7	7		8	8	8		2	6
Permitted Phases	1											6
Actuated Green, G (s)	19.7	19.7		7.7	7.7				25.6		11.0	34.7
Effective Green, g (s)	19.7	19.7		7.7	7.7				25.6		11.0	34.7
Actuated g/C Ratio	0.25	0.25		0.10	0.10				0.32		0.14	0.43
Clearance Time (s)	4.0	4.0		4.0	4.0				4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0		2.0	2.0				2.0		2.0	2.0
Lane Grp Cap (vph)	793	397		170	335				1118		458	625
v/s Ratio Prot	0.08	c0.10		0.01	c0.04				c0.25		c0.06	0.06
v/s Ratio Perm												
v/c Ratio	0.32	0.41		0.06	0.43				0.78		0.43	0.14
Uniform Delay, d1	24.7	25.3		32.9	34.1				24.7		31.6	13.6
Progression Factor	0.85	0.83		0.80	0.83				1.00		1.14	1.18
Incremental Delay, d2	1.1	3.1		0.1	0.3				3.4		0.2	0.5
Delay (s)	22.0	24.3		26.2	28.7				28.1		36.3	16.5
Level of Service	C	C		C	C				C		D	B
Approach Delay (s)		22.9			28.6				28.1		29.7	
Approach LOS		C			C				C		C	

Intersection Summary			
HCM Average Control Delay	27.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR2
Lane Configurations	
Volume (vph)	36
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frpb, ped/bikes	1.00
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Peak-hour factor, PHF	0.89
Adj. Flow (vph)	40
RTOR Reduction (vph)	23
Lane Group Flow (vph)	17
Confl. Peds. (#/hr)	74
Confl. Bikes (#/hr)	8
Turn Type	custom
Protected Phases	6
Permitted Phases	
Actuated Green, G (s)	34.7
Effective Green, g (s)	34.7
Actuated g/C Ratio	0.43
Clearance Time (s)	4.0
Vehicle Extension (s)	2.0
Lane Grp Cap (vph)	687
v/s Ratio Prot	0.01
v/s Ratio Perm	
v/c Ratio	0.03
Uniform Delay, d1	13.0
Progression Factor	1.95
Incremental Delay, d2	0.1
Delay (s)	25.3
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	380	282	0	0	94
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.25	0.25	0.25	0.92	0.92	0.66
Hourly flow rate (vph)	0	1520	1128	0	0	142
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		420	110			
pX, platoon unblocked	0.97				0.97	0.97
vC, conflicting volume	1128				1635	564
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1073				1594	492
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	72
cM capacity (veh/h)	627				95	507

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	0	507	507	507	564	564	142
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	142
cSH	1700	1700	1700	1700	1700	1700	507
Volume to Capacity	0.00	0.30	0.30	0.30	0.33	0.33	0.28
Queue Length 95th (ft)	0	0	0	0	0	0	29
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	14.8
Lane LOS							B
Approach Delay (s)	0.0				0.0		14.8
Approach LOS							B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	893	0	0	703	624	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0	4.0	4.0
Lane Util. Factor	0.94			0.91	0.95	0.76
Frpb, ped/bikes	1.00			1.00	1.00	0.96
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	4990			5085	3539	3481
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	4990			5085	3539	3481
Peak-hour factor, PHF	0.95	0.95	0.25	0.93	0.99	0.84
Adj. Flow (vph)	940	0	0	756	630	324
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	940	0	0	756	630	324
Confl. Peds. (#/hr)						20
Confl. Bikes (#/hr)						16
Turn Type						Free
Protected Phases	1			2	2	
Permitted Phases						Free
Actuated Green, G (s)	21.9			49.1	49.1	80.0
Effective Green, g (s)	21.9			49.1	49.1	80.0
Actuated g/C Ratio	0.27			0.61	0.61	1.00
Clearance Time (s)	5.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1366			3121	2172	3481
v/s Ratio Prot	c0.19			0.15	c0.18	
v/s Ratio Perm						0.09
v/c Ratio	0.69			0.24	0.29	0.09
Uniform Delay, d1	26.0			7.0	7.3	0.0
Progression Factor	1.07			1.00	0.78	1.00
Incremental Delay, d2	1.2			0.2	0.3	0.1
Delay (s)	29.0			7.2	6.0	0.1
Level of Service	C			A	A	A
Approach Delay (s)	29.0			7.2	4.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Volume (vph)	132	703	624	0	0	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	0.94	0.95	0.95			0.88
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	4990	3539	3539			2787
Flt Permitted	0.94	1.00	1.00			1.00
Satd. Flow (perm)	4938	3539	3539			2787
Peak-hour factor, PHF	0.69	0.88	0.92	0.92	0.92	0.71
Adj. Flow (vph)	191	799	678	0	0	154
RTOR Reduction (vph)	0	0	0	0	0	53
Lane Group Flow (vph)	191	799	678	0	0	101
Confl. Bikes (#/hr)				2		
Turn Type	Perm					custom
Protected Phases		2	1			2
Permitted Phases	2	1				2
Actuated Green, G (s)	52.6	74.0	21.4			52.6
Effective Green, g (s)	52.6	74.0	21.4			52.6
Actuated g/C Ratio	0.66	0.92	0.27			0.66
Clearance Time (s)	3.0	3.0	3.0			3.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	3247	3539	947			1832
v/s Ratio Prot		c0.15	c0.19			0.04
v/s Ratio Perm	0.04	0.08				
v/c Ratio	0.06	0.23	0.72			0.06
Uniform Delay, d1	4.9	0.3	26.5			4.9
Progression Factor	1.00	1.00	0.71			3.44
Incremental Delay, d2	0.0	0.0	2.5			0.1
Delay (s)	4.9	0.3	21.5			16.8
Level of Service	A	A	C			B
Approach Delay (s)		1.2	21.5		16.8	
Approach LOS		A	C		B	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	146	151	0	0	0	0	0	986	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6289	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6289	
Peak-hour factor, PHF	0.25	0.95	0.92	0.91	0.90	0.25	0.25	0.25	0.25	0.92	0.97	0.89
Adj. Flow (vph)	0	0	0	160	168	0	0	0	0	0	1016	128
RTOR Reduction (vph)	0	0	0	10	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	0	0	150	168	0	0	0	0	0	1120	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				31.0	31.0						35.0	
Effective Green, g (s)				31.0	31.0						35.0	
Actuated g/C Ratio				0.41	0.41						0.47	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				730	1463						2935	
v/s Ratio Prot					0.05						c0.18	
v/s Ratio Perm				c0.08								
v/c Ratio				0.21	0.11						0.38	
Uniform Delay, d1				14.1	13.5						13.0	
Progression Factor				1.00	1.00						0.62	
Incremental Delay, d2				0.6	0.2						0.1	
Delay (s)				14.7	13.7						8.2	
Level of Service				B	B						A	
Approach Delay (s)		0.0			14.2			0.0			8.2	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	396	947	59	269	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5022		3403	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5022		3403	
Peak-hour factor, PHF	0.82	0.93	0.93	0.82	0.91	0.89
Adj. Flow (vph)	244	426	1018	72	296	36
RTOR Reduction (vph)	7	0	11	0	0	0
Lane Group Flow (vph)	237	426	1079	0	332	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	23.6	23.6	22.4		17.0	
Effective Green, g (s)	23.6	23.6	22.4		17.0	
Actuated g/C Ratio	0.31	0.31	0.30		0.23	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	557	1600	1500		771	
v/s Ratio Prot		0.08	c0.21		c0.10	
v/s Ratio Perm	c0.13					
v/c Ratio	0.43	0.27	0.72		0.43	
Uniform Delay, d1	20.3	19.2	23.5		24.9	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.4	0.4	1.7		0.4	
Delay (s)	22.7	19.6	25.2		25.2	
Level of Service	C	B	C		C	
Approach Delay (s)		20.8	25.2		25.2	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	226	756	876	452	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3051	1417	1403	5826				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3051	1417	1403	5826				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.77	0.83	0.90	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	294	911	973	486	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	75	75	360	291	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	675	380	126	682	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					45.6	45.6	19.4	19.4				
Effective Green, g (s)					45.6	45.6	19.4	19.4				
Actuated g/C Ratio					0.61	0.61	0.26	0.26				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1855	862	363	1507				
v/s Ratio Prot					0.22							
v/s Ratio Perm						c0.27	0.09	0.12				
v/c Ratio					0.36	0.44	0.35	0.45				
Uniform Delay, d1					7.4	7.9	22.6	23.3				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.6	1.6	0.6	0.2				
Delay (s)					8.0	9.5	23.2	23.6				
Level of Service					A	A	C	C				
Approach Delay (s)		0.0			8.5			23.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	214	62	0	0	0	0	0	0	480	777	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.96								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3396								1522	4735	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3396								1522	4735	
Peak-hour factor, PHF	0.92	0.89	0.82	0.25	0.25	0.25	0.25	0.25	0.25	0.89	0.82	0.84
Adj. Flow (vph)	0	240	76	0	0	0	0	0	0	539	948	56
RTOR Reduction (vph)	0	30	0	0	0	0	0	0	0	216	34	0
Lane Group Flow (vph)	0	286	0	0	0	0	0	0	0	161	1132	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1585								649	2020	
v/s Ratio Prot		c0.08										
v/s Ratio Perm										0.11	0.24	
v/c Ratio		0.18								0.25	0.56	
Uniform Delay, d1		11.6								13.8	16.2	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.3								0.9	1.1	
Delay (s)		11.9								14.7	17.3	
Level of Service		B								B	B	
Approach Delay (s)		11.9			0.0			0.0			16.7	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	767	0	0	355	218	171	528	35	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3518			3539	1461		3467	1520			
Flt Permitted		0.87			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3078			3539	1461		3467	1520			
Peak-hour factor, PHF	0.63	0.86	0.25	0.99	0.96	0.96	0.84	0.92	0.73	0.25	0.25	0.25
Adj. Flow (vph)	84	892	0	0	370	227	204	574	48	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	158	0	0	6	0	0	0
Lane Group Flow (vph)	0	976	0	0	370	70	0	778	42	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		923			1062	438		1849	811			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.32				0.05		0.22	0.03			
v/c Ratio		1.06			0.35	0.16		0.42	0.05			
Uniform Delay, d1		21.0			16.4	15.4		8.4	6.7			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		46.0			0.9	0.8		0.7	0.1			
Delay (s)		67.0			17.3	16.2		9.1	6.8			
Level of Service		E			B	B		A	A			
Approach Delay (s)		67.0			16.9			9.0			0.0	
Approach LOS		E			B			A			A	

Intersection Summary			
HCM Average Control Delay	34.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	538	61	22	468	0	0	0	0	287	501	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3451			3529					1734	3511	
Flt Permitted		1.00			0.91					0.95	1.00	
Satd. Flow (perm)		3451			3233					1734	3511	
Peak-hour factor, PHF	0.25	0.91	0.76	0.79	0.91	0.25	0.25	0.25	0.25	0.94	0.96	0.67
Adj. Flow (vph)	0	591	80	28	514	0	0	0	0	305	522	24
RTOR Reduction (vph)	0	24	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	647	0	0	542	0	0	0	0	305	538	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1457			1365					732	1482	
v/s Ratio Prot		c0.19									0.15	
v/s Ratio Perm					0.17					c0.18		
v/c Ratio		0.44			0.40					0.42	0.36	
Uniform Delay, d1		9.2			9.0					9.1	8.9	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.0			0.9					1.7	0.7	
Delay (s)		10.2			9.9					10.9	9.6	
Level of Service		B			A					B	A	
Approach Delay (s)		10.2			9.9			0.0			10.0	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	359	7	16	335	37	58	372	21	95	149	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		0.99			1.00			1.00			0.99	
Frt		1.00			0.98			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3471			3446			3459			3347	
Flt Permitted		0.84			0.93			0.87			0.66	
Satd. Flow (perm)		2935			3223			3029			2254	
Peak-hour factor, PHF	0.80	0.92	0.58	0.80	0.83	0.71	0.85	0.86	0.58	0.82	0.97	0.81
Adj. Flow (vph)	76	390	12	20	404	52	68	433	36	116	154	52
RTOR Reduction (vph)	0	3	0	0	18	0	0	13	0	0	36	0
Lane Group Flow (vph)	0	475	0	0	458	0	0	524	0	0	286	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.5			23.5			14.0			14.0	
Effective Green, g (s)		23.5			23.5			14.0			14.0	
Actuated g/C Ratio		0.52			0.52			0.31			0.31	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1533			1683			942			701	
v/s Ratio Prot												
v/s Ratio Perm		c0.16			0.14			c0.17			0.13	
v/c Ratio		0.31			0.27			0.56			0.41	
Uniform Delay, d1		6.1			6.0			12.9			12.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.4			0.7			0.4	
Delay (s)		6.7			6.4			13.6			12.6	
Level of Service		A			A			B			B	
Approach Delay (s)		6.7			6.4			13.6			12.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	208	786	0	0	0	0	0	582	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6268						5025	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6268						5025	
Peak-hour factor, PHF	0.25	0.25	0.25	0.91	0.97	0.25	0.25	0.25	0.25	0.25	0.86	0.86
Adj. Flow (vph)	0	0	0	229	810	0	0	0	0	0	677	44
RTOR Reduction (vph)	0	0	0	0	69	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	970	0	0	0	0	0	709	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2716						2219	
v/s Ratio Prot											c0.14	
v/s Ratio Perm					0.15							
v/c Ratio					0.36						0.32	
Uniform Delay, d1					11.4						10.9	
Progression Factor					0.45						1.00	
Incremental Delay, d2					0.4						0.4	
Delay (s)					5.5						11.3	
Level of Service					A						B	
Approach Delay (s)		0.0			5.5			0.0			11.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	848	50	149	822	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6317			6222				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6317			6222				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.78	0.83	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	893	64	180	856	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	7	0	0	45	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	950	0	0	991	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3148			2136				
v/s Ratio Prot					c0.15							
v/s Ratio Perm								0.16				
v/c Ratio					0.30			0.46				
Uniform Delay, d1					8.9			15.4				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.2			0.7				
Delay (s)					9.1			16.1				
Level of Service					A			B				
Approach Delay (s)		0.0			9.1			16.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	57	0	0	901	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.71	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	80	0	0	979	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	251	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	251	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	712	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	80	245	245	245	245
Volume Left	80	0	0	0	0
Volume Right	0	0	0	0	0
cSH	712	1700	1700	1700	1700
Volume to Capacity	0.11	0.14	0.14	0.14	0.14
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	10.7	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.7	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	760	162	0	0	0	0	0	0	43	729	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.97									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6181									5061	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6181									5061	
Peak-hour factor, PHF	0.25	0.96	0.86	0.25	0.25	0.25	0.25	0.25	0.25	0.72	0.93	0.25
Adj. Flow (vph)	0	792	188	0	0	0	0	0	0	60	784	0
RTOR Reduction (vph)	0	55	0	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	925	0	0	0	0	0	0	0	0	829	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2369									2193	
v/s Ratio Prot		c0.15										
v/s Ratio Perm											0.16	
v/c Ratio		0.39									0.38	
Uniform Delay, d1		13.4									11.5	
Progression Factor		0.84									0.60	
Incremental Delay, d2		0.5									0.5	
Delay (s)		11.7									7.4	
Level of Service		B									A	
Approach Delay (s)		11.7			0.0			0.0			7.4	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	605	0	0	0	0	0	266	112	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6382						6050				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6382						6050				
Peak-hour factor, PHF	0.63	0.87	0.25	0.25	0.25	0.25	0.25	0.86	0.97	0.25	0.25	0.25
Adj. Flow (vph)	32	695	0	0	0	0	0	309	115	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	26	0	0	0	0
Lane Group Flow (vph)	0	713	0	0	0	0	0	398	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		12.3						40.7				
Effective Green, g (s)		12.3						40.7				
Actuated g/C Ratio		0.20						0.68				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1308						4104				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.11										
v/c Ratio		0.54						0.10				
Uniform Delay, d1		21.3						3.3				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.3						0.0				
Delay (s)		21.6						3.4				
Level of Service		C						A				
Approach Delay (s)		21.6			0.0			3.4			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	897	0	0	0	0	0	785	329	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6340						4830				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6340						4830				
Peak-hour factor, PHF	0.85	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	175	915	0	0	0	0	0	835	343	0	0	0
RTOR Reduction (vph)	0	37	0	0	0	0	0	26	0	0	0	0
Lane Group Flow (vph)	0	1053	0	0	0	0	0	1152	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2536						1932				
v/s Ratio Prot								c0.24				
v/s Ratio Perm		0.17										
v/c Ratio		0.42						0.60				
Uniform Delay, d1		9.7						10.6				
Progression Factor		0.99						1.58				
Incremental Delay, d2		0.4						1.1				
Delay (s)		10.0						18.0				
Level of Service		B						B				
Approach Delay (s)		10.0			0.0			18.0			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	812	238	0	0	0	0	0	0	362	1228	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6153									5014	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6153									5014	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.87	0.95	0.25
Adj. Flow (vph)	0	820	259	0	0	0	0	0	0	416	1293	0
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	38	0
Lane Group Flow (vph)	0	1068	0	0	0	0	0	0	0	0	1671	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2461									2228	
v/s Ratio Prot		c0.17										
v/s Ratio Perm											0.33	
v/c Ratio		0.43									0.75	
Uniform Delay, d1		9.8									10.4	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.6									2.4	
Delay (s)		10.4									12.8	
Level of Service		B									B	
Approach Delay (s)		10.4			0.0			0.0			12.8	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	6	308	47	293	294	0	0	180	1360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.97			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1815			1863	1559
Flt Permitted				0.95	1.00	1.00		0.74			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1373			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.50	0.78	0.84	0.84	0.90	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	12	395	56	349	327	0	0	196	1388
RTOR Reduction (vph)	0	0	0	0	0	43	0	0	0	0	0	42
Lane Group Flow (vph)	0	0	0	12	395	13	0	676	0	0	196	1346
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.3	14.3	14.3		34.7			34.7	34.7
Effective Green, g (s)				14.3	14.3	14.3		34.7			34.7	34.7
Actuated g/C Ratio				0.24	0.24	0.24		0.58			0.58	0.58
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				411	444	351		794			1077	902
v/s Ratio Prot					c0.21						0.11	
v/s Ratio Perm				0.01		0.01		0.49				c0.86
v/c Ratio				0.03	0.89	0.04		0.85			0.18	1.49
Uniform Delay, d1				17.5	22.1	17.6		10.5			6.0	12.6
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	19.1	0.0		11.1			0.4	227.3
Delay (s)				17.6	41.2	17.6		21.6			6.3	240.0
Level of Service				B	D	B		C			A	F
Approach Delay (s)		0.0			37.7			21.6			211.1	
Approach LOS		A			D			C			F	

Intersection Summary			
HCM Average Control Delay	134.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	146.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	154	524	55	47	608
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3501		3192	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3501		3192	1441
Peak-hour factor, PHF	0.92	0.90	0.86	0.60	0.84	0.94
Adj. Flow (vph)	0	171	609	92	56	647
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	780	0	472	323
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1268		1149	519
v/s Ratio Prot						
v/s Ratio Perm			0.22		0.15	c0.22
v/c Ratio			0.62		0.41	0.62
Uniform Delay, d1			11.8		10.8	11.9
Progression Factor			0.68		1.00	1.00
Incremental Delay, d2			0.2		1.1	5.5
Delay (s)			8.2		11.9	17.4
Level of Service			A		B	B
Approach Delay (s)			8.2		14.1	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	476	69	0	0	0	0	446	62	1	58	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.98			1.00	
Flt Protected		0.98						1.00			1.00	
Satd. Flow (prot)		4897						1830			1858	
Flt Permitted		0.98						1.00			0.71	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.86	0.93	0.72	0.25	0.25	0.25	0.25	0.75	0.70	0.25	0.76	0.25
Adj. Flow (vph)	283	512	96	0	0	0	0	595	89	4	76	0
RTOR Reduction (vph)	0	34	0	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	858	0	0	0	0	0	672	0	0	80	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						630			448	
v/s Ratio Prot								c0.37				
v/s Ratio Perm		c0.86									0.06	
v/c Ratio		1.72						1.07			0.18	
Uniform Delay, d1		11.2						14.8			10.3	
Progression Factor		1.00						1.00			0.03	
Incremental Delay, d2		330.2						55.1			0.8	
Delay (s)		341.4						69.8			1.2	
Level of Service		F						E			A	
Approach Delay (s)		341.4			0.0			69.8			1.2	
Approach LOS		F			A			E			A	

Intersection Summary			
HCM Average Control Delay	212.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	245	255	1000	700	235	713
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.93		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3306		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3306		1770	3539
Peak-hour factor, PHF	0.91	0.78	0.94	0.84	0.92	0.88
Adj. Flow (vph)	269	327	1064	833	255	810
RTOR Reduction (vph)	0	97	154	0	0	0
Lane Group Flow (vph)	269	230	1743	0	255	810
Turn Type		custom			Prot	
Protected Phases	4		6		5	2
Permitted Phases		2				
Actuated Green, G (s)	18.8	63.2	37.1		22.1	63.2
Effective Green, g (s)	18.8	63.2	37.1		22.1	63.2
Actuated g/C Ratio	0.21	0.70	0.41		0.25	0.70
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	370	1112	1363		435	2485
v/s Ratio Prot	c0.15		c0.53		c0.14	0.23
v/s Ratio Perm		0.15				
v/c Ratio	0.73	0.21	1.28		0.59	0.33
Uniform Delay, d1	33.2	4.7	26.4		29.9	5.2
Progression Factor	1.00	1.00	1.00		0.76	1.05
Incremental Delay, d2	7.0	0.4	131.2		5.0	0.3
Delay (s)	40.2	5.1	157.7		27.8	5.8
Level of Service	D	A	F		C	A
Approach Delay (s)	20.9		157.7			11.0
Approach LOS	C		F			B

Intersection Summary			
HCM Average Control Delay	90.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	665	466	148	311	623
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3403		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3403		1770	1583
Peak-hour factor, PHF	0.84	0.85	0.87	0.80	0.91	0.85
Adj. Flow (vph)	417	782	536	185	342	733
RTOR Reduction (vph)	0	0	52	0	0	380
Lane Group Flow (vph)	417	782	669	0	342	353
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.2	32.6	14.4		18.3	18.3
Effective Green, g (s)	14.2	32.6	14.4		18.3	18.3
Actuated g/C Ratio	0.24	0.55	0.24		0.31	0.31
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	427	1959	832		550	492
v/s Ratio Prot	c0.24	0.22	c0.20		0.19	
v/s Ratio Perm						c0.22
v/c Ratio	0.98	0.40	0.80		0.62	0.72
Uniform Delay, d1	22.2	7.5	20.9		17.3	18.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	37.1	0.1	5.7		2.2	4.9
Delay (s)	59.2	7.7	26.6		19.5	22.9
Level of Service	E	A	C		B	C
Approach Delay (s)		25.6	26.6		21.8	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	298	768	224	0	696	560	350	738	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4906			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4906			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.91	0.84	0.92	0.93	0.84	0.90	0.91	0.92
Adj. Flow (vph)	0	0	310	844	267	0	748	667	389	811	0
RTOR Reduction (vph)	0	0	0	46	0	0	0	102	0	0	0
Lane Group Flow (vph)	0	0	0	1375	0	0	748	565	389	811	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				29.4			20.8	20.8	26.8	51.6	
Effective Green, g (s)				29.4			20.8	20.8	26.8	51.6	
Actuated g/C Ratio				0.33			0.23	0.23	0.30	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1603			818	366	527	2029	
v/s Ratio Prot				c0.28			0.21		c0.22	0.23	
v/s Ratio Perm								c0.36			
v/c Ratio				0.86			0.91	1.54	0.74	0.40	
Uniform Delay, d1				28.3			33.7	34.6	28.4	10.6	
Progression Factor				1.00			1.43	1.62	1.00	1.00	
Incremental Delay, d2				4.8			2.0	245.6	5.4	0.1	
Delay (s)				33.1			50.2	301.6	33.8	10.8	
Level of Service				C			D	F	C	B	
Approach Delay (s)	0.0			33.1			168.7			18.2	
Approach LOS	A			C			F			B	

Intersection Summary			
HCM Average Control Delay	76.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	329	761	424	163	444	483	72	263	19	456
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95				1.00	0.95
Frt	1.00	0.99	0.85	0.85	0.92				1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)	1610	3154	1441	1583	3250				1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)	1610	3154	1441	1583	3250				1770	3539
Peak-hour factor, PHF	0.70	0.94	0.87	0.74	0.81	0.84	0.90	0.83	0.68	0.91
Adj. Flow (vph)	470	810	487	220	548	575	80	317	28	501
RTOR Reduction (vph)	0	0	0	43	6	0	0	0	0	0
Lane Group Flow (vph)	423	940	404	177	1197	0	0	0	345	501
Turn Type	Split		Prot	Perm				Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4						
Actuated Green, G (s)	28.0	28.0	28.0	28.0	37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0	28.0	37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	501	981	448	492	1336				236	2084
v/s Ratio Prot	0.26	c0.30	0.28		c0.37				c0.19	0.14
v/s Ratio Perm				0.11						
v/c Ratio	0.84	0.96	0.90	0.36	0.98dr				1.46	0.24
Uniform Delay, d1	29.0	30.4	29.7	24.0	24.7				39.0	8.9
Progression Factor	0.80	0.81	0.80	0.69	1.00				1.00	1.00
Incremental Delay, d2	5.2	8.3	8.8	0.6	9.6				229.7	0.3
Delay (s)	28.3	33.0	32.6	17.2	34.3				268.7	9.1
Level of Service	C	C	C	B	C				F	A
Approach Delay (s)		30.2			34.3					115.0
Approach LOS		C			C					F

Intersection Summary			
HCM Average Control Delay	49.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1213	172	242	745	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4860				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4860				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.91	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1264	189	247	793	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	31	0	23	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1264	159	0	1017	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1782				
v/s Ratio Prot					c0.25							
v/s Ratio Perm						0.10		0.21				
v/c Ratio					0.50	0.20		0.57				
Uniform Delay, d1					10.0	8.3		15.2				
Progression Factor					1.00	1.00		0.88				
Incremental Delay, d2					0.7	0.6		1.0				
Delay (s)					10.7	8.9		14.5				
Level of Service					B	A		B				
Approach Delay (s)		0.0			10.4			14.5			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	475	1008	0	0	0	0	0	526	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4776						3500	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4776						3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.90	0.97	0.92	0.92	0.92	0.92	0.92	0.75	0.86
Adj. Flow (vph)	0	0	0	528	1039	0	0	0	0	0	701	56
RTOR Reduction (vph)	0	0	0	50	28	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	330	1159	0	0	0	0	0	747	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2308						1342	
v/s Ratio Prot											c0.21	
v/s Ratio Perm				0.22	0.24							
v/c Ratio				0.45	0.50						0.56	
Uniform Delay, d1				10.2	10.6						14.5	
Progression Factor				1.66	1.45						1.00	
Incremental Delay, d2				1.7	0.7						1.7	
Delay (s)				18.7	16.1						16.2	
Level of Service				B	B						B	
Approach Delay (s)		0.0			16.7			0.0			16.2	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	362	8	13	178	15	12	18	22	50	37	33
Peak Hour Factor	0.90	0.94	0.67	0.81	0.84	0.63	0.75	0.75	0.79	0.74	0.77	0.69
Hourly flow rate (vph)	188	385	12	16	212	24	16	24	28	68	48	48

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	188	397	252	68	163
Volume Left (vph)	188	0	16	16	68
Volume Right (vph)	0	12	24	28	48
Hadj (s)	0.53	0.01	-0.01	-0.17	-0.06
Departure Headway (s)	6.1	5.5	5.5	6.1	6.0
Degree Utilization, x	0.32	0.61	0.38	0.11	0.27
Capacity (veh/h)	573	636	628	510	550
Control Delay (s)	10.7	15.7	11.8	9.9	11.1
Approach Delay (s)	14.1		11.8	9.9	11.1
Approach LOS	B		B	A	B

Intersection Summary			
Delay	12.8		
HCM Level of Service	B		
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      6.2       Worst Case Level Of Service: C[ 22.1]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1077     0     0    0   428     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1077     0     0    0   428     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1077     0     0    0   428     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.91  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1184     0     0    0   460     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1184     0     0    0   460     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   395  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   659  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   659  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.70  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   5.7  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  22.1 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     C     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             22.1            xxxxxx
ApproachLOS:         *                *                C                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	383	135	828	396	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1733	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1733	3539	1583	
Peak-hour factor, PHF	0.97	0.83	0.89	0.91	0.58
Adj. Flow (vph)	395	163	930	435	40
RTOR Reduction (vph)	117	48	0	0	0
Lane Group Flow (vph)	159	234	930	475	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	11.8	11.8	40.7	17.7	
Effective Green, g (s)	11.8	11.8	40.7	17.7	
Actuated g/C Ratio	0.20	0.20	0.68	0.30	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	331	341	2401	467	
v/s Ratio Prot			c0.26	c0.30	
v/s Ratio Perm	0.09	0.13			
v/c Ratio	0.48	0.69	0.39	1.02	
Uniform Delay, d1	21.4	22.4	4.2	21.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	4.5	0.5	46.0	
Delay (s)	21.8	26.9	4.7	67.2	
Level of Service	C	C	A	E	
Approach Delay (s)		24.4	25.8		
Approach LOS		C	C		

Intersection Summary			
HCM Average Control Delay	25.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	34	94	82	17	38	13	128	114	12	218	317	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.94			1.00	1.00	0.92		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1483			1770	1863	1450		3433	3502	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1483			1770	1863	1450		3433	3502	
Peak-hour factor, PHF	0.67	0.65	0.88	0.53	0.56	0.65	0.70	0.95	0.60	0.81	0.75	0.79
Adj. Flow (vph)	51	145	93	32	68	20	183	120	20	269	423	28
RTOR Reduction (vph)	0	0	15	0	0	0	0	99	0	0	4	0
Lane Group Flow (vph)	51	145	110	0	0	88	183	21	0	289	447	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	5.6	13.7	13.7			8.0	16.1	16.1		12.8	42.9	
Effective Green, g (s)	5.6	13.7	13.7			8.0	16.1	16.1		12.8	42.9	
Actuated g/C Ratio	0.06	0.15	0.15			0.09	0.18	0.18		0.14	0.48	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	110	539	226			157	333	259		488	1669	
v/s Ratio Prot	0.03	0.04				0.05	c0.10			c0.08	c0.13	
v/s Ratio Perm			c0.07					0.01				
v/c Ratio	0.46	0.27	0.49			0.56	0.55	0.08		0.59	0.27	
Uniform Delay, d1	40.7	33.7	34.9			39.3	33.6	30.8		36.2	14.1	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.3	1.6			4.5	1.9	0.1		1.9	0.4	
Delay (s)	43.8	34.0	36.6			43.8	35.5	30.9		38.1	14.5	
Level of Service	D	C	D			D	D	C		D	B	
Approach Delay (s)		36.6					36.0				23.7	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	82	1035	81	80
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.98		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3460		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3460		
Peak-hour factor, PHF	0.76	0.89	0.84	0.74
Adj. Flow (vph)	108	1163	96	108
RTOR Reduction (vph)	0	6	0	0
Lane Group Flow (vph)	108	1361	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	9.4	39.5		
Effective Green, g (s)	9.4	39.5		
Actuated g/C Ratio	0.10	0.44		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	185	1519		
v/s Ratio Prot	0.06	c0.39		
v/s Ratio Perm				
v/c Ratio	0.58	0.90		
Uniform Delay, d1	38.4	23.4		
Progression Factor	1.00	1.00		
Incremental Delay, d2	4.6	8.6		
Delay (s)	43.1	32.0		
Level of Service	D	C		
Approach Delay (s)		32.8		
Approach LOS		C		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	156	87	28	253	247	47	392	31	80	506	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.91			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4748			3507	1543	1759	3481		1765	3481	
Flt Permitted		0.80			0.85	1.00	0.37	1.00		0.48	1.00	
Satd. Flow (perm)		3844			3003	1543	677	3481		888	3481	
Peak-hour factor, PHF	0.60	0.93	0.92	0.58	0.95	0.85	0.68	0.97	0.86	0.71	0.91	0.60
Adj. Flow (vph)	80	168	95	48	266	291	69	404	36	113	556	60
RTOR Reduction (vph)	0	55	0	0	0	168	0	8	0	0	9	0
Lane Group Flow (vph)	0	288	0	0	314	123	69	432	0	113	607	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio		0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)		1628			1272	654	303	1556		397	1556	
v/s Ratio Prot								0.12			c0.17	
v/s Ratio Perm		0.07			c0.10	0.08	0.10			0.13		
v/c Ratio		0.18			0.25	0.19	0.23	0.28		0.28	0.39	
Uniform Delay, d1		15.3			15.8	15.3	14.5	14.8		14.9	15.7	
Progression Factor		0.78			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.5	0.6	1.7	0.4		1.8	0.7	
Delay (s)		12.1			16.2	16.0	16.2	15.3		16.7	16.5	
Level of Service		B			B	B	B	B		B	B	
Approach Delay (s)		12.1			16.1			15.4			16.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	293	340	125	37	227	91	75	309	19	41	306	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3391		1766	3378		1761	3484		1764	3357	
Flt Permitted	0.45	1.00		0.45	1.00		0.28	1.00		0.44	1.00	
Satd. Flow (perm)	843	3391		845	3378		518	3484		811	3357	
Peak-hour factor, PHF	0.81	0.86	0.92	0.84	0.79	0.88	0.96	0.91	0.68	0.70	0.87	0.76
Adj. Flow (vph)	362	395	136	44	287	103	78	340	28	59	352	149
RTOR Reduction (vph)	0	23	0	0	31	0	0	10	0	0	73	0
Lane Group Flow (vph)	362	508	0	44	359	0	78	358	0	59	428	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	60.2	52.3		47.0	43.6		15.8	15.8		15.8	15.8	
Effective Green, g (s)	60.2	52.3		47.0	43.6		15.8	15.8		15.8	15.8	
Actuated g/C Ratio	0.71	0.62		0.55	0.51		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	729	2086		504	1733		96	648		151	624	
v/s Ratio Prot	c0.07	0.15		0.00	0.11			0.10			0.13	
v/s Ratio Perm	c0.28			0.04			c0.15			0.07		
v/c Ratio	0.50	0.24		0.09	0.21		0.81	0.55		0.39	0.69	
Uniform Delay, d1	4.9	7.4		8.7	11.3		33.2	31.4		30.4	32.3	
Progression Factor	1.00	1.00		0.63	0.71		0.91	0.89		1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.0	0.3		35.8	0.6		0.6	2.5	
Delay (s)	5.1	7.7		5.5	8.3		66.2	28.6		31.0	34.8	
Level of Service	A	A		A	A		E	C		C	C	
Approach Delay (s)		6.6			8.0			35.2			34.4	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	132	751	0	0	127	270	4	229	21	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.92	0.85		0.98				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1520	4802			4407	1362		4977				
Flt Permitted	0.53	0.93			1.00	1.00		1.00				
Satd. Flow (perm)	854	4479			4407	1362		4977				
Peak-hour factor, PHF	0.89	0.89	0.92	0.92	0.86	0.74	0.50	0.88	0.58	0.92	0.92	0.92
Adj. Flow (vph)	148	844	0	0	148	365	8	260	36	0	0	0
RTOR Reduction (vph)	0	0	0	0	110	109	0	22	0	0	0	0
Lane Group Flow (vph)	133	859	0	0	221	73	0	282	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	342	1792			1763	545		1991				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.16	c0.19				0.05		0.06				
v/c Ratio	0.39	0.48			0.13	0.13		0.14				
Uniform Delay, d1	8.5	8.9			7.6	7.6		7.6				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	3.3	0.9			0.1	0.5		0.1				
Delay (s)	11.8	9.8			7.7	8.1		7.8				
Level of Service	B	A			A	A		A				
Approach Delay (s)		10.1			7.9			7.8			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	239	23	9	135	0	0	0	0	626	940	297
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0					4.0	4.0	4.0
Lane Util. Factor		0.91			0.91					0.91	0.91	1.00
Frpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.98			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	0.99	1.00
Satd. Flow (prot)		4984			5060					1610	3368	1583
Flt Permitted		1.00			0.91					0.95	0.99	1.00
Satd. Flow (perm)		4984			4613					1610	3368	1583
Peak-hour factor, PHF	0.92	0.91	0.64	0.56	0.82	0.92	0.92	0.92	0.92	0.88	0.93	0.77
Adj. Flow (vph)	0	263	36	16	165	0	0	0	0	711	1011	386
RTOR Reduction (vph)	0	23	0	0	0	0	0	0	0	0	0	187
Lane Group Flow (vph)	0	276	0	0	181	0	0	0	0	555	1167	199
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type				Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		21.0			21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0			21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35			0.35					0.52	0.52	0.52
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1744			1615					832	1740	818
v/s Ratio Prot		c0.06										
v/s Ratio Perm					0.04					0.34	0.35	0.13
v/c Ratio		0.16			0.11					0.67	0.67	0.24
Uniform Delay, d1		13.4			13.2					10.7	10.7	8.0
Progression Factor		1.00			1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2			0.1					4.2	2.1	0.7
Delay (s)		13.6			13.3					14.9	12.8	8.7
Level of Service		B			B					B	B	A
Approach Delay (s)		13.6			13.3			0.0			12.6	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	166	517	571	114	740	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3411		3432	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3411		3432	1414
Peak-hour factor, PHF	0.91	0.86	0.89	0.70	0.90	0.89
Adj. Flow (vph)	182	601	642	163	822	188
RTOR Reduction (vph)	0	0	25	0	2	119
Lane Group Flow (vph)	182	601	780	0	839	50
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.0	48.4	32.4		23.6	23.6
Effective Green, g (s)	12.0	48.4	32.4		23.6	23.6
Actuated g/C Ratio	0.15	0.60	0.40		0.30	0.30
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	266	2141	1381		1012	417
v/s Ratio Prot	c0.10	0.17	c0.23		c0.24	
v/s Ratio Perm						0.04
v/c Ratio	0.68	0.28	0.56		0.83	0.12
Uniform Delay, d1	32.2	7.5	18.4		26.3	20.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.7	0.3	1.7		5.4	0.0
Delay (s)	37.9	7.8	20.0		31.8	20.7
Level of Service	D	A	C		C	C
Approach Delay (s)		14.8	20.0		29.9	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	786	303	58	368	59	170	223	26	106	314	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92		1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.95		1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1766	3253		1770	3336		1768	3450		1756	3418	
Flt Permitted	0.33	1.00		0.16	1.00		0.44	1.00		0.58	1.00	
Satd. Flow (perm)	610	3253		297	3336		811	3450		1077	3418	
Peak-hour factor, PHF	0.77	0.96	0.85	0.85	0.83	0.72	0.82	0.95	0.65	0.87	0.92	0.77
Adj. Flow (vph)	119	819	356	68	443	82	207	235	40	122	341	84
RTOR Reduction (vph)	0	54	0	0	17	0	0	10	0	0	24	0
Lane Group Flow (vph)	119	1121	0	68	508	0	207	265	0	122	401	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	25.1	25.1		25.1	25.1		49.4	49.4		35.8	35.8	
Effective Green, g (s)	25.1	25.1		25.1	25.1		49.4	49.4		35.8	35.8	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.58	0.58		0.42	0.42	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	180	961		88	985		574	2005		454	1440	
v/s Ratio Prot		c0.34			0.15		c0.04	0.08			0.12	
v/s Ratio Perm	0.20			0.23			c0.17			0.11		
v/c Ratio	0.66	1.17		0.77	0.52		0.36	0.13		0.27	0.28	
Uniform Delay, d1	26.2	30.0		27.3	24.9		8.7	8.1		16.1	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.07	1.09	
Incremental Delay, d2	17.5	86.5		47.5	1.9		0.1	0.1		1.4	0.5	
Delay (s)	43.7	116.5		74.8	26.8		8.8	8.2		18.7	18.1	
Level of Service	D	F		E	C		A	A		B	B	
Approach Delay (s)		109.8			32.3			8.5			18.2	
Approach LOS		F			C			A			B	

Intersection Summary			
HCM Average Control Delay	60.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	681	81	80	414	61	98	372	83	87	342	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99			0.99		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.98			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1750	3340			3323		1763	3539	1531	1760	3435	
Flt Permitted	0.29	1.00			0.59		0.46	1.00	1.00	0.51	1.00	
Satd. Flow (perm)	528	3340			1989		863	3539	1531	937	3435	
Peak-hour factor, PHF	0.71	0.92	0.74	0.83	0.90	0.90	0.63	0.92	0.66	0.55	0.88	0.83
Adj. Flow (vph)	111	740	109	96	460	68	156	404	126	158	389	80
RTOR Reduction (vph)	0	17	0	0	14	0	0	0	48	0	17	0
Lane Group Flow (vph)	111	832	0	0	610	0	156	404	78	158	452	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	27.6	27.6			27.6		44.4	44.4	44.4	44.4	44.4	
Effective Green, g (s)	27.6	27.6			27.6		44.4	44.4	44.4	44.4	44.4	
Actuated g/C Ratio	0.34	0.34			0.34		0.55	0.55	0.55	0.55	0.55	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	182	1152			686		479	1964	850	520	1906	
v/s Ratio Prot		0.25						0.11			0.13	
v/s Ratio Perm	0.21				c0.31		c0.18		0.05	0.17		
v/c Ratio	0.61	0.72			0.89		0.33	0.21	0.09	0.30	0.24	
Uniform Delay, d1	21.7	22.9			24.8		9.7	8.9	8.3	9.5	9.1	
Progression Factor	1.00	1.00			1.12		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.9	1.9			13.1		1.8	0.2	0.2	1.5	0.3	
Delay (s)	25.7	24.8			40.7		11.5	9.2	8.6	11.0	9.4	
Level of Service	C	C			D		B	A	A	B	A	
Approach Delay (s)		24.9			40.7			9.6			9.8	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	356	406	101	375	0	0	0	0	10	128	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.98	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.92		1.00	1.00						0.98	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3055		1770	3427						3360	
Flt Permitted		1.00		0.19	1.00						0.99	
Satd. Flow (perm)		3055		350	3427						3360	
Peak-hour factor, PHF	0.25	0.93	0.92	0.84	0.91	0.25	0.92	0.92	0.92	0.50	0.91	0.63
Adj. Flow (vph)	0	383	441	120	412	0	0	0	0	20	141	25
RTOR Reduction (vph)	0	223	0	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	601	0	120	412	0	0	0	0	0	171	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.8		43.0	43.0						29.0	
Effective Green, g (s)		31.8		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1214		298	1842						1218	
v/s Ratio Prot		c0.20		c0.03	0.12							
v/s Ratio Perm				0.18							0.05	
v/c Ratio		0.50		0.40	0.22						0.14	
Uniform Delay, d1		18.1		11.2	9.7						17.1	
Progression Factor		2.54		1.00	1.00						1.00	
Incremental Delay, d2		1.3		0.3	0.3						0.2	
Delay (s)		47.2		11.5	10.0						17.4	
Level of Service		D		B	B						B	
Approach Delay (s)		47.2			10.3			0.0			17.4	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	128	66	573	465	101	103	701	292	28	787	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	1.00	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	1863	1479	3433	3539	1485		5042	1419		4954	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.66	1.00		0.79	
Satd. Flow (perm)	3433	1863	1479	3433	3539	1485		3333	1419		3947	
Peak-hour factor, PHF	0.74	0.81	0.65	0.89	0.80	0.52	0.83	0.88	0.82	0.50	0.93	0.79
Adj. Flow (vph)	74	158	102	644	581	194	124	797	356	56	846	116
RTOR Reduction (vph)	0	0	18	0	0	108	0	0	228	0	16	0
Lane Group Flow (vph)	74	158	84	644	581	86	0	921	128	0	1002	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	5.6	33.0	33.0	16.0	44.4	44.4		36.0	36.0		36.0	
Effective Green, g (s)	5.6	33.0	33.0	16.0	44.4	44.4		36.0	36.0		36.0	
Actuated g/C Ratio	0.06	0.33	0.33	0.16	0.44	0.44		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	192	615	488	549	1571	659		1200	511		1421	
v/s Ratio Prot	0.02	0.08		c0.19	c0.16							
v/s Ratio Perm			0.06			0.06		c0.28	0.09		0.25	
v/c Ratio	0.39	0.26	0.17	1.17	0.37	0.13		1.02dl	0.25		0.71	
Uniform Delay, d1	45.5	24.5	23.8	42.0	18.5	16.4		28.3	22.5		27.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.5	1.0	0.8	95.9	0.7	0.4		4.7	1.2		3.0	
Delay (s)	46.0	25.5	24.6	137.9	19.2	16.8		33.0	23.7		30.4	
Level of Service	D	C	C	F	B	B		C	C		C	
Approach Delay (s)		29.8			72.7			30.4			30.4	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	112	37	94	816	976	649
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.96		1.00	1.00	0.94	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	3303		1768	3725	6019	
Flt Permitted	0.96		0.10	1.00	1.00	
Satd. Flow (perm)	3303		178	3725	6019	
Peak-hour factor, PHF	0.83	0.89	0.84	0.96	0.93	0.91
Adj. Flow (vph)	135	42	112	850	1049	713
RTOR Reduction (vph)	37	0	0	0	77	0
Lane Group Flow (vph)	140	0	112	850	1685	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	8.7		57.8	51.7	51.7	
Effective Green, g (s)	8.7		57.8	51.7	51.7	
Actuated g/C Ratio	0.11		0.72	0.65	0.65	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	359		250	2407	3890	
v/s Ratio Prot	c0.04		c0.03	0.23	0.28	
v/s Ratio Perm			c0.29			
v/c Ratio	0.39		0.45	0.35	0.43	
Uniform Delay, d1	33.2		3.9	6.5	7.0	
Progression Factor	1.00		1.63	1.15	1.00	
Incremental Delay, d2	0.7		1.3	0.4	0.4	
Delay (s)	33.9		7.7	7.9	7.3	
Level of Service	C		A	A	A	
Approach Delay (s)	33.9			7.9	7.3	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	136	29	111	629	1	13
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.66	0.82	0.83	0.25	0.25
Hourly flow rate (vph)	162	44	135	758	4	52
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			208		1221	193
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			208		1221	193
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		98	94
cM capacity (veh/h)			1361		177	842

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	206	893	56
Volume Left	0	135	4
Volume Right	44	0	52
cSH	1700	1361	664
Volume to Capacity	0.12	0.10	0.08
Queue Length 95th (ft)	0	8	7
Control Delay (s)	0.0	2.4	10.9
Lane LOS		A	B
Approach Delay (s)	0.0	2.4	10.9
Approach LOS			B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	130	253	398	232	2	34
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.83	0.88	0.76	0.50	0.50
Hourly flow rate (vph)	173	305	452	305	4	68
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			480		1562	352
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			480		1562	352
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			58		94	90
cM capacity (veh/h)			1080		70	677

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	478	758	72
Volume Left	0	452	4
Volume Right	305	0	68
cSH	1700	1080	457
Volume to Capacity	0.28	0.42	0.16
Queue Length 95th (ft)	0	53	14
Control Delay (s)	0.0	8.6	14.3
Lane LOS		A	B
Approach Delay (s)	0.0	8.6	14.3
Approach LOS			B

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	228	149	130	319	33	42
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	1.00	0.73	0.85	0.86	0.75
Hourly flow rate (vph)	268	149	178	375	38	56
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.85		0.85	0.85
vC, conflicting volume			419		1092	361
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		1018	154
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			84		79	92
cM capacity (veh/h)			1137		185	743

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	417	553	19	19	28	28
Volume Left	0	178	19	19	0	0
Volume Right	149	0	0	0	28	28
cSH	1700	1137	185	185	743	743
Volume to Capacity	0.25	0.16	0.10	0.10	0.04	0.04
Queue Length 95th (ft)	0	14	9	9	3	3
Control Delay (s)	0.0	4.0	26.7	26.7	10.0	10.0
Lane LOS		A	D	D	B	B
Approach Delay (s)	0.0	4.0	16.8			
Approach LOS			C			

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	317	54	40	50	0	0	0	0	255	334	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.96						0.95	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1342		1755						4684	
Flt Permitted		1.00	1.00		0.58						0.98	
Satd. Flow (perm)		1863	1342		1044						4684	
Peak-hour factor, PHF	0.92	0.87	0.80	0.77	0.85	0.92	0.92	0.92	0.92	0.91	0.90	0.75
Adj. Flow (vph)	0	364	68	52	59	0	0	0	0	280	371	32
RTOR Reduction (vph)	0	0	48	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	364	20	0	111	0	0	0	0	0	680	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		22.8	22.8		22.8						49.2	
Effective Green, g (s)		22.8	22.8		22.8						49.2	
Actuated g/C Ratio		0.29	0.29		0.29						0.62	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		531	382		298						2881	
v/s Ratio Prot		c0.20										
v/s Ratio Perm			0.01		0.11						0.15	
v/c Ratio		0.69	0.05		0.37						0.24	
Uniform Delay, d1		25.4	20.8		22.9						6.9	
Progression Factor		1.00	1.00		1.00						0.68	
Incremental Delay, d2		3.7	0.1		0.8						0.2	
Delay (s)		29.1	20.8		23.7						4.9	
Level of Service		C	C		C						A	
Approach Delay (s)		27.8			23.7			0.0			4.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	227	3	0	37	34	8	177	157	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		0.99			0.94			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1837			1647			3504	1377			
Flt Permitted		0.99			1.00			1.00	1.00			
Satd. Flow (perm)		1826			1647			3504	1377			
Peak-hour factor, PHF	0.50	0.89	0.25	0.92	0.75	0.81	0.50	0.77	0.86	0.92	0.92	0.92
Adj. Flow (vph)	12	255	12	0	49	42	16	230	183	0	0	0
RTOR Reduction (vph)	0	2	0	0	15	0	0	0	152	0	0	0
Lane Group Flow (vph)	0	277	0	0	76	0	0	246	31	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		29.4			29.4			7.6	7.6			
Effective Green, g (s)		29.4			29.4			7.6	7.6			
Actuated g/C Ratio		0.65			0.65			0.17	0.17			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1193			1076			592	233			
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.15						0.07	0.02			
v/c Ratio		0.23			0.07			0.42	0.13			
Uniform Delay, d1		3.2			2.8			16.7	15.9			
Progression Factor		0.43			1.00			1.00	1.00			
Incremental Delay, d2		0.4			0.1			0.2	0.1			
Delay (s)		1.8			3.0			16.9	16.0			
Level of Service		A			A			B	B			
Approach Delay (s)		1.8			3.0			16.5			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	113	14	21	0	30	0	269	31	94	290	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			0.99	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1751	1825			1651			3449			3463	
Flt Permitted	0.71	1.00			0.89			1.00			0.77	
Satd. Flow (perm)	1317	1825			1497			3449			2710	
Peak-hour factor, PHF	0.56	0.92	0.88	0.79	0.92	0.78	0.92	0.85	0.78	0.85	0.89	0.92
Adj. Flow (vph)	16	123	16	27	0	38	0	316	40	111	326	0
RTOR Reduction (vph)	0	9	0	0	22	0	0	22	0	0	0	0
Lane Group Flow (vph)	16	130	0	0	43	0	0	334	0	0	437	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	556	771			632			1303			1024	
v/s Ratio Prot		c0.07						0.10				
v/s Ratio Perm	0.01				0.03						c0.16	
v/c Ratio	0.03	0.17			0.07			0.26			0.43	
Uniform Delay, d1	7.6	8.1			7.7			9.6			10.4	
Progression Factor	1.00	1.00			1.38			1.00			1.00	
Incremental Delay, d2	0.1	0.5			0.2			0.5			1.3	
Delay (s)	7.7	8.6			10.9			10.1			11.7	
Level of Service	A	A			B			B			B	
Approach Delay (s)		8.5			10.9			10.1			11.7	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	86	16	10	161	86	27	369	42	132	131	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.94			0.98		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3431			3287			3455		1768	3385	
Flt Permitted		0.88			0.94			0.91		0.42	1.00	
Satd. Flow (perm)		3029			3092			3162		779	3385	
Peak-hour factor, PHF	0.75	0.78	0.80	0.83	0.94	0.74	0.61	0.98	0.79	0.91	0.76	0.78
Adj. Flow (vph)	20	110	20	12	171	116	44	377	53	145	172	60
RTOR Reduction (vph)	0	17	0	0	98	0	0	12	0	0	18	0
Lane Group Flow (vph)	0	133	0	0	201	0	0	462	0	145	214	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.2			9.2			31.2		41.8	41.8	
Effective Green, g (s)		9.2			9.2			31.2		41.8	41.8	
Actuated g/C Ratio		0.15			0.15			0.52		0.70	0.70	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		464			474			1644		643	2358	
v/s Ratio Prot										c0.02	0.06	
v/s Ratio Perm		0.04			c0.06			c0.15		0.13		
v/c Ratio		0.29			0.42			0.28		0.23	0.09	
Uniform Delay, d1		22.5			23.0			8.1		3.2	2.9	
Progression Factor		1.00			0.99			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.6			0.4		0.2	0.1	
Delay (s)		22.8			23.4			8.5		3.4	3.0	
Level of Service		C			C			A		A	A	
Approach Delay (s)		22.8			23.4			8.5			3.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	179	52	41	138	97	51	414	76	57	352	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.97			0.95			0.98			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		3355			3152			3386			4966	
Flt Permitted		0.95			0.87			0.88			0.79	
Satd. Flow (perm)		3179			2750			2990			3972	
Peak-hour factor, PHF	0.88	0.81	0.76	0.79	0.90	0.87	0.91	0.93	0.91	0.78	0.89	0.79
Adj. Flow (vph)	8	221	68	52	153	111	56	445	84	73	396	28
RTOR Reduction (vph)	0	43	0	0	70	0	0	23	0	0	11	0
Lane Group Flow (vph)	0	254	0	0	246	0	0	562	0	0	486	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1166			1008			1491			1192	
v/s Ratio Prot								c0.04				
v/s Ratio Perm		0.08			c0.09			c0.14			0.12	
v/c Ratio		0.22			0.24			0.38			0.41	
Uniform Delay, d1		13.1			13.2			9.8			16.7	
Progression Factor		0.88			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.6			0.7			1.0	
Delay (s)		11.9			13.8			10.5			17.8	
Level of Service		B			B			B			B	
Approach Delay (s)		11.9			13.8			10.5			17.8	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	296	0	0	212	80	29	248	95	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3518			3362	1337		5028	1460			
Flt Permitted		0.93			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3280			3362	1337		5028	1460			
Peak-hour factor, PHF	0.96	0.91	0.92	0.92	0.92	0.91	0.72	0.74	0.91	0.92	0.92	0.92
Adj. Flow (vph)	24	325	0	0	230	88	40	335	104	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	18	0	0	89	0	0	0
Lane Group Flow (vph)	0	349	0	0	238	61	0	375	15	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		61.4			61.4	61.4		11.6	11.6			
Effective Green, g (s)		61.4			61.4	61.4		11.6	11.6			
Actuated g/C Ratio		0.77			0.77	0.77		0.14	0.14			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2517			2580	1026		729	212			
v/s Ratio Prot					0.07							
v/s Ratio Perm		c0.11				0.05		0.07	0.01			
v/c Ratio		0.14			0.09	0.06		0.51	0.07			
Uniform Delay, d1		2.4			2.3	2.3		31.6	29.5			
Progression Factor		1.00			1.06	2.11		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.6	0.1			
Delay (s)		2.5			2.5	4.9		32.2	29.7			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.5			3.1			31.7			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	257	138	163	221	0	0	0	0	54	295	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.94	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	0.99						0.99	
Satd. Flow (prot)		3539	1422	1610	3339						4429	
Flt Permitted		1.00	1.00	0.95	0.91						0.99	
Satd. Flow (perm)		3539	1422	1610	3067						4429	
Peak-hour factor, PHF	0.92	0.83	0.95	0.91	0.88	0.25	0.92	0.92	0.92	0.84	0.91	0.78
Adj. Flow (vph)	0	310	145	179	251	0	0	0	0	64	324	92
RTOR Reduction (vph)	0	0	107	0	0	0	0	0	0	0	49	0
Lane Group Flow (vph)	0	310	38	140	290	0	0	0	0	0	431	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1626						1716	
v/s Ratio Prot		c0.09		c0.09	0.04							
v/s Ratio Perm			0.03		0.06						0.10	
v/c Ratio		0.33	0.10	0.43	0.18						0.25	
Uniform Delay, d1		23.8	22.4	28.0	10.5						16.6	
Progression Factor		1.06	1.74	1.19	1.36						1.12	
Incremental Delay, d2		1.0	0.5	0.3	0.0						0.0	
Delay (s)		26.3	39.5	33.7	14.3						18.7	
Level of Service		C	D	C	B						B	
Approach Delay (s)		30.5			20.6			0.0			18.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBT	NBR	SBT
Lane Configurations												
Volume (vph)	96	89	31	122	11	111	42	50	67	249	15	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	0.95				0.95		0.91
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Frt	1.00	1.00	0.89		1.00	0.96				0.99		0.99
Flt Protected	0.95	0.95	1.00		0.95	1.00				0.98		1.00
Satd. Flow (prot)	1770	3221	1500		1770	3393				3460		3351
Flt Permitted	0.95	0.95	1.00		0.95	1.00				0.98		1.00
Satd. Flow (perm)	1770	3221	1500		1770	3393				3460		3351
Peak-hour factor, PHF	0.92	0.79	0.82	0.83	0.69	0.84	0.84	0.94	0.94	0.96	0.75	0.85
Adj. Flow (vph)	104	113	38	147	16	132	50	53	71	259	20	384
RTOR Reduction (vph)	0	0	113	0	0	0	0	0	0	5	0	0
Lane Group Flow (vph)	104	102	83	0	16	182	0	0	0	398	0	416
Confl. Peds. (#/hr)	16											
Confl. Bikes (#/hr)			2							6		
Turn Type	Prot	custom			Split			Split	Split			
Protected Phases	5	1	1		7	7		8	8	8		2
Permitted Phases		1										
Actuated Green, G (s)	7.8	18.7	18.7		7.5	7.5				12.5		16.8
Effective Green, g (s)	7.8	18.7	18.7		7.5	7.5				12.5		16.8
Actuated g/C Ratio	0.10	0.23	0.23		0.09	0.09				0.16		0.21
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0				2.0		2.0
Lane Grp Cap (vph)	173	753	351		166	318				541		704
v/s Ratio Prot	c0.06	0.03	0.06		0.01	c0.05				c0.12		c0.12
v/s Ratio Perm												
v/c Ratio	0.60	0.14	0.24		0.10	0.57				0.74		0.59
Uniform Delay, d1	34.6	24.3	24.9		33.2	34.7				32.2		28.5
Progression Factor	1.31	1.64	3.28		1.12	1.18				1.00		0.78
Incremental Delay, d2	3.9	0.4	1.5		0.1	1.5				4.5		0.9
Delay (s)	49.1	40.1	83.2		37.3	42.4				36.6		23.2
Level of Service	D	D	F		D	D				D		C
Approach Delay (s)			63.4			42.0				36.6		20.6
Approach LOS			E			D				D		C

Intersection Summary			
HCM Average Control Delay	37.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	24.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR	SBR2	SEL	SER	SER2
Lane Configurations					
Volume (vph)	202	23	20	19	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0
Lane Util. Factor	0.91	1.00	1.00		0.95
Frpb, ped/bikes	1.00	1.00	0.90		0.94
Flpb, ped/bikes	1.00	1.00	1.00		1.00
Frt	0.85	0.85	0.92		0.85
Flt Protected	1.00	1.00	0.98		1.00
Satd. Flow (prot)	1441	1583	1515		1416
Flt Permitted	1.00	1.00	0.98		1.00
Satd. Flow (perm)	1441	1583	1515		1416
Peak-hour factor, PHF	0.96	0.96	0.92	0.92	0.92
Adj. Flow (vph)	210	24	22	21	27
RTOR Reduction (vph)	0	16	3	0	19
Lane Group Flow (vph)	178	8	43	0	5
Confl. Peds. (#/hr)		102	32		32
Confl. Bikes (#/hr)		10			2
Turn Type	custom	custom			custom
Protected Phases	6	6	9		
Permitted Phases	6				2
Actuated Green, G (s)	27.7	27.7	4.5		16.8
Effective Green, g (s)	27.7	27.7	4.5		16.8
Actuated g/C Ratio	0.35	0.35	0.06		0.21
Clearance Time (s)	4.0	4.0	4.0		4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0
Lane Grp Cap (vph)	499	548	85		297
v/s Ratio Prot	c0.12	0.01	c0.03		
v/s Ratio Perm					0.00
v/c Ratio	0.36	0.02	0.51		0.02
Uniform Delay, d1	19.5	17.2	36.7		25.1
Progression Factor	0.72	0.54	1.00		1.00
Incremental Delay, d2	2.0	0.1	1.7		0.0
Delay (s)	16.1	9.4	38.4		25.1
Level of Service	B	A	D		C
Approach Delay (s)			33.8		
Approach LOS			C		

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	339	0	0	669	385	548
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0	4.0	4.0
Lane Util. Factor	0.94			0.91	0.95	0.76
Frpb, ped/bikes	1.00			1.00	1.00	0.97
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	4990			5085	3539	3510
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	4990			5085	3539	3510
Peak-hour factor, PHF	0.90	0.92	0.92	0.97	0.96	0.90
Adj. Flow (vph)	377	0	0	690	401	609
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	377	0	0	690	401	609
Confl. Peds. (#/hr)						14
Confl. Bikes (#/hr)						2
Turn Type						Free
Protected Phases	1			2	2	
Permitted Phases						Free
Actuated Green, G (s)	11.5			59.5	59.5	80.0
Effective Green, g (s)	11.5			59.5	59.5	80.0
Actuated g/C Ratio	0.14			0.74	0.74	1.00
Clearance Time (s)	5.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	717			3782	2632	3510
v/s Ratio Prot	c0.08			0.14	0.11	
v/s Ratio Perm						c0.17
v/c Ratio	0.53			0.18	0.15	0.17
Uniform Delay, d1	31.7			3.0	3.0	0.0
Progression Factor	1.25			1.00	1.26	1.00
Incremental Delay, d2	0.6			0.1	0.1	0.1
Delay (s)	40.2			3.1	3.8	0.1
Level of Service	D			A	A	A
Approach Delay (s)	40.2			3.1	1.6	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Volume (vph)	165	669	385	0	0	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	0.94	0.95	0.95			0.88
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	4990	3539	3539			2787
Flt Permitted	0.94	1.00	1.00			1.00
Satd. Flow (perm)	4938	3539	3539			2787
Peak-hour factor, PHF	0.85	0.94	0.82	0.92	0.92	0.88
Adj. Flow (vph)	194	712	470	0	0	68
RTOR Reduction (vph)	0	0	0	0	0	19
Lane Group Flow (vph)	194	712	470	0	0	49
Confl. Bikes (#/hr)				8		4
Turn Type	Perm					custom
Protected Phases		2	1			2
Permitted Phases	2	1				2
Actuated Green, G (s)	57.3	74.0	16.7			57.3
Effective Green, g (s)	57.3	74.0	16.7			57.3
Actuated g/C Ratio	0.72	0.92	0.21			0.72
Clearance Time (s)	3.0	3.0	3.0			3.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	3537	3539	739			1996
v/s Ratio Prot		c0.14	c0.13			0.02
v/s Ratio Perm	0.04	0.06				
v/c Ratio	0.05	0.20	0.64			0.02
Uniform Delay, d1	3.4	0.3	28.9			3.3
Progression Factor	1.00	1.00	1.10			1.00
Incremental Delay, d2	0.0	0.0	1.8			0.0
Delay (s)	3.4	0.3	33.5			3.3
Level of Service	A	A	C			A
Approach Delay (s)		1.0	33.5		3.3	
Approach LOS		A	C		A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	113	0	0	0	0	0	2317	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6398	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6398	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.83	0.92	0.92	0.92	0.92	0.92	0.96	0.45
Adj. Flow (vph)	0	0	0	88	136	0	0	0	0	0	2414	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	136	0	0	0	0	0	2434	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4845	
v/s Ratio Prot					0.04						c0.38	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.31						0.50	
Uniform Delay, d1				30.4	30.0						3.6	
Progression Factor				1.00	1.00						0.92	
Incremental Delay, d2				5.5	1.9						0.1	
Delay (s)				35.9	31.9						3.4	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.5			0.0			3.4	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1178	410	65	377	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4920		3372	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4920		3372	
Peak-hour factor, PHF	0.86	0.96	0.95	0.74	0.94	0.86
Adj. Flow (vph)	255	1227	432	88	401	97
RTOR Reduction (vph)	81	0	37	0	0	0
Lane Group Flow (vph)	174	1227	483	0	498	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	35.5	35.5	12.9		14.6	
Effective Green, g (s)	35.5	35.5	12.9		14.6	
Actuated g/C Ratio	0.47	0.47	0.17		0.19	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	838	2407	846		656	
v/s Ratio Prot		c0.24	c0.10		c0.15	
v/s Ratio Perm	0.10					
v/c Ratio	0.21	0.51	0.57		0.76	
Uniform Delay, d1	11.5	13.7	28.5		28.5	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.6	0.8	0.9		5.0	
Delay (s)	12.1	14.5	29.4		33.6	
Level of Service	B	B	C		C	
Approach Delay (s)		14.1	29.4		33.6	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	130	200	272	273	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3147	1423	1425	5920				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3147	1423	1425	5920				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.89	0.87	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	138	225	313	297	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	41	43	124	125	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	207	72	32	329	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.8	37.8	12.2	12.2				
Effective Green, g (s)					37.8	37.8	12.2	12.2				
Actuated g/C Ratio					0.63	0.63	0.20	0.20				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1983	896	290	1204				
v/s Ratio Prot					c0.07							
v/s Ratio Perm						0.05	0.02	0.06				
v/c Ratio					0.10	0.08	0.11	0.27				
Uniform Delay, d1					4.4	4.3	19.5	20.2				
Progression Factor					4.34	7.68	1.00	1.00				
Incremental Delay, d2					0.1	0.1	0.2	0.1				
Delay (s)					19.2	33.4	19.6	20.3				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			23.7			20.1			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	153	31	0	0	0	0	0	0	954	1071	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		0.99								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3401								1522	4717	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3401								1522	4717	
Peak-hour factor, PHF	0.92	0.93	0.65	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.90	0.75
Adj. Flow (vph)	0	165	48	0	0	0	0	0	0	1109	1190	40
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	337	67	0
Lane Group Flow (vph)	0	202	0	0	0	0	0	0	0	240	1696	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1757								634	1965	
v/s Ratio Prot		c0.06										
v/s Ratio Perm										0.16	0.36	
v/c Ratio		0.11								0.38	0.86	
Uniform Delay, d1		14.9								24.2	31.9	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.1								1.7	5.3	
Delay (s)		15.0								26.0	37.2	
Level of Service		B								C	D	
Approach Delay (s)		15.0			0.0			0.0			34.4	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	261	0	0	547	480	116	535	23	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3513			3539	1548		3490	1531			
Flt Permitted		0.83			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2945			3539	1548		3490	1531			
Peak-hour factor, PHF	0.85	0.89	0.92	0.96	0.88	0.96	0.85	0.96	0.72	0.92	0.92	0.92
Adj. Flow (vph)	40	293	0	0	622	500	136	557	32	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	172	0	0	15	0	0	0
Lane Group Flow (vph)	0	333	0	0	622	328	0	693	17	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		884			1062	464		1861	817			
v/s Ratio Prot					0.18							
v/s Ratio Perm		0.11				c0.21		0.20	0.01			
v/c Ratio		0.38			0.59	0.71		0.37	0.02			
Uniform Delay, d1		16.6			17.8	18.7		8.2	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.2			2.4	8.8		0.6	0.0			
Delay (s)		17.8			20.2	27.4		8.7	6.7			
Level of Service		B			C	C		A	A			
Approach Delay (s)		17.8			23.4			8.6			0.0	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	233	39	21	621	0	0	0	0	50	320	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3435			3529					1746	3497	
Flt Permitted		1.00			0.93					0.95	1.00	
Satd. Flow (perm)		3435			3292					1746	3497	
Peak-hour factor, PHF	0.92	0.75	0.70	0.66	0.96	0.92	0.92	0.92	0.92	0.74	0.96	0.71
Adj. Flow (vph)	0	311	56	32	647	0	0	0	0	68	333	24
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	335	0	0	679	0	0	0	0	68	345	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1450			1390					737	1477	
v/s Ratio Prot		0.10									c0.10	
v/s Ratio Perm					c0.21					0.04		
v/c Ratio		0.23			0.49					0.09	0.23	
Uniform Delay, d1		8.3			9.5					7.8	8.3	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.4			1.2					0.2	0.4	
Delay (s)		8.7			10.7					8.1	8.7	
Level of Service		A			B					A	A	
Approach Delay (s)		8.7			10.7			0.0			8.6	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	141	10	7	340	84	56	375	23	25	63	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3424			3364			3443			3358	
Flt Permitted		0.85			0.95			0.89			0.80	
Satd. Flow (perm)		2922			3202			3083			2725	
Peak-hour factor, PHF	0.79	0.80	0.36	0.88	0.91	0.75	0.74	0.90	0.52	0.63	0.72	0.86
Adj. Flow (vph)	48	176	28	8	374	112	76	417	44	40	88	28
RTOR Reduction (vph)	0	14	0	0	52	0	0	17	0	0	19	0
Lane Group Flow (vph)	0	238	0	0	442	0	0	520	0	0	137	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.2			23.2			14.3			14.3	
Effective Green, g (s)		23.2			23.2			14.3			14.3	
Actuated g/C Ratio		0.52			0.52			0.32			0.32	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1506			1651			980			866	
v/s Ratio Prot												
v/s Ratio Perm		0.08			c0.14			c0.17			0.05	
v/c Ratio		0.16			0.27			0.53			0.16	
Uniform Delay, d1		5.7			6.1			12.6			11.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.4			0.6			0.1	
Delay (s)		6.0			6.5			13.2			11.1	
Level of Service		A			A			B			B	
Approach Delay (s)		6.0			6.5			13.2			11.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	353	1277	0	0	0	0	0	328	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6290						4899	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6290						4899	
Peak-hour factor, PHF	0.92	0.92	0.92	0.91	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.81
Adj. Flow (vph)	0	0	0	388	1316	0	0	0	0	0	335	80
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	0	0	0	1616	0	0	0	0	0	407	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2164	
v/s Ratio Prot											c0.08	
v/s Ratio Perm					0.26							
v/c Ratio					0.59						0.19	
Uniform Delay, d1					13.0						10.2	
Progression Factor					0.48						1.00	
Incremental Delay, d2					0.8						0.2	
Delay (s)					7.0						10.4	
Level of Service					A						B	
Approach Delay (s)		0.0			7.0			0.0			10.4	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1431	66	275	698	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6338			6170				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6338			6170				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.87	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1475	76	296	759	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	12	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1539	0	0	1047	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3158			2118				
v/s Ratio Prot					c0.24							
v/s Ratio Perm								0.17				
v/c Ratio					0.49			0.49				
Uniform Delay, d1					10.0			15.6				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.5			0.8				
Delay (s)					10.5			16.4				
Level of Service					B			B				
Approach Delay (s)		0.0			10.5			16.4			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	56	0	0	937	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	64	0	0	946	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	249	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	249	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	100	100			
cM capacity (veh/h)	711	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	64	237	237	237	237
Volume Left	64	0	0	0	0
Volume Right	0	0	0	0	0
cSH	711	1700	1700	1700	1700
Volume to Capacity	0.09	0.14	0.14	0.14	0.14
Queue Length 95th (ft)	7	0	0	0	0
Control Delay (s)	10.6	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.6	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	338	121	0	0	0	0	0	0	22	668	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6067									5067	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6067									5067	
Peak-hour factor, PHF	0.92	0.86	0.84	0.92	0.92	0.92	0.92	0.92	0.92	0.55	0.95	0.92
Adj. Flow (vph)	0	393	144	0	0	0	0	0	0	40	703	0
RTOR Reduction (vph)	0	71	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	466	0	0	0	0	0	0	0	0	733	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2326									2196	
v/s Ratio Prot		c0.08										
v/s Ratio Perm											0.14	
v/c Ratio		0.20									0.33	
Uniform Delay, d1		12.4									11.3	
Progression Factor		0.77									1.19	
Incremental Delay, d2		0.2									0.4	
Delay (s)		9.7									13.8	
Level of Service		A									B	
Approach Delay (s)		9.7			0.0			0.0			13.8	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	342	0	0	0	0	0	362	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6253						6281				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6253						6281				
Peak-hour factor, PHF	0.79	0.93	0.92	0.92	0.92	0.92	0.92	0.74	0.83	0.92	0.92	0.92
Adj. Flow (vph)	135	368	0	0	0	0	0	489	60	0	0	0
RTOR Reduction (vph)	0	116	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	387	0	0	0	0	0	534	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		8.4						44.6				
Effective Green, g (s)		8.4						44.6				
Actuated g/C Ratio		0.14						0.74				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		875						4669				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.06										
v/c Ratio		0.44						0.11				
Uniform Delay, d1		23.7						2.2				
Progression Factor		1.02						1.00				
Incremental Delay, d2		0.1						0.0				
Delay (s)		24.2						2.2				
Level of Service		C						A				
Approach Delay (s)		24.2			0.0			2.2			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	115	490	0	0	0	0	0	979	247	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.97				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6329						4883				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6329						4883				
Peak-hour factor, PHF	0.93	0.91	0.92	0.92	0.92	0.92	0.92	0.85	0.71	0.92	0.92	0.92
Adj. Flow (vph)	124	538	0	0	0	0	0	1152	348	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	97	0	0	0	0
Lane Group Flow (vph)	0	650	0	0	0	0	0	1403	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2532						1953				
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.10										
v/c Ratio		0.26						0.72				
Uniform Delay, d1		9.0						11.4				
Progression Factor		0.82						0.73				
Incremental Delay, d2		0.2						1.9				
Delay (s)		7.6						10.3				
Level of Service		A						B				
Approach Delay (s)		7.6			0.0			10.3			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	470	241	0	0	0	0	0	0	131	530	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6034									5024	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6034									5024	
Peak-hour factor, PHF	0.92	0.92	0.86	0.92	0.92	0.92	0.92	0.92	0.92	0.89	0.98	0.92
Adj. Flow (vph)	0	511	280	0	0	0	0	0	0	147	541	0
RTOR Reduction (vph)	0	125	0	0	0	0	0	0	0	0	82	0
Lane Group Flow (vph)	0	666	0	0	0	0	0	0	0	0	606	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2414									2233	
v/s Ratio Prot		c0.11										
v/s Ratio Perm											0.12	
v/c Ratio		0.28									0.27	
Uniform Delay, d1		9.1									7.9	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.3									0.3	
Delay (s)		9.4									8.2	
Level of Service		A									A	
Approach Delay (s)		9.4			0.0			0.0			8.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	20	297	45	192	240	0	0	142	1512
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1820			1863	1558
Flt Permitted				0.95	1.00	1.00		0.77			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1435			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.71	0.96	0.87	0.84	0.87	0.92	0.92	0.81	0.95
Adj. Flow (vph)	0	0	0	28	309	52	229	276	0	0	175	1592
RTOR Reduction (vph)	0	0	0	0	0	39	0	0	0	0	0	117
Lane Group Flow (vph)	0	0	0	28	309	13	0	505	0	0	175	1475
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				11.6	11.6	11.6		22.4			22.4	22.4
Effective Green, g (s)				11.6	11.6	11.6		22.4			22.4	22.4
Actuated g/C Ratio				0.26	0.26	0.26		0.50			0.50	0.50
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				448	480	387		714			927	776
v/s Ratio Prot					c0.17						0.09	
v/s Ratio Perm				0.02		0.01		0.35				c0.95
v/c Ratio				0.06	0.64	0.03		0.71			0.19	1.90
Uniform Delay, d1				12.6	14.9	12.5		8.8			6.3	11.3
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.1	3.0	0.0		5.8			0.5	410.2
Delay (s)				12.7	17.8	12.5		14.6			6.7	421.5
Level of Service				B	B	B		B			A	F
Approach Delay (s)		0.0			16.7			14.6			380.4	
Approach LOS		A			B			B			F	

Intersection Summary			
HCM Average Control Delay	257.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	146.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	123	429	120	49	778
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3491		3197	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3491		3197	1441
Peak-hour factor, PHF	0.92	0.75	0.96	0.77	0.86	0.89
Adj. Flow (vph)	0	164	447	156	57	874
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	611	0	650	437
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1265		1151	519
v/s Ratio Prot						
v/s Ratio Perm			0.18		0.20	c0.30
v/c Ratio			0.48		0.56	0.84
Uniform Delay, d1			11.1		11.6	13.2
Progression Factor			0.81		1.00	1.00
Incremental Delay, d2			0.6		2.0	15.2
Delay (s)			9.6		13.6	28.4
Level of Service			A		B	C
Approach Delay (s)			9.6		19.6	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	303	558	152	0	0	0	0	230	68	3	117	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4848						1795			1858	
Flt Permitted		0.99						1.00			0.98	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.89	0.81	0.92	0.92	0.92	0.92	0.82	0.74	0.38	0.77	0.92
Adj. Flow (vph)	319	627	188	0	0	0	0	280	92	8	152	0
RTOR Reduction (vph)	0	67	0	0	0	0	0	26	0	0	0	0
Lane Group Flow (vph)	0	1068	0	0	0	0	0	346	0	0	160	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						618			551	
v/s Ratio Prot								c0.19				
v/s Ratio Perm		c0.58									0.10	
v/c Ratio		1.15						0.56			0.29	
Uniform Delay, d1		11.2						12.0			10.7	
Progression Factor		1.00						1.00			0.97	
Incremental Delay, d2		81.7						3.6			1.1	
Delay (s)		92.9						15.6			11.6	
Level of Service		F						B			B	
Approach Delay (s)		92.9			0.0			15.6			11.6	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	67.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	46.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	443	302	461	294	155	1028
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3340		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3340		1770	3539
Peak-hour factor, PHF	0.89	0.92	0.83	0.88	0.90	0.85
Adj. Flow (vph)	498	328	555	334	172	1209
RTOR Reduction (vph)	0	233	95	0	0	0
Lane Group Flow (vph)	498	95	794	0	172	1209
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	26.0	26.0	38.7		13.3	56.0
Effective Green, g (s)	26.0	26.0	38.7		13.3	56.0
Actuated g/C Ratio	0.29	0.29	0.43		0.15	0.62
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	511	457	1436		262	2202
v/s Ratio Prot	c0.28		0.24		c0.10	c0.34
v/s Ratio Perm		0.06				
v/c Ratio	0.97	0.21	0.55		0.66	0.55
Uniform Delay, d1	31.7	24.2	19.2		36.2	9.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	33.0	0.2	1.5		12.2	1.0
Delay (s)	64.7	24.4	20.7		48.4	10.7
Level of Service	E	C	C		D	B
Approach Delay (s)	48.7		20.7			15.4
Approach LOS	D		C			B

Intersection Summary			
HCM Average Control Delay	25.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	471	447	572	262	182	261
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3370		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3370		1770	1583
Peak-hour factor, PHF	0.94	0.92	0.91	0.89	0.85	0.92
Adj. Flow (vph)	501	486	629	294	214	284
RTOR Reduction (vph)	0	0	79	0	0	219
Lane Group Flow (vph)	501	486	844	0	214	65
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.1	33.2	15.1		12.3	12.3
Effective Green, g (s)	14.1	33.2	15.1		12.3	12.3
Actuated g/C Ratio	0.26	0.62	0.28		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	466	2196	951		407	364
v/s Ratio Prot	c0.28	0.14	c0.25		c0.12	
v/s Ratio Perm						0.04
v/c Ratio	1.08	0.22	0.89		0.53	0.18
Uniform Delay, d1	19.7	4.5	18.4		18.0	16.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	63.3	0.1	10.1		1.2	0.2
Delay (s)	83.0	4.5	28.5		19.3	16.8
Level of Service	F	A	C		B	B
Approach Delay (s)		44.4	28.5		17.9	
Approach LOS		D	C		B	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	395	626	270	0	571	184	277	1208	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.96			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4877			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4877			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.78	0.88	0.69	0.92	0.93	0.76	0.80	0.84	0.92
Adj. Flow (vph)	0	0	506	711	391	0	614	242	346	1438	0
RTOR Reduction (vph)	0	0	0	25	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	0	0	1583	0	0	614	75	346	1438	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1679			584	261	651	2020	
v/s Ratio Prot				c0.32			c0.17		0.20	c0.41	
v/s Ratio Perm								0.05			
v/c Ratio				0.94			1.05	0.29	0.53	0.71	
Uniform Delay, d1				33.7			44.3	38.8	26.3	16.4	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				11.2			51.5	2.8	3.1	2.2	
Delay (s)				44.9			95.7	41.5	29.4	18.6	
Level of Service				D			F	D	C	B	
Approach Delay (s)	0.0			44.9			80.4			20.7	
Approach LOS	A			D			F			C	

Intersection Summary			
HCM Average Control Delay	41.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	260	445	196	184	340	259	32	229	31	654
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95				1.00	0.95
Frt	1.00	0.99	0.85	0.85	0.93				1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)	1610	3173	1441	1583	3281				1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)	1610	3173	1441	1583	3281				1770	3539
Peak-hour factor, PHF	0.81	0.88	0.89	0.88	0.94	0.85	0.83	0.91	0.78	0.82
Adj. Flow (vph)	321	506	220	209	362	305	39	252	40	798
RTOR Reduction (vph)	0	0	0	76	3	0	0	0	0	0
Lane Group Flow (vph)	276	573	198	133	703	0	0	0	292	798
Turn Type	Split		Prot	Perm				Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4						
Actuated Green, G (s)	28.8	28.8	28.8	28.8	42.0				22.7	68.2
Effective Green, g (s)	28.8	28.8	28.8	28.8	42.0				22.7	68.2
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.40				0.21	0.64
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	437	862	392	430	1300				379	2277
v/s Ratio Prot	0.17	c0.18	0.14		c0.21				c0.17	0.23
v/s Ratio Perm				0.08						
v/c Ratio	0.63	0.66	0.51	0.31	0.54				0.77	0.35
Uniform Delay, d1	33.9	34.3	32.6	30.7	24.6				39.2	8.7
Progression Factor	0.76	0.76	0.76	0.64	1.00				1.00	1.00
Incremental Delay, d2	1.9	1.2	0.6	0.3	1.6				9.3	0.4
Delay (s)	27.8	27.4	25.5	19.8	26.2				48.5	9.1
Level of Service	C	C	C	B	C				D	A
Approach Delay (s)		25.9			26.2					19.7
Approach LOS		C			C					B

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2273	103	381	340	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4790				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4790				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.78	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2368	132	410	358	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	69	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2368	63	0	767	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2036				
v/s Ratio Prot					c0.47							
v/s Ratio Perm						0.04		0.16				
v/c Ratio					0.98	0.08		0.38				
Uniform Delay, d1					20.6	11.5		15.7				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					14.3	0.2		0.5				
Delay (s)					34.9	11.7		16.3				
Level of Service					C	B		B				
Approach Delay (s)		0.0			33.7			16.3			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1142	1418	0	0	0	0	0	1032	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4746						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4746						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1177	1541	0	0	0	0	0	1098	32
RTOR Reduction (vph)	0	0	0	5	5	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	654	2054	0	0	0	0	0	1127	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2729						1145	
v/s Ratio Prot											c0.32	
v/s Ratio Perm				0.43	0.43							
v/c Ratio				0.75	0.75						0.98	
Uniform Delay, d1				12.7	12.7						26.8	
Progression Factor				1.47	1.49						1.00	
Incremental Delay, d2				2.6	0.9						23.1	
Delay (s)				21.2	19.8						49.9	
Level of Service				C	B						D	
Approach Delay (s)		0.0			20.1			0.0			49.9	
Approach LOS		A			C			A			D	

Intersection Summary			
HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	74	196	6	9	433	13	9	6	8	18	14	13
Peak Hour Factor	0.90	0.94	0.67	0.81	0.84	0.63	0.75	0.75	0.79	0.74	0.77	0.69
Hourly flow rate (vph)	82	209	9	11	515	21	12	8	10	24	18	19

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	82	217	547	30	61
Volume Left (vph)	82	0	11	12	24
Volume Right (vph)	0	9	21	10	19
Hadj (s)	0.53	0.01	0.02	-0.09	-0.07
Departure Headway (s)	5.8	5.2	4.6	5.9	5.8
Degree Utilization, x	0.13	0.32	0.71	0.05	0.10
Capacity (veh/h)	607	665	761	538	544
Control Delay (s)	8.4	9.4	18.0	9.2	9.5
Approach Delay (s)	9.2		18.0	9.2	9.5
Approach LOS	A		C	A	A

Intersection Summary			
Delay	14.3		
HCM Level of Service	B		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

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                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      4.0       Worst Case Level Of Service: B[ 12.2]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0  609     0     0    0   258     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0  609     0     0    0   258     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0  609     0     0    0   258     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.91  1.00  1.00 1.00  0.80  1.00 1.00  1.00
PHF Volume:     0    0     0     0  669     0     0    0   323     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0  669     0     0    0   323     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   223  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   821  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   821  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.39  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   1.9  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  12.2 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     B     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx              12.2           xxxxxx
ApproachLOS:         *                *                 B                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	543	257	990	746	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1740	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1740	3539	1583	
Peak-hour factor, PHF	0.88	0.83	0.89	0.92	0.75
Adj. Flow (vph)	617	310	1112	811	96
RTOR Reduction (vph)	71	31	0	0	0
Lane Group Flow (vph)	386	439	1112	907	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	464	2153	356	
v/s Ratio Prot			c0.31	c0.57	
v/s Ratio Perm	0.23	0.25			
v/c Ratio	0.86	0.95	0.52	2.55	
Uniform Delay, d1	20.9	21.6	6.7	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	15.0	28.2	0.9	704.7	
Delay (s)	36.0	49.8	7.6	728.0	
Level of Service	D	D	A	F	
Approach Delay (s)		43.0	331.2		
Approach LOS		D	F		

Intersection Summary			
HCM Average Control Delay	240.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	192	365	89	17	45	14	155	177	8	384	1204	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1520		3433	3495	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1520		3433	3495	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.85	0.85	0.85	0.85	0.92	0.92	0.92	0.92
Adj. Flow (vph)	204	388	95	18	53	16	182	208	9	417	1309	93
RTOR Reduction (vph)	0	0	7	0	0	0	0	175	0	0	6	0
Lane Group Flow (vph)	204	388	106	0	0	69	182	33	0	426	1396	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	19.5	26.3	26.3			7.5	14.3	14.3		14.4	27.2	
Effective Green, g (s)	19.5	26.3	26.3			7.5	14.3	14.3		14.4	27.2	
Actuated g/C Ratio	0.22	0.29	0.29			0.08	0.16	0.16		0.16	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	384	1034	463			148	296	242		549	1056	
v/s Ratio Prot	c0.12	0.11				0.04	c0.10			0.12	c0.40	
v/s Ratio Perm			0.07					0.02				
v/c Ratio	0.53	0.38	0.23			0.47	0.61	0.14		0.78	1.32	
Uniform Delay, d1	31.2	25.3	24.2			39.3	35.3	32.5		36.3	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.2	0.3			2.3	3.8	0.3		6.8	151.7	
Delay (s)	32.6	25.5	24.4			41.7	39.0	32.8		43.0	183.1	
Level of Service	C	C	C			D	D	C		D	F	
Approach Delay (s)		27.4					36.6				150.5	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	91.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	185	437	39	65
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3437		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3437		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	199	470	42	70
RTOR Reduction (vph)	0	12	0	0
Lane Group Flow (vph)	199	570	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	22.8		
Effective Green, g (s)	11.0	22.8		
Actuated g/C Ratio	0.12	0.25		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	871		
v/s Ratio Prot	c0.11	0.17		
v/s Ratio Perm				
v/c Ratio	0.92	0.65		
Uniform Delay, d1	39.1	30.1		
Progression Factor	1.00	1.00		
Incremental Delay, d2	40.0	3.8		
Delay (s)	79.0	33.9		
Level of Service	E	C		
Approach Delay (s)		45.4		
Approach LOS		D		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	206	66	29	427	237	173	618	30	144	594	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.91			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4788			3523	1536	1767	3504		1767	3455	
Flt Permitted		0.74			0.88	1.00	0.30	1.00		0.31	1.00	
Satd. Flow (perm)		3588			3119	1536	559	3504		581	3455	
Peak-hour factor, PHF	0.68	0.86	0.66	0.73	0.96	0.87	0.83	0.92	0.75	0.82	0.92	0.86
Adj. Flow (vph)	107	240	100	40	445	272	208	672	40	176	646	88
RTOR Reduction (vph)	0	58	0	0	0	84	0	5	0	0	13	0
Lane Group Flow (vph)	0	389	0	0	485	188	208	707	0	176	721	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)		36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio		0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)		5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)		1520			1321	651	250	1566		260	1545	
v/s Ratio Prot								0.20			0.21	
v/s Ratio Perm		0.11			c0.16	0.12	c0.37			0.30		
v/c Ratio		0.26			0.37	0.29	0.83	0.45		0.68	0.47	
Uniform Delay, d1		15.8			16.7	16.1	20.7	16.3		18.6	16.4	
Progression Factor		0.79			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.8	1.1	26.4	0.9		13.3	1.0	
Delay (s)		12.9			17.5	17.2	47.1	17.2		31.9	17.4	
Level of Service		B			B	B	D	B		C	B	
Approach Delay (s)		12.9			17.4			24.0			20.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	105.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	352	118	55	585	99	182	430	39	112	391	294
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.98		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	3388		1769	3436		1761	3472		1762	3257	
Flt Permitted	0.16	1.00		0.43	1.00		0.27	1.00		0.39	1.00	
Satd. Flow (perm)	297	3388		806	3436		495	3472		716	3257	
Peak-hour factor, PHF	0.85	0.90	0.89	0.81	0.88	0.72	0.88	0.87	0.70	0.80	0.92	0.91
Adj. Flow (vph)	212	391	133	68	665	138	207	494	56	140	425	323
RTOR Reduction (vph)	0	35	0	0	20	0	0	10	0	0	161	0
Lane Group Flow (vph)	212	489	0	68	783	0	207	540	0	140	587	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	42.8	33.2		34.2	28.9		33.0	33.0		33.0	33.0	
Effective Green, g (s)	42.8	33.2		34.2	28.9		33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.50	0.39		0.40	0.34		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5		4.5	3.5		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	316	1323		384	1168		192	1348		278	1264	
v/s Ratio Prot	c0.08	0.14		0.01	0.23			0.16			0.18	
v/s Ratio Perm	c0.26			0.06			c0.42			0.20		
v/c Ratio	0.67	0.37		0.18	0.67		1.08	0.40		0.50	0.46	
Uniform Delay, d1	14.7	18.4		15.8	24.0		26.0	18.8		19.8	19.4	
Progression Factor	1.00	1.00		1.58	1.46		0.76	0.66		1.00	1.00	
Incremental Delay, d2	4.4	0.8		0.1	2.8		84.5	0.1		0.5	0.1	
Delay (s)	19.1	19.2		25.0	37.8		104.2	12.6		20.3	19.5	
Level of Service	B	B		C	D		F	B		C	B	
Approach Delay (s)		19.2			36.8			37.6			19.6	
Approach LOS		B			D			D			B	

Intersection Summary			
HCM Average Control Delay	28.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	211	569	0	0	221	942	18	747	63	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.90	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1521	4785			4329	1362		5007				
Flt Permitted	0.33	0.84			1.00	1.00		1.00				
Satd. Flow (perm)	536	4023			4329	1362		5007				
Peak-hour factor, PHF	0.93	0.90	0.25	0.25	0.89	0.97	0.64	0.92	0.83	0.25	0.25	0.25
Adj. Flow (vph)	227	632	0	0	248	971	28	812	76	0	0	0
RTOR Reduction (vph)	0	0	0	0	43	43	0	26	0	0	0	0
Lane Group Flow (vph)	166	693	0	0	691	442	0	890	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	214	1609			1732	545		2003				
v/s Ratio Prot					0.16							
v/s Ratio Perm	0.31	0.17				c0.32		0.18				
v/c Ratio	0.78	0.43			0.40	0.81		0.44				
Uniform Delay, d1	10.4	8.7			8.6	10.7		8.8				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	23.6	0.8			0.7	12.4		0.7				
Delay (s)	34.0	9.5			9.3	23.1		9.5				
Level of Service	C	A			A	C		A				
Approach Delay (s)		14.3			14.8			9.5			0.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	423	33	10	209	0	0	0	0	348	261	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0					4.0	4.0	4.0
Lane Util. Factor		0.91			0.91					0.91	0.91	1.00
Frpb, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	0.98	1.00
Satd. Flow (prot)		5014			5069					1605	3332	1558
Flt Permitted		1.00			0.91					0.95	0.98	1.00
Satd. Flow (perm)		5014			4607					1605	3332	1558
Peak-hour factor, PHF	0.25	0.95	0.83	0.63	0.86	0.25	0.25	0.25	0.25	0.87	0.79	0.88
Adj. Flow (vph)	0	445	40	16	243	0	0	0	0	400	330	195
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	0	94
Lane Group Flow (vph)	0	467	0	0	259	0	0	0	0	240	490	101
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type				Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases				8						6		6
Actuated Green, G (s)		21.0			21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0			21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35			0.35					0.52	0.52	0.52
Clearance Time (s)		4.0			4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1755			1612					829	1722	805
v/s Ratio Prot		c0.09										
v/s Ratio Perm					0.06					c0.15	0.15	0.06
v/c Ratio		0.27			0.16					0.29	0.28	0.13
Uniform Delay, d1		14.0			13.4					8.2	8.2	7.5
Progression Factor		1.00			1.00					1.00	1.00	1.00
Incremental Delay, d2		0.4			0.2					0.9	0.4	0.3
Delay (s)		14.4			13.6					9.1	8.6	7.8
Level of Service		B			B					A	A	A
Approach Delay (s)		14.4			13.6			0.0			8.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	234	492	546	431	176	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.98		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3264		3426	1421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3264		3426	1421
Peak-hour factor, PHF	0.74	0.93	0.90	0.97	0.72	0.86
Adj. Flow (vph)	316	529	607	444	244	103
RTOR Reduction (vph)	0	0	130	0	5	81
Lane Group Flow (vph)	316	529	921	0	249	12
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	20.4	61.8	37.4		10.2	10.2
Effective Green, g (s)	20.4	61.8	37.4		10.2	10.2
Actuated g/C Ratio	0.26	0.77	0.47		0.13	0.13
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	451	2734	1526		437	181
v/s Ratio Prot	c0.18	0.15	c0.28		c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.70	0.19	0.60		0.57	0.07
Uniform Delay, d1	27.0	2.4	15.8		32.8	30.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.0	0.2	1.8		1.0	0.1
Delay (s)	31.0	2.6	17.6		33.9	30.8
Level of Service	C	A	B		C	C
Approach Delay (s)		13.2	17.6		33.0	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	604	27	16	776	124	80	482	28	121	363	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92		1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3393		1761	3333		1769	3496		1760	3378	
Flt Permitted	0.17	1.00		0.17	1.00		0.40	1.00		0.42	1.00	
Satd. Flow (perm)	308	3393		306	3333		747	3496		779	3378	
Peak-hour factor, PHF	0.64	0.80	0.61	0.57	0.92	0.85	0.87	0.85	0.64	0.87	0.95	0.72
Adj. Flow (vph)	36	755	44	28	843	146	92	567	44	139	382	124
RTOR Reduction (vph)	0	5	0	0	16	0	0	7	0	0	31	0
Lane Group Flow (vph)	36	794	0	28	973	0	92	604	0	139	475	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4			4			2			6		
Actuated Green, G (s)	24.2	24.2		24.2	24.2		50.3	50.3		40.4	40.4	
Effective Green, g (s)	24.2	24.2		24.2	24.2		50.3	50.3		40.4	40.4	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.59	0.59		0.48	0.48	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	966		87	949		507	2069		370	1606	
v/s Ratio Prot		0.23			c0.29		0.01	c0.17			0.14	
v/s Ratio Perm	0.12			0.09			0.10			c0.18		
v/c Ratio	0.41	0.82		0.32	1.03		0.18	0.29		0.38	0.30	
Uniform Delay, d1	24.6	28.4		23.9	30.4		7.7	8.6		14.2	13.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.12	1.15	
Incremental Delay, d2	13.5	7.8		9.5	35.9		0.1	0.4		2.7	0.4	
Delay (s)	38.1	36.2		33.5	66.3		7.8	8.9		18.6	16.0	
Level of Service	D	D		C	E		A	A		B	B	
Approach Delay (s)		36.3			65.4			8.8			16.6	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM Average Control Delay	35.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	414	37	90	306	30	303	580	146	50	427	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.98			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1764	3361			3321		1764	3539	1551	1748	3408	
Flt Permitted	0.31	1.00			0.63		0.41	1.00	1.00	0.39	1.00	
Satd. Flow (perm)	583	3361			2105		761	3539	1551	727	3408	
Peak-hour factor, PHF	0.72	0.91	0.65	0.63	0.90	0.52	0.87	0.95	0.79	0.57	0.90	0.84
Adj. Flow (vph)	97	455	57	143	340	58	348	611	185	88	474	108
RTOR Reduction (vph)	0	15	0	0	15	0	0	0	74	0	18	0
Lane Group Flow (vph)	97	497	0	0	526	0	348	611	111	88	564	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	23.9	23.9			23.9		48.1	48.1	48.1	48.1	48.1	
Effective Green, g (s)	23.9	23.9			23.9		48.1	48.1	48.1	48.1	48.1	
Actuated g/C Ratio	0.30	0.30			0.30		0.60	0.60	0.60	0.60	0.60	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	174	1004			629		458	2128	933	437	2049	
v/s Ratio Prot		0.15						0.17			0.17	
v/s Ratio Perm	0.17				c0.25		c0.46		0.07	0.12		
v/c Ratio	0.56	0.49			0.84		0.76	0.29	0.12	0.20	0.28	
Uniform Delay, d1	23.6	23.1			26.2		11.7	7.7	6.9	7.2	7.6	
Progression Factor	1.00	1.00			1.07		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2	0.1			9.0		11.3	0.3	0.3	1.0	0.3	
Delay (s)	25.8	23.2			36.9		23.0	8.0	7.1	8.3	8.0	
Level of Service	C	C			D		C	A	A	A	A	
Approach Delay (s)		23.6			36.9			12.4			8.0	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	574	192	102	328	2	0	0	0	70	197	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.96		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3101		1770	3413						3352	
Flt Permitted		0.95		0.19	1.00						0.99	
Satd. Flow (perm)		2941		362	3413						3352	
Peak-hour factor, PHF	0.42	0.99	0.87	0.93	0.88	0.25	0.25	0.25	0.25	0.74	0.94	0.69
Adj. Flow (vph)	12	580	221	110	373	8	0	0	0	95	210	86
RTOR Reduction (vph)	0	41	0	0	2	0	0	0	0	0	33	0
Lane Group Flow (vph)	0	772	0	110	379	0	0	0	0	0	358	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		32.0		43.0	43.0						29.0	
Effective Green, g (s)		32.0		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1176		300	1834						1215	
v/s Ratio Prot				c0.03	0.11							
v/s Ratio Perm		c0.26		0.17							0.11	
v/c Ratio		0.66		0.37	0.21						0.30	
Uniform Delay, d1		19.5		11.0	9.6						18.2	
Progression Factor		1.66		1.00	1.00						1.00	
Incremental Delay, d2		2.8		0.3	0.3						0.6	
Delay (s)		35.1		11.3	9.9						18.8	
Level of Service		D		B	A						B	
Approach Delay (s)		35.1			10.2			0.0			18.8	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	546	113	326	724	36	9	1431	839	2	545	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1484	3433	3539	1459		5082	1466		4918	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.93	
Satd. Flow (perm)	3433	3539	1484	3433	3539	1459		4721	1466		4564	
Peak-hour factor, PHF	0.63	0.92	0.83	0.98	0.93	0.75	0.56	0.92	0.86	0.50	0.96	0.50
Adj. Flow (vph)	195	593	136	333	778	48	16	1555	976	4	568	104
RTOR Reduction (vph)	0	0	61	0	0	29	0	0	261	0	26	0
Lane Group Flow (vph)	195	593	75	333	778	19	0	1571	715	0	650	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	10.0	35.4	35.4	13.6	40.0	40.0		36.0	36.0		36.0	
Effective Green, g (s)	10.0	35.4	35.4	13.6	40.0	40.0		36.0	36.0		36.0	
Actuated g/C Ratio	0.10	0.35	0.35	0.14	0.40	0.40		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	343	1253	525	467	1416	584		1700	528		1643	
v/s Ratio Prot	0.06	0.17		c0.10	c0.22							
v/s Ratio Perm			0.05			0.01		0.33	c0.49		0.14	
v/c Ratio	0.57	0.47	0.14	0.71	0.55	0.03		0.92	1.35		0.40	
Uniform Delay, d1	42.9	25.1	22.0	41.3	23.1	18.2		30.7	32.0		23.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	1.3	1.3	0.6	4.3	1.5	0.1		10.0	171.4		0.7	
Delay (s)	44.2	26.3	22.6	45.6	24.6	18.3		40.7	203.4		24.6	
Level of Service	D	C	C	D	C	B		D	F		C	
Approach Delay (s)		29.6			30.4			103.0			24.6	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM Average Control Delay	64.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	705	109	86	1293	779	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.99		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.99	1.00	1.00	
Frt	0.95		1.00	1.00	0.97	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3270		1759	3725	6247	
Flt Permitted	0.97		0.19	1.00	1.00	
Satd. Flow (perm)	3270		360	3725	6247	
Peak-hour factor, PHF	0.90	0.25	0.91	0.96	0.90	0.88
Adj. Flow (vph)	783	436	95	1347	866	174
RTOR Reduction (vph)	107	0	0	0	42	0
Lane Group Flow (vph)	1112	0	95	1347	998	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	31.9		34.6	28.1	28.1	
Effective Green, g (s)	31.9		34.6	28.1	28.1	
Actuated g/C Ratio	0.40		0.43	0.35	0.35	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1304		269	1308	2194	
v/s Ratio Prot	c0.34		c0.03	c0.36	0.16	
v/s Ratio Perm			0.12			
v/c Ratio	0.85		0.35	1.03	0.46	
Uniform Delay, d1	21.9		13.9	25.9	20.0	
Progression Factor	1.00		0.81	0.99	1.00	
Incremental Delay, d2	5.6		0.8	32.4	0.7	
Delay (s)	27.5		12.0	58.0	20.7	
Level of Service	C		B	E	C	
Approach Delay (s)	27.5			55.0	20.7	
Approach LOS	C			D	C	

Intersection Summary			
HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	475	10	27	214	11	298
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.63	0.66	0.91	0.69	0.84
Hourly flow rate (vph)	505	16	41	235	16	355
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			521		848	531
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			521		848	531
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		95	34
cM capacity (veh/h)			1045		314	540

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	521	276	371
Volume Left	0	41	16
Volume Right	16	0	355
cSH	1700	1045	524
Volume to Capacity	0.31	0.04	0.71
Queue Length 95th (ft)	0	3	141
Control Delay (s)	0.0	1.6	26.8
Lane LOS		A	D
Approach Delay (s)	0.0	1.6	26.8
Approach LOS			D

Intersection Summary			
Average Delay	8.9		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	266	41	66	160	29	219
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.75	0.31	0.83	0.73	0.75
Hourly flow rate (vph)	296	55	213	193	40	292
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			350		968	350
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			350		968	350
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			82		82	57
cM capacity (veh/h)			1209		227	678

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	350	406	332
Volume Left	0	213	40
Volume Right	55	0	292
cSH	1700	1209	547
Volume to Capacity	0.21	0.18	0.61
Queue Length 95th (ft)	0	16	100
Control Delay (s)	0.0	5.3	21.2
Lane LOS		A	C
Approach Delay (s)	0.0	5.3	21.2
Approach LOS			C

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	314	32	34	116	113	205
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.38	0.63	0.94	0.80	0.82
Hourly flow rate (vph)	324	84	54	123	141	250
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.91		0.91	0.91
vC, conflicting volume			408		617	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			300		530	275
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		67	63
cM capacity (veh/h)			1148		435	683

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	408	177	71	71	125	125
Volume Left	0	54	71	71	0	0
Volume Right	84	0	0	0	125	125
cSH	1700	1148	435	435	683	683
Volume to Capacity	0.24	0.05	0.16	0.16	0.18	0.18
Queue Length 95th (ft)	0	4	14	14	17	17
Control Delay (s)	0.0	2.8	14.9	14.9	11.4	11.4
Lane LOS		A	B	B	B	B
Approach Delay (s)	0.0	2.8	12.7			
Approach LOS			B			

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	191	80	58	199	0	0	0	0	66	410	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.98	
Flpb, ped/bikes		1.00	1.00		0.98						0.96	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1436		1800						4739	
Flt Permitted		1.00	1.00		0.85						0.99	
Satd. Flow (perm)		1863	1436		1545						4739	
Peak-hour factor, PHF	0.92	0.91	0.79	0.76	0.84	0.92	0.25	0.25	0.25	0.75	0.97	0.69
Adj. Flow (vph)	0	210	101	76	237	0	0	0	0	88	423	32
RTOR Reduction (vph)	0	0	36	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	210	65	0	313	0	0	0	0	0	538	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		22.9	22.9		22.9						49.1	
Effective Green, g (s)		22.9	22.9		22.9						49.1	
Actuated g/C Ratio		0.29	0.29		0.29						0.61	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		533	411		442						2909	
v/s Ratio Prot		0.11										
v/s Ratio Perm			0.05		c0.20						0.11	
v/c Ratio		0.39	0.16		0.71						0.19	
Uniform Delay, d1		23.0	21.3		25.6						6.7	
Progression Factor		1.00	1.00		1.00						1.32	
Incremental Delay, d2		0.5	0.2		5.1						0.1	
Delay (s)		23.5	21.5		30.7						9.0	
Level of Service		C	C		C						A	
Approach Delay (s)		22.8			30.7			0.0			9.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	106	1	0	119	98	16	303	159	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.81			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		0.99			1.00			1.00	1.00			
Satd. Flow (prot)		1833			1686			3507	1277			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1782			1686			3507	1277			
Peak-hour factor, PHF	0.69	0.84	0.25	0.25	0.87	0.82	0.80	0.93	0.88	0.25	0.25	0.25
Adj. Flow (vph)	16	126	4	0	137	120	20	326	181	0	0	0
RTOR Reduction (vph)	0	2	0	0	44	0	0	0	145	0	0	0
Lane Group Flow (vph)	0	144	0	0	213	0	0	346	36	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		28.0			28.0			9.0	9.0			
Effective Green, g (s)		28.0			28.0			9.0	9.0			
Actuated g/C Ratio		0.62			0.62			0.20	0.20			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1109			1049			701	255			
v/s Ratio Prot					c0.13							
v/s Ratio Perm		0.08						0.10	0.03			
v/c Ratio		0.13			0.20			0.49	0.14			
Uniform Delay, d1		3.5			3.7			16.0	14.8			
Progression Factor		0.44			1.00			1.00	1.00			
Incremental Delay, d2		0.2			0.4			0.2	0.1			
Delay (s)		1.8			4.1			16.2	14.9			
Level of Service		A			A			B	B			
Approach Delay (s)		1.8			4.1			15.7			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	39	17	63	0	67	0	446	35	37	369	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.98			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.96			0.93			0.99			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1748	1765			1649			3477			3511	
Flt Permitted	0.72	1.00			0.86			1.00			0.87	
Satd. Flow (perm)	1326	1765			1457			3477			3056	
Peak-hour factor, PHF	0.69	0.82	0.85	0.88	0.92	0.77	0.25	0.89	0.88	0.89	0.99	0.92
Adj. Flow (vph)	16	48	20	72	0	87	0	501	40	42	373	0
RTOR Reduction (vph)	0	12	0	0	50	0	0	13	0	0	0	0
Lane Group Flow (vph)	16	56	0	0	109	0	0	528	0	0	415	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	560	745			615			1314			1154	
v/s Ratio Prot		0.03						c0.15				
v/s Ratio Perm	0.01				c0.07						0.14	
v/c Ratio	0.03	0.08			0.18			0.40			0.36	
Uniform Delay, d1	7.6	7.8			8.1			10.3			10.1	
Progression Factor	1.00	1.00			1.12			1.00			1.00	
Incremental Delay, d2	0.1	0.2			0.6			0.9			0.9	
Delay (s)	7.7	8.0			9.7			11.2			11.0	
Level of Service	A	A			A			B			B	
Approach Delay (s)		7.9			9.7			11.2			11.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	131	23	9	173	183	20	507	25	32	139	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.92			0.99		1.00	0.94	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3379			3197			3489		1766	3281	
Flt Permitted		0.73			0.94			0.93		0.34	1.00	
Satd. Flow (perm)		2470			3012			3267		639	3281	
Peak-hour factor, PHF	0.55	0.84	0.52	0.56	0.70	0.65	0.71	0.91	0.66	0.97	0.85	0.44
Adj. Flow (vph)	40	156	44	16	247	282	28	557	38	33	164	111
RTOR Reduction (vph)	0	35	0	0	225	0	0	6	0	0	39	0
Lane Group Flow (vph)	0	205	0	0	320	0	0	617	0	33	236	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.1			12.1			31.8		38.9	38.9	
Effective Green, g (s)		12.1			12.1			31.8		38.9	38.9	
Actuated g/C Ratio		0.20			0.20			0.53		0.65	0.65	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		498			607			1732		463	2127	
v/s Ratio Prot										0.00	c0.07	
v/s Ratio Perm		0.08			c0.11			c0.19		0.04		
v/c Ratio		0.41			0.53			0.36		0.07	0.11	
Uniform Delay, d1		20.8			21.4			8.2		4.1	4.0	
Progression Factor		1.00			0.75			1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.8			0.6		0.1	0.1	
Delay (s)		21.4			16.7			8.7		4.2	4.1	
Level of Service		C			B			A		A	A	
Approach Delay (s)		21.4			16.7			8.7			4.1	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	138	80	51	256	108	92	676	99	38	480	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.96			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3231			3218			3408			4958	
Flt Permitted		0.90			0.89			0.77			0.81	
Satd. Flow (perm)		2930			2866			2651			4009	
Peak-hour factor, PHF	0.79	0.82	0.83	0.91	0.89	0.80	0.92	0.92	0.95	0.71	0.88	0.63
Adj. Flow (vph)	24	168	96	56	288	135	100	735	104	54	545	52
RTOR Reduction (vph)	0	61	0	0	65	0	0	16	0	0	17	0
Lane Group Flow (vph)	0	227	0	0	414	0	0	923	0	0	634	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1074			1051			1370			1203	
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.08			c0.14			c0.25			0.16	
v/c Ratio		0.21			0.39			0.67			0.53	
Uniform Delay, d1		13.0			14.1			11.9			17.5	
Progression Factor		1.85			1.00			1.00			1.00	
Incremental Delay, d2		0.4			1.1			2.7			1.7	
Delay (s)		24.6			15.2			14.5			19.1	
Level of Service		C			B			B			B	
Approach Delay (s)		24.6			15.2			14.5			19.1	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	270	0	0	364	108	65	327	239	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3503			3367	1319		4983	1457			
Flt Permitted		0.87			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3079			3367	1319		4983	1457			
Peak-hour factor, PHF	0.66	0.87	0.92	0.92	0.92	0.94	0.83	0.91	0.93	0.92	0.92	0.92
Adj. Flow (vph)	44	310	0	0	396	115	78	359	257	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	26	0	0	215	0	0	0
Lane Group Flow (vph)	0	354	0	0	407	77	0	437	42	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		59.8			59.8	59.8		13.2	13.2			
Effective Green, g (s)		59.8			59.8	59.8		13.2	13.2			
Actuated g/C Ratio		0.75			0.75	0.75		0.16	0.16			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2302			2517	986		822	240			
v/s Ratio Prot					c0.12							
v/s Ratio Perm		0.11				0.06		0.09	0.03			
v/c Ratio		0.15			0.16	0.08		0.53	0.18			
Uniform Delay, d1		2.9			2.9	2.7		30.6	28.7			
Progression Factor		1.00			0.49	0.69		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.7	0.4			
Delay (s)		3.0			1.5	2.0		31.2	29.1			
Level of Service		A			A	A		C	C			
Approach Delay (s)		3.0			1.6			30.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	357	151	125	379	0	0	0	0	63	412	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3376						4496	
Flt Permitted		1.00	1.00	0.95	0.95						0.99	
Satd. Flow (perm)		3539	1439	1610	3199						4496	
Peak-hour factor, PHF	0.92	0.88	0.90	0.83	0.92	0.25	0.25	0.25	0.25	0.72	0.92	0.92
Adj. Flow (vph)	0	406	168	151	412	0	0	0	0	88	448	100
RTOR Reduction (vph)	0	0	49	0	0	0	0	0	0	0	34	0
Lane Group Flow (vph)	0	406	119	136	427	0	0	0	0	0	602	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1702						1686	
v/s Ratio Prot		c0.11		c0.08	0.03							
v/s Ratio Perm			0.08		0.10						0.13	
v/c Ratio		0.33	0.24	0.68	0.25						0.36	
Uniform Delay, d1		19.1	18.4	33.5	10.4						18.0	
Progression Factor		1.15	1.23	0.93	1.44						1.35	
Incremental Delay, d2		0.7	1.1	6.2	0.0						0.0	
Delay (s)		22.7	23.8	37.2	15.0						24.4	
Level of Service		C	C	D	B						C	
Approach Delay (s)		23.0			20.3			0.0			24.4	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	NBL2	NBL	NBT	NBR	SBT
Lane Configurations												
Volume (vph)	14	283	89	35	7	112	16	75	31	629	20	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.91	0.91		1.00	0.95				0.95		0.91
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Frt	1.00	1.00	0.96		1.00	0.98				1.00		0.98
Flt Protected	0.95	0.95	0.99		0.95	1.00				0.99		1.00
Satd. Flow (prot)	1770	3221	1614		1770	3472				3493		3328
Flt Permitted	0.95	0.95	0.99		0.95	1.00				0.99		1.00
Satd. Flow (perm)	1770	3221	1614		1770	3472				3493		3328
Peak-hour factor, PHF	0.89	0.91	0.86	0.73	0.63	0.86	0.86	0.71	0.71	0.88	0.71	0.78
Adj. Flow (vph)	16	311	103	48	11	130	19	106	44	715	28	179
RTOR Reduction (vph)	0	0	16	0	0	0	0	0	0	3	0	0
Lane Group Flow (vph)	16	280	166	0	11	149	0	0	0	890	0	204
Confl. Peds. (#/hr)	22											
Confl. Bikes (#/hr)			12							7		
Turn Type	Prot	custom			Split			Split	Split			
Protected Phases	5	1	1		7	7		8	8	8		2
Permitted Phases		1										
Actuated Green, G (s)	16.0	15.0	15.0		7.8	7.8				18.2		11.0
Effective Green, g (s)	16.0	15.0	15.0		7.8	7.8				18.2		11.0
Actuated g/C Ratio	0.20	0.19	0.19		0.10	0.10				0.23		0.14
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0				4.0		4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0				2.0		2.0
Lane Grp Cap (vph)	354	604	303		173	339				795		458
v/s Ratio Prot	0.01	0.09	c0.10		0.01	c0.04				c0.25		c0.06
v/s Ratio Perm												
v/c Ratio	0.05	0.46	0.55		0.06	0.44				1.12		0.45
Uniform Delay, d1	25.8	28.9	29.4		32.8	34.0				30.9		31.7
Progression Factor	1.79	1.73	1.81		0.76	0.85				1.00		0.82
Incremental Delay, d2	0.0	2.4	6.7		0.1	0.3				70.0		0.3
Delay (s)	46.2	52.4	59.9		25.1	29.1				100.9		26.1
Level of Service	D	D	E		C	C				F		C
Approach Delay (s)			55.0			28.8				100.9		27.9
Approach LOS			E			C				F		C

Intersection Summary			
HCM Average Control Delay	81.2	HCM Level of Service	F
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR	SBR2	SEL	SER	SER2
Lane Configurations					
Volume (vph)	100	36	92	101	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0
Lane Util. Factor	0.91	1.00	1.00		0.95
Frpb, ped/bikes	1.00	1.00	0.98		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00
Frt	0.85	0.85	0.92		0.85
Flt Protected	1.00	1.00	0.98		1.00
Satd. Flow (prot)	1441	1583	1646		1469
Flt Permitted	1.00	1.00	0.98		1.00
Satd. Flow (perm)	1441	1583	1646		1469
Peak-hour factor, PHF	0.89	0.89	0.95	0.95	0.95
Adj. Flow (vph)	112	40	97	106	115
RTOR Reduction (vph)	0	35	3	0	68
Lane Group Flow (vph)	87	5	212	0	35
Confl. Peds. (#/hr)		74			
Confl. Bikes (#/hr)		8			7
Turn Type	custom	custom			custom
Protected Phases	6	6	9		
Permitted Phases	6				2
Actuated Green, G (s)	10.0	10.0	8.0		11.0
Effective Green, g (s)	10.0	10.0	8.0		11.0
Actuated g/C Ratio	0.12	0.12	0.10		0.14
Clearance Time (s)	4.0	4.0	4.0		4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0
Lane Grp Cap (vph)	180	198	165		202
v/s Ratio Prot	0.06	0.00	c0.13		
v/s Ratio Perm					0.02
v/c Ratio	0.48	0.03	1.29		0.17
Uniform Delay, d1	32.6	30.7	36.0		30.5
Progression Factor	0.80	0.68	1.00		1.00
Incremental Delay, d2	9.0	0.2	166.9		0.1
Delay (s)	35.1	21.1	202.9		30.6
Level of Service	D	C	F		C
Approach Delay (s)			147.1		
Approach LOS			F		

Intersection Summary

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	923	0	0	705	671	278
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0			4.0	4.0	4.0
Lane Util. Factor	0.94			0.91	0.95	0.76
Frpb, ped/bikes	1.00			1.00	1.00	0.96
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	1.00			1.00	1.00	0.85
Flt Protected	0.95			1.00	1.00	1.00
Satd. Flow (prot)	4990			5085	3539	3481
Flt Permitted	0.95			1.00	1.00	1.00
Satd. Flow (perm)	4990			5085	3539	3481
Peak-hour factor, PHF	0.95	0.95	0.25	0.93	0.99	0.84
Adj. Flow (vph)	972	0	0	758	678	331
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	972	0	0	758	678	331
Confl. Peds. (#/hr)						20
Confl. Bikes (#/hr)						16
Turn Type						Free
Protected Phases	1			2	2	
Permitted Phases						Free
Actuated Green, G (s)	22.6			48.4	48.4	80.0
Effective Green, g (s)	22.6			48.4	48.4	80.0
Actuated g/C Ratio	0.28			0.60	0.60	1.00
Clearance Time (s)	5.0			4.0	4.0	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	1410			3076	2141	3481
v/s Ratio Prot	c0.19			0.15	c0.19	
v/s Ratio Perm						0.10
v/c Ratio	0.69			0.25	0.32	0.10
Uniform Delay, d1	25.6			7.3	7.7	0.0
Progression Factor	1.76			1.00	0.77	1.00
Incremental Delay, d2	0.5			0.2	0.3	0.0
Delay (s)	45.5			7.5	6.3	0.0
Level of Service	D			A	A	A
Approach Delay (s)	45.5			7.5	4.2	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Volume (vph)	135	705	671	0	0	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0			3.0
Lane Util. Factor	0.94	0.95	0.95			0.88
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	4990	3539	3539			2787
Flt Permitted	0.94	1.00	1.00			1.00
Satd. Flow (perm)	4938	3539	3539			2787
Peak-hour factor, PHF	0.69	0.88	0.92	0.92	0.92	0.71
Adj. Flow (vph)	196	801	729	0	0	230
RTOR Reduction (vph)	0	0	0	0	0	63
Lane Group Flow (vph)	196	801	729	0	0	167
Confl. Bikes (#/hr)				2		
Turn Type	Perm					custom
Protected Phases		2	1			2
Permitted Phases	2	1				2
Actuated Green, G (s)	50.3	74.0	23.7			50.3
Effective Green, g (s)	50.3	74.0	23.7			50.3
Actuated g/C Ratio	0.63	0.92	0.30			0.63
Clearance Time (s)	3.0	3.0	3.0			3.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	3105	3539	1048			1752
v/s Ratio Prot		c0.14	c0.21			0.06
v/s Ratio Perm	0.04	0.08				
v/c Ratio	0.06	0.23	0.70			0.10
Uniform Delay, d1	5.7	0.3	25.0			5.9
Progression Factor	1.00	1.00	1.42			0.04
Incremental Delay, d2	0.0	0.0	2.0			0.0
Delay (s)	5.8	0.3	37.5			0.3
Level of Service	A	A	D			A
Approach Delay (s)		1.4	37.5		0.3	
Approach LOS		A	D		A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	3.0
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	150	168	0	0	0	0	0	986	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6289	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6289	
Peak-hour factor, PHF	0.25	0.95	0.92	0.91	0.90	0.25	0.25	0.25	0.25	0.92	0.97	0.89
Adj. Flow (vph)	0	0	0	165	187	0	0	0	0	0	1016	128
RTOR Reduction (vph)	0	0	0	10	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	0	0	155	187	0	0	0	0	0	1120	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				31.1	31.1						34.9	
Effective Green, g (s)				31.1	31.1						34.9	
Actuated g/C Ratio				0.41	0.41						0.47	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				732	1468						2926	
v/s Ratio Prot					0.05						c0.18	
v/s Ratio Perm				c0.09								
v/c Ratio				0.21	0.13						0.38	
Uniform Delay, d1				14.1	13.6						13.0	
Progression Factor				1.00	1.00						0.62	
Incremental Delay, d2				0.7	0.2						0.1	
Delay (s)				14.7	13.7						8.2	
Level of Service				B	B						A	
Approach Delay (s)		0.0			14.2			0.0			8.2	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	397	947	61	269	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5021		3403	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5021		3403	
Peak-hour factor, PHF	0.82	0.93	0.93	0.82	0.91	0.89
Adj. Flow (vph)	244	427	1018	74	296	36
RTOR Reduction (vph)	7	0	11	0	0	0
Lane Group Flow (vph)	237	427	1081	0	332	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	23.6	23.6	22.4		17.0	
Effective Green, g (s)	23.6	23.6	22.4		17.0	
Actuated g/C Ratio	0.31	0.31	0.30		0.23	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	557	1600	1500		771	
v/s Ratio Prot		0.08	c0.22		c0.10	
v/s Ratio Perm	c0.13					
v/c Ratio	0.43	0.27	0.72		0.43	
Uniform Delay, d1	20.3	19.2	23.5		24.9	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.4	0.4	1.7		0.4	
Delay (s)	22.7	19.6	25.2		25.2	
Level of Service	C	B	C		C	
Approach Delay (s)		20.8	25.2		25.2	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	238	756	876	452	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3057	1417	1403	5826				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3057	1417	1403	5826				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.77	0.83	0.90	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	309	911	973	486	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	75	75	346	291	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	690	380	140	682	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					45.6	45.6	19.4	19.4				
Effective Green, g (s)					45.6	45.6	19.4	19.4				
Actuated g/C Ratio					0.61	0.61	0.26	0.26				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1859	862	363	1507				
v/s Ratio Prot					0.23							
v/s Ratio Perm						c0.27	0.10	0.12				
v/c Ratio					0.37	0.44	0.39	0.45				
Uniform Delay, d1					7.4	7.9	22.9	23.3				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.6	1.6	0.7	0.2				
Delay (s)					8.0	9.5	23.6	23.6				
Level of Service					A	A	C	C				
Approach Delay (s)		0.0			8.6			23.6			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	216	62	0	0	0	0	0	0	480	777	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.96								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3397								1522	4735	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3397								1522	4735	
Peak-hour factor, PHF	0.92	0.89	0.82	0.25	0.25	0.25	0.25	0.25	0.25	0.89	0.82	0.84
Adj. Flow (vph)	0	243	76	0	0	0	0	0	0	539	948	56
RTOR Reduction (vph)	0	30	0	0	0	0	0	0	0	216	34	0
Lane Group Flow (vph)	0	289	0	0	0	0	0	0	0	161	1132	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1585								649	2020	
v/s Ratio Prot		c0.09										
v/s Ratio Perm										0.11	0.24	
v/c Ratio		0.18								0.25	0.56	
Uniform Delay, d1		11.7								13.8	16.2	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.3								0.9	1.1	
Delay (s)		11.9								14.7	17.3	
Level of Service		B								B	B	
Approach Delay (s)		11.9			0.0			0.0			16.7	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	767	0	0	355	218	171	533	35	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3518			3539	1461		3468	1520			
Flt Permitted		0.87			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3078			3539	1461		3468	1520			
Peak-hour factor, PHF	0.63	0.86	0.25	0.99	0.96	0.96	0.84	0.92	0.73	0.25	0.25	0.25
Adj. Flow (vph)	84	892	0	0	370	227	204	579	48	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	155	0	0	6	0	0	0
Lane Group Flow (vph)	0	976	0	0	370	72	0	783	42	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		923			1062	438		1850	811			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.32				0.05		0.23	0.03			
v/c Ratio		1.06			0.35	0.16		0.42	0.05			
Uniform Delay, d1		21.0			16.4	15.5		8.4	6.7			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		46.0			0.9	0.8		0.7	0.1			
Delay (s)		67.0			17.3	16.3		9.2	6.8			
Level of Service		E			B	B		A	A			
Approach Delay (s)		67.0			16.9			9.0			0.0	
Approach LOS		E			B			A			A	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	538	61	22	468	0	0	0	0	287	584	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3451			3529					1734	3515	
Flt Permitted		1.00			0.91					0.95	1.00	
Satd. Flow (perm)		3451			3233					1734	3515	
Peak-hour factor, PHF	0.25	0.91	0.76	0.79	0.91	0.25	0.25	0.25	0.25	0.94	0.96	0.67
Adj. Flow (vph)	0	591	80	28	514	0	0	0	0	305	608	24
RTOR Reduction (vph)	0	24	0	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	647	0	0	542	0	0	0	0	305	626	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1457			1365					732	1484	
v/s Ratio Prot		c0.19									c0.18	
v/s Ratio Perm					0.17					0.18		
v/c Ratio		0.44			0.40					0.42	0.42	
Uniform Delay, d1		9.2			9.0					9.1	9.1	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.0			0.9					1.7	0.9	
Delay (s)		10.2			9.9					10.9	10.0	
Level of Service		B			A					B	B	
Approach Delay (s)		10.2			9.9			0.0			10.3	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	359	7	16	335	37	58	376	21	95	149	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		0.99			1.00			1.00			0.99	
Frt		1.00			0.98			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3471			3446			3459			3347	
Flt Permitted		0.84			0.93			0.87			0.66	
Satd. Flow (perm)		2935			3223			3032			2254	
Peak-hour factor, PHF	0.80	0.92	0.58	0.80	0.83	0.71	0.85	0.86	0.58	0.82	0.97	0.81
Adj. Flow (vph)	76	390	12	20	404	52	68	437	36	116	154	52
RTOR Reduction (vph)	0	3	0	0	18	0	0	13	0	0	36	0
Lane Group Flow (vph)	0	475	0	0	458	0	0	528	0	0	286	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.4			23.4			14.1			14.1	
Effective Green, g (s)		23.4			23.4			14.1			14.1	
Actuated g/C Ratio		0.52			0.52			0.31			0.31	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1526			1676			950			706	
v/s Ratio Prot												
v/s Ratio Perm		c0.16			0.14			c0.17			0.13	
v/c Ratio		0.31			0.27			0.56			0.41	
Uniform Delay, d1		6.2			6.0			12.8			12.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.4			0.7			0.4	
Delay (s)		6.7			6.4			13.6			12.5	
Level of Service		A			A			B			B	
Approach Delay (s)		6.7			6.4			13.6			12.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	208	786	0	0	0	0	0	665	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6268						5032	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6268						5032	
Peak-hour factor, PHF	0.25	0.25	0.25	0.91	0.97	0.25	0.25	0.25	0.25	0.25	0.86	0.86
Adj. Flow (vph)	0	0	0	229	810	0	0	0	0	0	773	44
RTOR Reduction (vph)	0	0	0	0	51	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	0	988	0	0	0	0	0	806	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2716						2222	
v/s Ratio Prot											c0.16	
v/s Ratio Perm					0.16							
v/c Ratio					0.36						0.36	
Uniform Delay, d1					11.4						11.1	
Progression Factor					0.47						1.00	
Incremental Delay, d2					0.4						0.5	
Delay (s)					5.7						11.6	
Level of Service					A						B	
Approach Delay (s)		0.0			5.7			0.0			11.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	848	50	149	827	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6317			6223				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6317			6223				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.78	0.83	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	893	64	180	861	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	7	0	0	45	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	950	0	0	996	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3148			2137				
v/s Ratio Prot					c0.15							
v/s Ratio Perm								0.16				
v/c Ratio					0.30			0.47				
Uniform Delay, d1					8.9			15.4				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.2			0.7				
Delay (s)					9.1			16.1				
Level of Service					A			B				
Approach Delay (s)		0.0			9.1			16.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	57	0	0	907	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.71	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	80	0	0	986	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	252	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	252	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	711	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	80	246	246	246	246
Volume Left	80	0	0	0	0
Volume Right	0	0	0	0	0
cSH	711	1700	1700	1700	1700
Volume to Capacity	0.11	0.14	0.14	0.14	0.14
Queue Length 95th (ft)	10	0	0	0	0
Control Delay (s)	10.7	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.7	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	760	162	0	0	0	0	0	0	43	812	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.97									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6181									5063	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6181									5063	
Peak-hour factor, PHF	0.25	0.96	0.86	0.25	0.25	0.25	0.25	0.25	0.25	0.72	0.93	0.25
Adj. Flow (vph)	0	792	188	0	0	0	0	0	0	60	873	0
RTOR Reduction (vph)	0	41	0	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	939	0	0	0	0	0	0	0	0	920	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2369									2194	
v/s Ratio Prot		c0.15										
v/s Ratio Perm											0.18	
v/c Ratio		0.40									0.42	
Uniform Delay, d1		13.5									11.8	
Progression Factor		0.84									0.56	
Incremental Delay, d2		0.5									0.6	
Delay (s)		11.8									7.2	
Level of Service		B									A	
Approach Delay (s)		11.8			0.0			0.0			7.2	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	605	0	0	0	0	0	282	112	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6374						6065				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6374						6065				
Peak-hour factor, PHF	0.63	0.87	0.25	0.25	0.25	0.25	0.25	0.86	0.97	0.25	0.25	0.25
Adj. Flow (vph)	43	695	0	0	0	0	0	328	115	0	0	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	26	0	0	0	0
Lane Group Flow (vph)	0	718	0	0	0	0	0	417	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		12.4						40.6				
Effective Green, g (s)		12.4						40.6				
Actuated g/C Ratio		0.21						0.68				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1317						4104				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.11										
v/c Ratio		0.55						0.10				
Uniform Delay, d1		21.3						3.4				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.2						0.0				
Delay (s)		21.5						3.4				
Level of Service		C						A				
Approach Delay (s)		21.5			0.0			3.4			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	940	0	0	0	0	0	792	329	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6343						4832				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6343						4832				
Peak-hour factor, PHF	0.85	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	175	959	0	0	0	0	0	843	343	0	0	0
RTOR Reduction (vph)	0	35	0	0	0	0	0	22	0	0	0	0
Lane Group Flow (vph)	0	1099	0	0	0	0	0	1164	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2537						1933				
v/s Ratio Prot								c0.24				
v/s Ratio Perm		0.17										
v/c Ratio		0.43						0.60				
Uniform Delay, d1		9.8						10.7				
Progression Factor		1.03						1.58				
Incremental Delay, d2		0.4						1.2				
Delay (s)		10.5						18.0				
Level of Service		B						B				
Approach Delay (s)		10.5			0.0			18.0			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	816	242	0	0	0	0	0	0	401	1271	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6151									5011	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6151									5011	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.87	0.95	0.25
Adj. Flow (vph)	0	824	263	0	0	0	0	0	0	461	1338	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	38	0
Lane Group Flow (vph)	0	1077	0	0	0	0	0	0	0	0	1761	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2460									2227	
v/s Ratio Prot		c0.18										
v/s Ratio Perm											0.35	
v/c Ratio		0.44									0.79	
Uniform Delay, d1		9.8									10.7	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.6									3.0	
Delay (s)		10.4									13.7	
Level of Service		B									B	
Approach Delay (s)		10.4			0.0			0.0			13.7	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	6	308	47	293	294	0	0	180	1379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.97			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1815			1863	1559
Flt Permitted				0.95	1.00	1.00		0.74			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1373			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.50	0.78	0.84	0.84	0.90	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	12	395	56	349	327	0	0	196	1407
RTOR Reduction (vph)	0	0	0	0	0	43	0	0	0	0	0	42
Lane Group Flow (vph)	0	0	0	12	395	13	0	676	0	0	196	1365
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.3	14.3	14.3		34.7			34.7	34.7
Effective Green, g (s)				14.3	14.3	14.3		34.7			34.7	34.7
Actuated g/C Ratio				0.24	0.24	0.24		0.58			0.58	0.58
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				411	444	351		794			1077	902
v/s Ratio Prot					c0.21						0.11	
v/s Ratio Perm				0.01		0.01		0.49				c0.88
v/c Ratio				0.03	0.89	0.04		0.85			0.18	1.51
Uniform Delay, d1				17.5	22.1	17.6		10.5			6.0	12.6
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	19.1	0.0		11.1			0.4	236.6
Delay (s)				17.6	41.2	17.6		21.6			6.3	249.3
Level of Service				B	D	B		C			A	F
Approach Delay (s)		0.0			37.7			21.6			219.6	
Approach LOS		A			D			C			F	

Intersection Summary			
HCM Average Control Delay	140.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	147.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	154	524	55	47	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3501		3191	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3501		3191	1441
Peak-hour factor, PHF	0.92	0.90	0.86	0.60	0.84	0.94
Adj. Flow (vph)	0	171	609	92	56	654
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	780	0	475	327
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1268		1149	519
v/s Ratio Prot						
v/s Ratio Perm			0.22		0.15	c0.23
v/c Ratio			0.62		0.41	0.63
Uniform Delay, d1			11.8		10.8	11.9
Progression Factor			0.68		1.00	1.00
Incremental Delay, d2			0.2		1.1	5.7
Delay (s)			8.2		11.9	17.6
Level of Service			A		B	B
Approach Delay (s)			8.2		14.3	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	523	69	0	0	0	0	446	62	1	58	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.98			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4907						1830			1858	
Flt Permitted		0.99						1.00			0.71	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.86	0.93	0.72	0.25	0.25	0.25	0.25	0.75	0.70	0.25	0.76	0.25
Adj. Flow (vph)	283	562	96	0	0	0	0	595	89	4	76	0
RTOR Reduction (vph)	0	31	0	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	910	0	0	0	0	0	672	0	0	80	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						630			448	
v/s Ratio Prot								c0.37				
v/s Ratio Perm		c0.91									0.06	
v/c Ratio		1.82						1.07			0.18	
Uniform Delay, d1		11.2						14.8			10.3	
Progression Factor		1.00						1.00			0.03	
Incremental Delay, d2		376.8						55.1			0.8	
Delay (s)		388.1						69.8			1.2	
Level of Service		F						E			A	
Approach Delay (s)		388.1			0.0			69.8			1.2	
Approach LOS		F			A			E			A	

Intersection Summary			
HCM Average Control Delay	242.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.51		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	245	255	1069	772	235	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.93		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3302		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3302		1770	3539
Peak-hour factor, PHF	0.91	0.78	0.94	0.84	0.92	0.88
Adj. Flow (vph)	269	327	1137	919	255	875
RTOR Reduction (vph)	0	97	159	0	0	0
Lane Group Flow (vph)	269	230	1897	0	255	875
Turn Type		custom			Prot	
Protected Phases	4		6		5	2
Permitted Phases		2				
Actuated Green, G (s)	18.8	63.2	37.1		22.1	63.2
Effective Green, g (s)	18.8	63.2	37.1		22.1	63.2
Actuated g/C Ratio	0.21	0.70	0.41		0.25	0.70
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	370	1112	1361		435	2485
v/s Ratio Prot	c0.15		c0.57		c0.14	0.25
v/s Ratio Perm		0.15				
v/c Ratio	0.73	0.21	1.39		0.59	0.35
Uniform Delay, d1	33.2	4.7	26.4		29.9	5.3
Progression Factor	1.00	1.00	1.00		0.77	1.12
Incremental Delay, d2	7.0	0.4	181.9		4.9	0.3
Delay (s)	40.2	5.1	208.3		27.9	6.3
Level of Service	D	A	F		C	A
Approach Delay (s)	20.9		208.3			11.1
Approach LOS	C		F			B

Intersection Summary			
HCM Average Control Delay	119.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	665	466	148	383	623
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.96		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3403		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3403		1770	1583
Peak-hour factor, PHF	0.84	0.86	0.87	0.80	0.91	0.85
Adj. Flow (vph)	417	773	536	185	421	733
RTOR Reduction (vph)	0	0	52	0	0	371
Lane Group Flow (vph)	417	773	669	0	421	362
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.1	32.6	14.5		19.8	19.8
Effective Green, g (s)	14.1	32.6	14.5		19.8	19.8
Actuated g/C Ratio	0.23	0.54	0.24		0.33	0.33
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	413	1910	817		580	519
v/s Ratio Prot	c0.24	0.22	c0.20		c0.24	
v/s Ratio Perm						0.23
v/c Ratio	1.01	0.40	0.82		0.73	0.70
Uniform Delay, d1	23.1	8.2	21.7		17.9	17.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	46.7	0.1	6.4		4.5	4.1
Delay (s)	69.9	8.3	28.1		22.4	21.8
Level of Service	E	A	C		C	C
Approach Delay (s)		29.9	28.1		22.0	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	298	768	224	0	696	629	350	785	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4906			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4906			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.91	0.84	0.92	0.93	0.84	0.90	0.91	0.92
Adj. Flow (vph)	0	0	310	844	267	0	748	749	389	863	0
RTOR Reduction (vph)	0	0	0	46	0	0	0	102	0	0	0
Lane Group Flow (vph)	0	0	0	1375	0	0	748	647	389	863	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				29.4			20.7	20.7	26.9	51.6	
Effective Green, g (s)				29.4			20.7	20.7	26.9	51.6	
Actuated g/C Ratio				0.33			0.23	0.23	0.30	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1603			814	364	529	2029	
v/s Ratio Prot				c0.28			0.21		c0.22	0.24	
v/s Ratio Perm								c0.41			
v/c Ratio				0.86			0.92	1.78	0.74	0.43	
Uniform Delay, d1				28.3			33.8	34.6	28.4	10.8	
Progression Factor				1.00			1.39	1.56	1.00	1.00	
Incremental Delay, d2				4.8			2.1	350.4	5.3	0.1	
Delay (s)				33.1			49.1	404.6	33.6	11.0	
Level of Service				C			D	F	C	B	
Approach Delay (s)	0.0			33.1			227.0			18.0	
Approach LOS	A			C			F			B	

Intersection Summary			
HCM Average Control Delay	98.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	329	830	424	163	444	483	144	263	19	456
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95				1.00	0.95
Frt	1.00	0.99	0.85	0.85	0.91				1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (prot)	1610	3166	1441	1583	3235				1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00				0.95	1.00
Satd. Flow (perm)	1610	3166	1441	1583	3235				1770	3539
Peak-hour factor, PHF	0.70	0.94	0.87	0.74	0.81	0.84	0.90	0.83	0.68	0.91
Adj. Flow (vph)	470	883	487	220	548	575	160	317	28	501
RTOR Reduction (vph)	0	0	0	41	12	0	0	0	0	0
Lane Group Flow (vph)	423	993	424	179	1271	0	0	0	345	501
Turn Type	Split		Prot	Perm				Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4						
Actuated Green, G (s)	28.0	28.0	28.0	28.0	37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0	28.0	37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0				3.0	3.0
Lane Grp Cap (vph)	501	985	448	492	1330				236	2084
v/s Ratio Prot	0.26	c0.31	0.29		c0.39				c0.19	0.14
v/s Ratio Perm				0.11						
v/c Ratio	0.84	1.01	0.95	0.36	1.09dr				1.46	0.24
Uniform Delay, d1	29.0	31.0	30.3	24.1	25.7				39.0	8.9
Progression Factor	0.80	0.82	0.81	0.70	1.00				1.00	1.00
Incremental Delay, d2	1.7	10.7	5.2	0.2	16.1				229.7	0.3
Delay (s)	24.9	36.0	29.7	17.0	41.8				268.7	9.1
Level of Service	C	D	C	B	D				F	A
Approach Delay (s)		30.4			41.8					115.0
Approach LOS		C			D					F

Intersection Summary			
HCM Average Control Delay	51.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1240	172	242	820	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4864				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4864				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.91	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1292	189	247	872	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	23	0	21	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1292	167	0	1098	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1783				
v/s Ratio Prot					c0.25							
v/s Ratio Perm						0.11		0.23				
v/c Ratio					0.51	0.21		0.62				
Uniform Delay, d1					10.1	8.4		15.5				
Progression Factor					1.00	1.00		1.30				
Incremental Delay, d2					0.7	0.6		1.2				
Delay (s)					10.8	9.0		21.4				
Level of Service					B	A		C				
Approach Delay (s)		0.0			10.6			21.4			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	502	1008	0	0	0	0	0	533	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4772						3500	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4772						3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.90	0.97	0.92	0.92	0.92	0.92	0.92	0.75	0.86
Adj. Flow (vph)	0	0	0	558	1039	0	0	0	0	0	711	56
RTOR Reduction (vph)	0	0	0	48	35	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	337	1177	0	0	0	0	0	757	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2306						1342	
v/s Ratio Prot											c0.22	
v/s Ratio Perm				0.22	0.25							
v/c Ratio				0.46	0.51						0.56	
Uniform Delay, d1				10.3	10.6						14.6	
Progression Factor				1.64	1.44						1.00	
Incremental Delay, d2				1.8	0.7						1.7	
Delay (s)				18.6	16.0						16.3	
Level of Service				B	B						B	
Approach Delay (s)		0.0			16.6			0.0			16.3	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	437	8	13	185	15	12	18	22	50	37	33
Peak Hour Factor	0.90	0.94	0.67	0.81	0.84	0.63	0.75	0.75	0.79	0.74	0.77	0.69
Hourly flow rate (vph)	188	465	12	16	220	24	16	24	28	68	48	48

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	188	477	260	68	163
Volume Left (vph)	188	0	16	16	68
Volume Right (vph)	0	12	24	28	48
Hadj (s)	0.53	0.02	-0.01	-0.17	-0.06
Departure Headway (s)	6.1	5.6	5.6	6.3	6.1
Degree Utilization, x	0.32	0.74	0.40	0.12	0.28
Capacity (veh/h)	571	628	615	506	531
Control Delay (s)	10.8	21.7	12.3	10.2	11.5
Approach Delay (s)	18.6		12.3	10.2	11.5
Approach LOS	C		B	B	B

Intersection Summary			
Delay	15.7		
HCM Level of Service	C		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

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-------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
*******************************************************************************
Average Delay (sec/veh):      9.0       Worst Case Level Of Service: D[ 28.3]
*******************************************************************************
Street Name:         Harrison Street         Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1060     0     0    0   491     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1060     0     0    0   491     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1060     0     0    0   491     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1152     0     0    0   534     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1152     0     0    0   534     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   384  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   668  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   668  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.80  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   8.1  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  28.3 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     D     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx              28.3           xxxxxx
ApproachLOS:         *                *                 D                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	468	165	1004	422	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1730	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1730	3539	1583	
Peak-hour factor, PHF	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	482	179	1091	459	30
RTOR Reduction (vph)	79	55	0	0	0
Lane Group Flow (vph)	249	278	1091	489	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	12.9	12.9	39.6	16.6	
Effective Green, g (s)	12.9	12.9	39.6	16.6	
Actuated g/C Ratio	0.22	0.22	0.66	0.28	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	361	372	2336	438	
v/s Ratio Prot			c0.31	c0.31	
v/s Ratio Perm	0.15	0.16			
v/c Ratio	0.69	0.75	0.47	1.12	
Uniform Delay, d1	21.7	22.0	5.0	21.7	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.3	7.0	0.7	78.6	
Delay (s)	26.0	29.0	5.7	100.3	
Level of Service	C	C	A	F	
Approach Delay (s)		27.5	35.0		
Approach LOS		C	C		

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	38	110	74	20	45	15	150	134	14	235	307	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.93			1.00	1.00	0.91		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1477			1770	1863	1442		3433	3494	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1477			1770	1863	1442		3433	3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	120	80	22	49	16	163	141	15	255	334	28
RTOR Reduction (vph)	0	0	13	0	0	0	0	118	0	0	5	0
Lane Group Flow (vph)	41	120	89	0	0	65	163	23	0	270	357	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	5.2	12.7	12.7			7.4	14.9	14.9		12.3	44.6	
Effective Green, g (s)	5.2	12.7	12.7			7.4	14.9	14.9		12.3	44.6	
Actuated g/C Ratio	0.06	0.14	0.14			0.08	0.17	0.17		0.14	0.50	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	102	499	208			146	308	239		469	1731	
v/s Ratio Prot	0.02	0.03				0.04	c0.09			c0.08	c0.10	
v/s Ratio Perm			c0.06					0.02				
v/c Ratio	0.40	0.24	0.43			0.45	0.53	0.10		0.58	0.21	
Uniform Delay, d1	40.9	34.4	35.3			39.3	34.3	31.8		36.4	12.8	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.3	1.4			2.2	1.6	0.2		1.7	0.3	
Delay (s)	43.5	34.6	36.8			41.5	36.0	32.0		38.1	13.0	
Level of Service	D	C	D			D	D	C		D	B	
Approach Delay (s)		36.8					35.4				23.7	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	96	939	95	94
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3450		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3450		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	1021	103	102
RTOR Reduction (vph)	0	5	0	0
Lane Group Flow (vph)	104	1221	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	9.3	41.6		
Effective Green, g (s)	9.3	41.6		
Actuated g/C Ratio	0.10	0.46		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	183	1595		
v/s Ratio Prot	0.06	c0.35		
v/s Ratio Perm				
v/c Ratio	0.57	0.77		
Uniform Delay, d1	38.4	20.1		
Progression Factor	1.00	1.00		
Incremental Delay, d2	4.0	3.6		
Delay (s)	42.4	23.7		
Level of Service	D	C		
Approach Delay (s)		25.2		
Approach LOS		C		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	161	77	33	280	289	48	457	37	94	511	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1746	3321			3516	1543	1759	3484		1766	3492	
Flt Permitted	0.55	1.00			0.90	1.00	0.37	1.00		0.43	1.00	
Satd. Flow (perm)	1014	3321			3169	1543	692	3484		799	3492	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.95	0.92	0.92	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	173	84	36	295	314	52	471	40	102	555	47
RTOR Reduction (vph)	0	48	0	0	0	148	0	7	0	0	7	0
Lane Group Flow (vph)	61	209	0	0	331	166	52	504	0	102	595	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	429	1407			1342	654	309	1558		357	1561	
v/s Ratio Prot		0.06						0.14			c0.17	
v/s Ratio Perm	0.06				0.10	c0.11	0.08			0.13		
v/c Ratio	0.14	0.15			0.25	0.25	0.17	0.32		0.29	0.38	
Uniform Delay, d1	15.0	15.1			15.8	15.8	14.1	15.2		14.9	15.7	
Progression Factor	1.00	0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.2			0.4	0.9	1.2	0.6		2.0	0.7	
Delay (s)	15.7	14.5			16.2	16.8	15.2	15.7		16.9	16.4	
Level of Service	B	B			B	B	B	B		B	B	
Approach Delay (s)		14.8			16.5			15.7			16.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	343	354	134	43	244	107	81	360	22	46	327	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1561	1765	1863	1547	1761	3498		1764	3361	
Flt Permitted	0.49	1.00	1.00	0.53	1.00	1.00	0.29	1.00		0.38	1.00	
Satd. Flow (perm)	916	1863	1561	992	1863	1547	529	3498		710	3361	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	373	385	146	47	265	116	84	391	24	50	355	145
RTOR Reduction (vph)	0	0	57	0	0	57	0	7	0	0	69	0
Lane Group Flow (vph)	373	385	89	47	265	59	84	408	0	50	431	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	59.9	52.0	52.0	46.3	42.9	42.9	16.1	16.1		16.1	16.1	
Effective Green, g (s)	59.9	52.0	52.0	46.3	42.9	42.9	16.1	16.1		16.1	16.1	
Actuated g/C Ratio	0.70	0.61	0.61	0.54	0.50	0.50	0.19	0.19		0.19	0.19	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	771	1140	955	571	940	781	100	663		134	637	
v/s Ratio Prot	c0.07	0.21		0.00	0.14			0.12			0.13	
v/s Ratio Perm	c0.27		0.06	0.04		0.04	c0.16			0.07		
v/c Ratio	0.48	0.34	0.09	0.08	0.28	0.07	0.84	0.61		0.37	0.68	
Uniform Delay, d1	5.3	8.1	6.8	9.1	12.2	10.8	33.2	31.6		30.0	32.0	
Progression Factor	1.00	1.00	1.00	0.65	0.68	0.36	0.91	0.89		1.00	1.00	
Incremental Delay, d2	0.2	0.8	0.2	0.0	0.7	0.2	41.3	1.2		0.6	2.2	
Delay (s)	5.5	8.9	7.0	5.9	9.0	4.1	71.5	29.4		30.7	34.3	
Level of Service	A	A	A	A	A	A	E	C		C	C	
Approach Delay (s)		7.2			7.4			36.5			34.0	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	155	823	0	0	149	286	5	259	25	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1608	3387			3539	2787		5007				
Flt Permitted	0.65	0.95			1.00	1.00		1.00				
Satd. Flow (perm)	1099	3219			3539	2787		5007				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	895	0	0	162	311	5	282	27	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	187	0	16	0	0	0	0
Lane Group Flow (vph)	151	912	0	0	162	124	0	298	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	440	1288			1416	1115		2003				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.14	c0.28				0.04		0.06				
v/c Ratio	0.34	0.71			0.11	0.11		0.15				
Uniform Delay, d1	8.3	10.0			7.5	7.5		7.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.1	3.3			0.2	0.2		0.2				
Delay (s)	10.5	13.4			7.7	7.7		7.8				
Level of Service	B	B			A	A		A				
Approach Delay (s)		12.9			7.7			7.8			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	280	27	11	158	0	0	0	0	681	990	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1558		3526					1610	3369	1583
Flt Permitted		1.00	1.00		0.93					0.95	0.99	1.00
Satd. Flow (perm)		3539	1558		3296					1610	3369	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	0	304	29	12	172	0	0	0	0	740	1065	382
RTOR Reduction (vph)	0	0	19	0	0	0	0	0	0	0	0	185
Lane Group Flow (vph)	0	304	10	0	184	0	0	0	0	585	1220	197
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	545		1154					832	1741	818
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.01		0.06					c0.36	0.36	0.12
v/c Ratio		0.25	0.02		0.16					0.70	0.70	0.24
Uniform Delay, d1		13.9	12.8		13.4					11.0	11.0	8.0
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.1		0.3					4.9	2.4	0.7
Delay (s)		14.3	12.8		13.7					15.9	13.4	8.7
Level of Service		B	B		B					B	B	A
Approach Delay (s)		14.2			13.7			0.0			13.2	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	195	568	669	122	765	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3441		3431	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3441		3431	1414
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	617	727	133	832	214
RTOR Reduction (vph)	0	0	17	0	2	136
Lane Group Flow (vph)	212	617	843	0	851	57
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.8	48.2	31.4		23.8	23.8
Effective Green, g (s)	12.8	48.2	31.4		23.8	23.8
Actuated g/C Ratio	0.16	0.60	0.39		0.30	0.30
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	283	2132	1351		1021	421
v/s Ratio Prot	c0.12	0.17	c0.24		c0.25	
v/s Ratio Perm						0.04
v/c Ratio	0.75	0.29	0.62		0.83	0.14
Uniform Delay, d1	32.1	7.7	19.6		26.2	20.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.1	0.3	2.2		5.7	0.1
Delay (s)	41.2	8.0	21.7		31.9	20.6
Level of Service	D	A	C		C	C
Approach Delay (s)		16.5	21.7		29.9	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	776	357	68	419	65	201	256	31	86	354	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1766	3427	1553	1768	3348		1768	3470		1757	3430	
Flt Permitted	0.32	1.00	1.00	0.16	1.00		0.41	1.00		0.57	1.00	
Satd. Flow (perm)	599	3427	1553	304	3348		761	3470		1049	3430	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	808	388	74	455	71	218	269	34	93	385	84
RTOR Reduction (vph)	0	0	276	0	14	0	0	11	0	0	20	0
Lane Group Flow (vph)	117	808	112	74	512	0	218	292	0	93	449	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.5	24.5	24.5	24.5	24.5		50.0	50.0		36.2	36.2	
Effective Green, g (s)	24.5	24.5	24.5	24.5	24.5		50.0	50.0		36.2	36.2	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29		0.59	0.59		0.43	0.43	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	173	988	448	88	965		558	2041		447	1461	
v/s Ratio Prot		0.24			0.15		c0.04	0.08			0.13	
v/s Ratio Perm	0.20		0.07	c0.24			c0.19			0.09		
v/c Ratio	0.68	0.82	0.25	0.84	0.53		0.39	0.14		0.21	0.31	
Uniform Delay, d1	26.7	28.2	23.2	28.4	25.4		8.5	7.9		15.4	16.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.14	1.17	
Incremental Delay, d2	19.2	7.5	1.3	59.2	2.1		0.2	0.1		1.0	0.5	
Delay (s)	46.0	35.7	24.5	87.6	27.5		8.7	8.0		18.5	19.4	
Level of Service	D	D	C	F	C		A	A		B	B	
Approach Delay (s)		33.3			34.9			8.3			19.3	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM Average Control Delay	26.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	653	62	94	484	72	100	416	90	60	360	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			0.99		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1753	3369			3324		1763	3539	1530	1761	3430	
Flt Permitted	0.25	1.00			0.64		0.46	1.00	1.00	0.47	1.00	
Satd. Flow (perm)	467	3369			2128		846	3539	1530	873	3430	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	710	67	102	526	78	109	452	98	65	391	85
RTOR Reduction (vph)	0	10	0	0	13	0	0	0	46	0	19	0
Lane Group Flow (vph)	95	767	0	0	693	0	109	452	52	65	457	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	29.7	29.7			29.7		42.3	42.3	42.3	42.3	42.3	
Effective Green, g (s)	29.7	29.7			29.7		42.3	42.3	42.3	42.3	42.3	
Actuated g/C Ratio	0.37	0.37			0.37		0.53	0.53	0.53	0.53	0.53	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	173	1251			790		447	1871	809	462	1814	
v/s Ratio Prot		0.23						0.13			c0.13	
v/s Ratio Perm	0.20				c0.33		0.13		0.03	0.07		
v/c Ratio	0.55	0.61			0.88		0.24	0.24	0.06	0.14	0.25	
Uniform Delay, d1	19.9	20.5			23.4		10.2	10.2	9.2	9.6	10.2	
Progression Factor	1.00	1.00			1.18		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	0.6			10.4		1.3	0.3	0.2	0.6	0.3	
Delay (s)	21.8	21.1			38.2		11.5	10.5	9.3	10.2	10.6	
Level of Service	C	C			D		B	B	A	B	B	
Approach Delay (s)		21.2			38.2			10.5			10.5	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	386	312	119	439	0	0	0	0	10	158	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.93		1.00	1.00						0.98	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		3113		1770	3427						3416	
Flt Permitted		1.00		0.22	1.00						1.00	
Satd. Flow (perm)		3113		406	3427						3416	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	415	339	129	477	0	0	0	0	11	172	21
RTOR Reduction (vph)	0	171	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	583	0	129	477	0	0	0	0	0	193	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.6		43.0	43.0						29.0	
Effective Green, g (s)		31.6		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1230		327	1842						1238	
v/s Ratio Prot		c0.19		c0.03	0.14							
v/s Ratio Perm				0.18							0.06	
v/c Ratio		0.47		0.39	0.26						0.16	
Uniform Delay, d1		18.0		10.8	9.9						17.2	
Progression Factor		2.64		1.00	1.00						1.00	
Incremental Delay, d2		1.2		0.3	0.3						0.3	
Delay (s)		48.7		11.1	10.3						17.5	
Level of Service		D		B	B						B	
Approach Delay (s)		48.7			10.5			0.0			17.5	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	148	77	406	547	119	121	741	341	33	686	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	3539	1479	3433	3539	1485		5037	1419		4961	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.68	1.00		0.86	
Satd. Flow (perm)	3433	3539	1479	3433	3539	1485		3435	1419		4256	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	67	161	84	441	595	129	132	805	371	36	738	97
RTOR Reduction (vph)	0	0	31	0	0	72	0	0	237	0	16	0
Lane Group Flow (vph)	67	161	53	441	595	57	0	937	134	0	855	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	5.5	33.7	33.7	15.3	44.5	44.5		36.0	36.0		36.0	
Effective Green, g (s)	5.5	33.7	33.7	15.3	44.5	44.5		36.0	36.0		36.0	
Actuated g/C Ratio	0.06	0.34	0.34	0.15	0.44	0.44		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	189	1193	498	525	1575	661		1237	511		1532	
v/s Ratio Prot	0.02	0.05		c0.13	c0.17							
v/s Ratio Perm			0.04			0.04		c0.27	0.09		0.20	
v/c Ratio	0.35	0.13	0.11	0.84	0.38	0.09		0.76	0.26		0.56	
Uniform Delay, d1	45.5	23.0	22.8	41.2	18.5	16.0		28.2	22.6		25.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.2	0.4	11.1	0.7	0.3		4.4	1.2		1.5	
Delay (s)	46.0	23.3	23.2	52.3	19.2	16.3		32.5	23.8		27.1	
Level of Service	D	C	C	D	B	B		C	C		C	
Approach Delay (s)		28.1			31.4			30.1			27.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	59	38	99	947	1088	313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.97		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.94		1.00	1.00	0.97	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3199		1766	3725	6191	
Flt Permitted	0.97		0.14	1.00	1.00	
Satd. Flow (perm)	3199		253	3725	6191	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.93	0.92
Adj. Flow (vph)	64	41	108	986	1170	340
RTOR Reduction (vph)	38	0	0	0	30	0
Lane Group Flow (vph)	67	0	108	986	1480	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	6.0		60.5	54.5	54.5	
Effective Green, g (s)	6.0		60.5	54.5	54.5	
Actuated g/C Ratio	0.08		0.76	0.68	0.68	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	240		305	2538	4218	
v/s Ratio Prot	c0.02		c0.03	c0.26	0.24	
v/s Ratio Perm			0.24			
v/c Ratio	0.28		0.35	0.39	0.35	
Uniform Delay, d1	35.0		2.7	5.5	5.3	
Progression Factor	1.00		1.49	1.17	1.00	
Incremental Delay, d2	0.6		0.6	0.4	0.2	
Delay (s)	35.6		4.6	6.9	5.6	
Level of Service	D		A	A	A	
Approach Delay (s)	35.6			6.7	5.6	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	7.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	101	30	87	326	1	1
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	33	95	354	1	1
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			144		679	135
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			144		679	135
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		100	100
cM capacity (veh/h)			1436		387	907

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	142	449	2
Volume Left	0	95	1
Volume Right	33	0	1
cSH	1700	1436	542
Volume to Capacity	0.08	0.07	0.00
Queue Length 95th (ft)	0	5	0
Control Delay (s)	0.0	2.1	11.7
Lane LOS		A	B
Approach Delay (s)	0.0	2.1	11.7
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	128	103	138	190	2	2
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	112	150	207	2	2
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			253		728	221
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			253		728	221
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			89		99	100
cM capacity (veh/h)			1310		338	801

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	251	357	4
Volume Left	0	150	2
Volume Right	112	0	2
cSH	1700	1310	476
Volume to Capacity	0.15	0.11	0.01
Queue Length 95th (ft)	0	10	1
Control Delay (s)	0.0	4.0	12.6
Lane LOS		A	B
Approach Delay (s)	0.0	4.0	12.6
Approach LOS			B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	93	8	39	396	25	15
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	1.00	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	101	8	42	430	27	16
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked						
vC, conflicting volume			111		638	123
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			111		638	123
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		94	98
cM capacity (veh/h)			1476		422	914

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	109	473	14	14	8	8
Volume Left	0	42	14	14	0	0
Volume Right	8	0	0	0	8	8
cSH	1700	1476	422	422	914	914
Volume to Capacity	0.06	0.03	0.03	0.03	0.01	0.01
Queue Length 95th (ft)	0	2	2	2	1	1
Control Delay (s)	0.0	0.9	13.8	13.8	9.0	9.0
Lane LOS		A	B	B	A	A
Approach Delay (s)	0.0	0.9	12.0			
Approach LOS			B			

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	190	56	50	51	0	0	0	0	154	400	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.94						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.99	
Satd. Flow (prot)		1863	1341		1712						4795	
Flt Permitted		1.00	1.00		0.63						0.99	
Satd. Flow (perm)		1863	1341		1100						4795	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	207	61	54	55	0	0	0	0	167	435	33
RTOR Reduction (vph)	0	0	50	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	207	11	0	109	0	0	0	0	0	632	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		14.8	14.8		14.8						57.2	
Effective Green, g (s)		14.8	14.8		14.8						57.2	
Actuated g/C Ratio		0.18	0.18		0.18						0.72	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		345	248		204						3428	
v/s Ratio Prot		c0.11										
v/s Ratio Perm			0.01		0.10						0.13	
v/c Ratio		0.60	0.05		0.53						0.18	
Uniform Delay, d1		29.9	26.8		29.5						3.7	
Progression Factor		1.00	1.00		1.00						0.71	
Incremental Delay, d2		2.9	0.1		2.7						0.1	
Delay (s)		32.8	26.9		32.2						2.8	
Level of Service		C	C		C						A	
Approach Delay (s)		31.5			32.2			0.0			2.8	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	172	4	0	39	34	10	202	81	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			1.00	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1847			1643			3514	1376			
Flt Permitted		0.99			1.00			1.00	1.00			
Satd. Flow (perm)		1839			1643			3514	1376			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	187	4	0	42	37	11	220	88	0	0	0
RTOR Reduction (vph)	0	1	0	0	13	0	0	0	74	0	0	0
Lane Group Flow (vph)	0	198	0	0	66	0	0	231	14	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		29.7			29.7			7.3	7.3			
Effective Green, g (s)		29.7			29.7			7.3	7.3			
Actuated g/C Ratio		0.66			0.66			0.16	0.16			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1214			1084			570	223			
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.11						0.07	0.01			
v/c Ratio		0.16			0.06			0.41	0.06			
Uniform Delay, d1		2.9			2.7			16.9	16.0			
Progression Factor		0.89			1.00			1.00	1.00			
Incremental Delay, d2		0.3			0.1			0.2	0.0			
Delay (s)		2.9			2.8			17.1	16.0			
Level of Service		A			A			B	B			
Approach Delay (s)		2.9			2.8			16.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	114	17	24	0	35	0	319	38	42	354	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			1.00	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1751	1822			1649			3455			3508	
Flt Permitted	0.72	1.00			0.89			1.00			0.88	
Satd. Flow (perm)	1319	1822			1499			3455			3103	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	124	18	26	0	38	0	347	41	46	385	0
RTOR Reduction (vph)	0	10	0	0	22	0	0	20	0	0	0	0
Lane Group Flow (vph)	12	132	0	0	42	0	0	368	0	0	431	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	557	769			633			1305			1172	
v/s Ratio Prot		c0.07						0.11				
v/s Ratio Perm	0.01				0.03						c0.14	
v/c Ratio	0.02	0.17			0.07			0.28			0.37	
Uniform Delay, d1	7.6	8.1			7.7			9.8			10.1	
Progression Factor	1.00	1.00			1.22			1.00			1.00	
Incremental Delay, d2	0.1	0.5			0.2			0.5			0.9	
Delay (s)	7.7	8.6			9.6			10.3			11.0	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.5			9.6			10.3			11.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	77	20	12	196	99	34	458	24	158	163	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.95			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3401			3325			3497		1769	3383	
Flt Permitted		0.86			0.94			0.92		0.38	1.00	
Satd. Flow (perm)		2947			3133			3237		712	3383	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	84	22	13	209	108	37	467	26	172	177	63
RTOR Reduction (vph)	0	18	0	0	90	0	0	5	0	0	20	0
Lane Group Flow (vph)	0	109	0	0	240	0	0	526	0	172	220	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.9			9.9			30.0		41.1	41.1	
Effective Green, g (s)		9.9			9.9			30.0		41.1	41.1	
Actuated g/C Ratio		0.16			0.16			0.50		0.68	0.68	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		486			517			1619		604	2317	
v/s Ratio Prot										c0.03	0.07	
v/s Ratio Perm		0.04			c0.08			c0.16		0.16		
v/c Ratio		0.22			0.46			0.32		0.28	0.10	
Uniform Delay, d1		21.7			22.7			9.0		3.6	3.2	
Progression Factor		1.00			0.99			1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.6			0.5		0.3	0.1	
Delay (s)		22.0			23.1			9.5		3.9	3.3	
Level of Service		C			C			A		A	A	
Approach Delay (s)		22.0			23.1			9.5			3.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	152	61	48	154	111	60	478	68	63	413	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.96			0.95			0.98			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		3318			3149			3412			4981	
Flt Permitted		0.94			0.88			0.86			0.80	
Satd. Flow (perm)		3130			2791			2958			4009	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	165	66	52	167	121	65	514	74	68	449	28
RTOR Reduction (vph)	0	42	0	0	77	0	0	17	0	0	10	0
Lane Group Flow (vph)	0	198	0	0	263	0	0	636	0	0	535	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1148			1023			1483			1203	
v/s Ratio Prot								c0.05				
v/s Ratio Perm		0.06			c0.09			c0.16			0.13	
v/c Ratio		0.17			0.26			0.43			0.44	
Uniform Delay, d1		12.8			13.3			10.1			17.0	
Progression Factor		0.85			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.6			0.9			1.2	
Delay (s)		11.2			13.9			11.0			18.2	
Level of Service		B			B			B			B	
Approach Delay (s)		11.2			13.9			11.0			18.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	277	0	0	252	86	32	190	94	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3512			3366	1337		5008	1456			
Flt Permitted		0.91			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3225			3366	1337		5008	1456			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	301	0	0	274	93	35	207	102	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	17	0	0	90	0	0	0
Lane Group Flow (vph)	0	331	0	0	282	67	0	242	12	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		63.8			63.8	63.8		9.2	9.2			
Effective Green, g (s)		63.8			63.8	63.8		9.2	9.2			
Actuated g/C Ratio		0.80			0.80	0.80		0.12	0.12			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2572			2684	1066		576	167			
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.10				0.05		0.05	0.01			
v/c Ratio		0.13			0.11	0.06		0.42	0.07			
Uniform Delay, d1		1.8			1.8	1.7		32.9	31.6			
Progression Factor		1.00			0.26	0.01		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.5	0.2			
Delay (s)		1.9			0.5	0.1		33.4	31.8			
Level of Service		A			A	A		C	C			
Approach Delay (s)		1.9			0.4			32.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	226	150	158	249	0	0	0	0	67	340	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.94	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1422	1610	3350						4452	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1422	1610	3148						4452	
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	246	158	172	271	0	0	0	0	73	370	97
RTOR Reduction (vph)	0	0	112	0	0	0	0	0	0	0	43	0
Lane Group Flow (vph)	0	246	46	143	300	0	0	0	0	0	497	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1654						1725	
v/s Ratio Prot		c0.07		c0.09	0.04							
v/s Ratio Perm			0.03		0.06						0.11	
v/c Ratio		0.26	0.12	0.44	0.18						0.29	
Uniform Delay, d1		23.4	22.5	28.1	10.5						16.9	
Progression Factor		1.09	1.76	1.26	1.75						1.12	
Incremental Delay, d2		0.7	0.7	0.3	0.0						0.0	
Delay (s)		26.3	40.2	35.7	18.3						18.9	
Level of Service		C	D	D	B						B	
Approach Delay (s)		31.7			23.9			0.0			18.9	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations										
Volume (vph)	122	171	61	30	318	400	337	59	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0	4.0	4.0		
Lane Util. Factor	0.94				0.95	0.91	0.91	1.00		
Frpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Frt	0.91				1.00	0.97	0.85	0.85		
Flt Protected	0.98				0.99	1.00	1.00	1.00		
Satd. Flow (prot)	4696				3500	3286	1441	1583		
Flt Permitted	0.98				0.99	1.00	1.00	1.00		
Satd. Flow (perm)	4696				3500	3286	1441	1583		
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.96	0.92	0.96	0.96	0.92	0.92
Adj. Flow (vph)	133	186	65	32	331	435	351	61	0	0
RTOR Reduction (vph)	142	0	0	0	0	0	0	24	0	0
Lane Group Flow (vph)	177	0	0	0	428	547	239	37	0	0
Confl. Peds. (#/hr)								102		
Confl. Bikes (#/hr)					6			10		
Turn Type			Split	Split			custom	custom		
Protected Phases	1		8	8	8	2	6	6		
Permitted Phases	1						6			
Actuated Green, G (s)	19.0				24.0	25.0	48.0	48.0		
Effective Green, g (s)	19.0				24.0	25.0	48.0	48.0		
Actuated g/C Ratio	0.24				0.30	0.31	0.60	0.60		
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0		
Vehicle Extension (s)	2.0				2.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	1115				1050	1027	865	950		
v/s Ratio Prot	0.04				c0.12	c0.17	c0.17	0.02		
v/s Ratio Perm										
v/c Ratio	0.16				0.41	0.53	0.28	0.04		
Uniform Delay, d1	24.2				22.3	22.7	7.7	6.6		
Progression Factor	2.93				1.00	0.66	0.69	0.36		
Incremental Delay, d2	0.3				0.1	0.3	0.8	0.1		
Delay (s)	71.1				22.4	15.3	6.1	2.4		
Level of Service	E				C	B	A	A		
Approach Delay (s)	71.1				22.4	11.8			0.0	
Approach LOS	E				C	B			A	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	34	293	398	0	0	37
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	318	433	0	0	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		431	98			
pX, platoon unblocked						
vC, conflicting volume	433				613	216
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	433				613	216
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	95
cM capacity (veh/h)	1123				410	788

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	37	106	106	106	216	216	40
Volume Left	37	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	40
cSH	1123	1700	1700	1700	1700	1700	788
Volume to Capacity	0.03	0.06	0.06	0.06	0.13	0.13	0.05
Queue Length 95th (ft)	3	0	0	0	0	0	4
Control Delay (s)	8.3	0.0	0.0	0.0	0.0	0.0	9.8
Lane LOS	A						A
Approach Delay (s)	0.9				0.0		9.8
Approach LOS							A

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	391	29	445	587	143	769
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5032		3433	5085	3179	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5032		3433	5085	3179	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.97
Adj. Flow (vph)	425	32	464	638	155	793
RTOR Reduction (vph)	11	0	0	0	331	330
Lane Group Flow (vph)	446	0	464	638	221	66
Confl. Bikes (#/hr)				2		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	33.0		20.6	58.6	13.4	13.4
Effective Green, g (s)	33.0		20.6	58.6	13.4	13.4
Actuated g/C Ratio	0.41		0.26	0.73	0.17	0.17
Clearance Time (s)	5.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2076		884	3725	532	241
v/s Ratio Prot	c0.09		c0.14	0.13	c0.07	
v/s Ratio Perm						0.05
v/c Ratio	0.22		0.52	0.17	0.42	0.28
Uniform Delay, d1	15.2		25.5	3.3	29.8	29.1
Progression Factor	0.59		0.80	1.29	1.00	1.00
Incremental Delay, d2	0.2		2.1	0.1	0.5	0.6
Delay (s)	9.2		22.5	4.3	30.3	29.7
Level of Service	A		C	A	C	C
Approach Delay (s)	9.2			12.0	30.1	
Approach LOS	A			B	C	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	110	0	0	0	0	0	2982	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6403	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	0	0	88	120	0	0	0	0	0	3106	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	120	0	0	0	0	0	3119	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4849	
v/s Ratio Prot					0.03						c0.49	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.28						0.64	
Uniform Delay, d1				30.4	29.9						4.3	
Progression Factor				1.00	1.00						0.95	
Incremental Delay, d2				5.5	1.6						0.3	
Delay (s)				35.9	31.5						4.4	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.3			0.0			4.4	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1172	528	68	486	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4971		3377	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4971		3377	
Peak-hour factor, PHF	0.92	0.96	0.95	0.92	0.94	0.92
Adj. Flow (vph)	238	1221	556	74	517	116
RTOR Reduction (vph)	50	0	26	0	0	0
Lane Group Flow (vph)	188	1221	604	0	633	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	33.7	33.7	15.0		14.3	
Effective Green, g (s)	33.7	33.7	15.0		14.3	
Actuated g/C Ratio	0.45	0.45	0.20		0.19	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	795	2285	994		644	
v/s Ratio Prot		c0.24	c0.12		c0.19	
v/s Ratio Perm	0.11					
v/c Ratio	0.24	0.53	0.61		0.98	
Uniform Delay, d1	12.7	15.0	27.3		30.2	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.9	1.1		31.0	
Delay (s)	13.4	15.9	28.4		61.2	
Level of Service	B	B	C		E	
Approach Delay (s)		15.5	28.4		61.2	
Approach LOS		B	C		E	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term AM

30: 12th St. & Castro Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	154	241	314	316	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3150	1423	1425	5925				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3150	1423	1425	5925				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	164	262	341	343	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	48	50	135	136	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	244	84	35	378	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.6	37.6	12.4	12.4				
Effective Green, g (s)					37.6	37.6	12.4	12.4				
Actuated g/C Ratio					0.63	0.63	0.21	0.21				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1974	892	295	1225				
v/s Ratio Prot					c0.08							
v/s Ratio Perm						0.06	0.02	0.06				
v/c Ratio					0.12	0.09	0.12	0.31				
Uniform Delay, d1					4.5	4.4	19.4	20.2				
Progression Factor					4.13	7.37	1.00	1.00				
Incremental Delay, d2					0.1	0.2	0.2	0.1				
Delay (s)					18.8	32.9	19.5	20.3				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			23.3			20.1			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	170	37	0	0	0	0	0	0	1085	1218	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3429								1522	4722	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3429								1522	4722	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	183	40	0	0	0	0	0	0	1179	1324	37
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	345	63	0
Lane Group Flow (vph)	0	216	0	0	0	0	0	0	0	280	1852	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1772								634	1968	
v/s Ratio Prot		c0.06										
v/s Ratio Perm										0.18	0.39	
v/c Ratio		0.12								0.44	0.94	
Uniform Delay, d1		15.0								25.0	33.6	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.1								2.2	10.5	
Delay (s)		15.1								27.3	44.1	
Level of Service		B								C	D	
Approach Delay (s)		15.1			0.0			0.0			39.9	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	307	0	0	644	565	136	594	27	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3539	1548		3491	1531			
Flt Permitted		0.79			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2782			3539	1548		3491	1531			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	334	0	0	700	589	148	619	29	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	147	0	0	14	0	0	0
Lane Group Flow (vph)	0	377	0	0	700	442	0	767	15	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		835			1062	464		1862	817			
v/s Ratio Prot					0.20							
v/s Ratio Perm		0.14				c0.29		0.22	0.01			
v/c Ratio		0.45			0.66	0.95		0.41	0.02			
Uniform Delay, d1		17.0			18.3	20.6		8.4	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.8			3.2	31.5		0.7	0.0			
Delay (s)		18.8			21.5	52.1		9.0	6.6			
Level of Service		B			C	D		A	A			
Approach Delay (s)		18.8			35.5			9.0			0.0	
Approach LOS		B			D			A			A	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	274	46	25	731	0	0	0	0	59	362	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3441			3531					1746	3505	
Flt Permitted		1.00			0.94					0.95	1.00	
Satd. Flow (perm)		3441			3321					1746	3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	298	50	27	761	0	0	0	0	64	377	22
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	319	0	0	788	0	0	0	0	64	390	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1453			1402					737	1480	
v/s Ratio Prot		0.09									c0.11	
v/s Ratio Perm					c0.24					0.04		
v/c Ratio		0.22			0.56					0.09	0.26	
Uniform Delay, d1		8.3			9.8					7.8	8.5	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.3			1.6					0.2	0.4	
Delay (s)		8.6			11.5					8.0	8.9	
Level of Service		A			B					A	A	
Approach Delay (s)		8.6			11.5			0.0			8.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	166	12	8	400	99	66	415	27	29	74	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3460			3387			3467			3344	
Flt Permitted		0.83			0.95			0.90			0.82	
Satd. Flow (perm)		2907			3224			3129			2777	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	180	13	9	435	108	72	451	29	32	80	30
RTOR Reduction (vph)	0	6	0	0	40	0	0	10	0	0	20	0
Lane Group Flow (vph)	0	236	0	0	512	0	0	542	0	0	122	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.2			23.2			14.3			14.3	
Effective Green, g (s)		23.2			23.2			14.3			14.3	
Actuated g/C Ratio		0.52			0.52			0.32			0.32	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1499			1662			994			882	
v/s Ratio Prot												
v/s Ratio Perm		0.08			c0.16			c0.17			0.04	
v/c Ratio		0.16			0.31			0.55			0.14	
Uniform Delay, d1		5.7			6.3			12.7			11.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.5			0.6			0.1	
Delay (s)		6.0			6.8			13.3			11.0	
Level of Service		A			A			B			B	
Approach Delay (s)		6.0			6.8			13.3			11.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	415	1502	0	0	0	0	0	372	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6291						4912	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6291						4912	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	451	1548	0	0	0	0	0	380	83
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	1911	0	0	0	0	0	460	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2169	
v/s Ratio Prot											c0.09	
v/s Ratio Perm					0.30							
v/c Ratio					0.70						0.21	
Uniform Delay, d1					13.8						10.3	
Progression Factor					0.48						1.00	
Incremental Delay, d2					1.3						0.2	
Delay (s)					7.9						10.5	
Level of Service					A						B	
Approach Delay (s)		0.0			7.9			0.0			10.5	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1684	78	324	786	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6341			6163				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6341			6163				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1736	85	348	854	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1811	0	0	1199	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3160			2116				
v/s Ratio Prot					c0.29							
v/s Ratio Perm								0.19				
v/c Ratio					0.57			0.57				
Uniform Delay, d1					10.6			16.1				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.8			1.1				
Delay (s)					11.3			17.2				
Level of Service					B			B				
Approach Delay (s)		0.0			11.3			17.2			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	66	0	0	1062	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	72	0	0	1073	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	280	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	680	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	72	268	268	268	268
Volume Left	72	0	0	0	0
Volume Right	0	0	0	0	0
cSH	680	1700	1700	1700	1700
Volume to Capacity	0.11	0.16	0.16	0.16	0.16
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.9	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	398	142	0	0	0	0	0	0	26	772	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6074									5074	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6074									5074	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	433	154	0	0	0	0	0	0	28	813	0
RTOR Reduction (vph)	0	50	0	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	537	0	0	0	0	0	0	0	0	835	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2328									2199	
v/s Ratio Prot		c0.09										
v/s Ratio Perm											0.16	
v/c Ratio		0.23									0.38	
Uniform Delay, d1		12.5									11.5	
Progression Factor		0.77									1.16	
Incremental Delay, d2		0.2									0.4	
Delay (s)		9.9									13.9	
Level of Service		A									B	
Approach Delay (s)		9.9			0.0			0.0			13.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	402	0	0	0	0	0	328	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6305						6232				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6305						6232				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	432	0	0	0	0	0	357	64	0	0	0
RTOR Reduction (vph)	0	79	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	446	0	0	0	0	0	404	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		9.0						44.0				
Effective Green, g (s)		9.0						44.0				
Actuated g/C Ratio		0.15						0.73				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		946						4570				
v/s Ratio Prot								c0.06				
v/s Ratio Perm		0.07										
v/c Ratio		0.47						0.09				
Uniform Delay, d1		23.3						2.3				
Progression Factor		1.01						1.00				
Incremental Delay, d2		0.1						0.0				
Delay (s)		23.6						2.3				
Level of Service		C						A				
Approach Delay (s)		23.6			0.0			2.3			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	568	0	0	0	0	0	1104	291	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.97				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6328						4904				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6328						4904				
Peak-hour factor, PHF	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	617	0	0	0	0	0	1200	316	0	0	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	74	0	0	0	0
Lane Group Flow (vph)	0	752	0	0	0	0	0	1442	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2531						1962				
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.12										
v/c Ratio		0.30						0.74				
Uniform Delay, d1		9.2						11.5				
Progression Factor		0.78						0.75				
Incremental Delay, d2		0.3						1.9				
Delay (s)		7.4						10.5				
Level of Service		A						B				
Approach Delay (s)		7.4			0.0			10.5			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	552	282	0	0	0	0	0	0	147	616	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6051									5027	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6051									5027	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	600	307	0	0	0	0	0	0	160	629	0
RTOR Reduction (vph)	0	95	0	0	0	0	0	0	0	0	82	0
Lane Group Flow (vph)	0	812	0	0	0	0	0	0	0	0	707	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2420									2234	
v/s Ratio Prot		c0.13										
v/s Ratio Perm											0.14	
v/c Ratio		0.34									0.32	
Uniform Delay, d1		9.4									8.1	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.4									0.4	
Delay (s)		9.7									8.5	
Level of Service		A									A	
Approach Delay (s)		9.7			0.0			0.0			8.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	24	348	53	226	282	0	0	167	1777
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1821			1863	1558
Flt Permitted				0.95	1.00	1.00		0.77			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1436			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	0	0	0	26	362	58	246	307	0	0	182	1871
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	0	94
Lane Group Flow (vph)	0	0	0	26	362	16	0	553	0	0	182	1777
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				12.2	12.2	12.2		21.8			21.8	21.8
Effective Green, g (s)				12.2	12.2	12.2		21.8			21.8	21.8
Actuated g/C Ratio				0.27	0.27	0.27		0.48			0.48	0.48
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				471	505	407		696			903	755
v/s Ratio Prot					c0.19						0.10	
v/s Ratio Perm				0.01		0.01		0.39				c1.14
v/c Ratio				0.06	0.72	0.04		0.79			0.20	2.35
Uniform Delay, d1				12.1	14.8	12.1		9.7			6.6	11.6
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	4.8	0.0		9.1			0.5	613.1
Delay (s)				12.2	19.7	12.1		18.8			7.1	624.7
Level of Service				B	B	B		B			A	F
Approach Delay (s)		0.0			18.2			18.8			569.9	
Approach LOS		A			B			B			F	

Intersection Summary			
HCM Average Control Delay	389.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	170.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	145	505	141	56	867
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3497		3191	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3497		3191	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	158	526	153	61	942
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	684	0	685	471
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1149	519
v/s Ratio Prot						
v/s Ratio Perm			0.20		0.21	c0.33
v/c Ratio			0.54		0.60	0.91
Uniform Delay, d1			11.4		11.7	13.7
Progression Factor			0.81		1.00	1.00
Incremental Delay, d2			0.5		2.3	22.2
Delay (s)			9.7		14.0	35.9
Level of Service			A		B	D
Approach Delay (s)			9.7		22.9	
Approach LOS			A		C	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	356	648	179	0	0	0	0	271	80	4	138	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4856						1800			1860	
Flt Permitted		0.99						1.00			0.99	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	375	704	195	0	0	0	0	295	87	4	150	0
RTOR Reduction (vph)	0	58	0	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	1217	0	0	0	0	0	358	0	0	154	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						620			551	
v/s Ratio Prot								c0.20				
v/s Ratio Perm		c0.66									0.10	
v/c Ratio		1.32						0.58			0.28	
Uniform Delay, d1		11.2						12.1			10.7	
Progression Factor		1.00						1.00			0.95	
Incremental Delay, d2		149.5						3.9			1.0	
Delay (s)		160.8						16.0			11.2	
Level of Service		F						B			B	
Approach Delay (s)		160.8			0.0			16.0			11.2	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	117.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	361	213	521	286	115	1094
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3351		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3351		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	232	566	311	125	1189
RTOR Reduction (vph)	0	171	75	0	0	0
Lane Group Flow (vph)	392	61	802	0	125	1189
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	23.5	23.5	40.6		13.9	58.5
Effective Green, g (s)	23.5	23.5	40.6		13.9	58.5
Actuated g/C Ratio	0.26	0.26	0.45		0.15	0.65
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	462	413	1512		273	2300
v/s Ratio Prot	c0.22		0.24		0.07	c0.34
v/s Ratio Perm		0.04				
v/c Ratio	0.85	0.15	0.53		0.46	0.52
Uniform Delay, d1	31.6	25.5	17.8		34.6	8.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	13.5	0.2	1.3		5.4	0.8
Delay (s)	45.1	25.7	19.2		40.1	9.1
Level of Service	D	C	B		D	A
Approach Delay (s)	37.9		19.2			12.1
Approach LOS	D		B			B

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	233	416	206	187	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3363		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3363		1770	1583
Peak-hour factor, PHF	0.94	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	372	243	452	224	203	216
RTOR Reduction (vph)	0	0	90	0	0	167
Lane Group Flow (vph)	372	243	586	0	203	49
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.2	31.5	13.3		11.7	11.7
Effective Green, g (s)	14.2	31.5	13.3		11.7	11.7
Actuated g/C Ratio	0.28	0.62	0.26		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	491	2177	874		404	362
v/s Ratio Prot	c0.21	0.07	c0.17		c0.11	
v/s Ratio Perm						0.03
v/c Ratio	0.76	0.11	0.67		0.50	0.14
Uniform Delay, d1	16.9	4.1	17.0		17.2	15.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.0	2.0		1.0	0.2
Delay (s)	23.5	4.1	19.0		18.2	15.9
Level of Service	C	A	B		B	B
Approach Delay (s)		15.8	19.0		17.0	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	213	282	1170	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4932			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4932			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	729	767	240	0	456	232	307	1272	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	182	0	0	0
Lane Group Flow (vph)	0	0	0	1714	0	0	456	50	307	1272	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.35			c0.13		0.17	c0.36	
v/s Ratio Perm								0.03			
v/c Ratio				1.16dl			0.78	0.19	0.47	0.63	
Uniform Delay, d1				34.8			42.4	38.2	25.6	15.2	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				24.2			10.0	1.6	2.4	1.5	
Delay (s)				59.0			52.4	39.8	28.1	16.7	
Level of Service				E			D	D	C	B	
Approach Delay (s)	0.0			59.0			48.1			18.9	
Approach LOS	A			E			D			B	

Intersection Summary			
HCM Average Control Delay	41.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	490	217	198	341	178	21	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3341				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3341				1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	284	533	236	215	363	193	23	375	51	500
RTOR Reduction (vph)	0	0	80	0	3	0	0	0	0	0
Lane Group Flow (vph)	256	703	229	0	576	0	0	0	426	500
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.6	30.6	30.6		34.1				28.8	66.4
Effective Green, g (s)	30.6	30.6	30.6		34.1				28.8	66.4
Actuated g/C Ratio	0.29	0.29	0.29		0.32				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	465	895	416		1075				481	2217
v/s Ratio Prot	0.16	c0.23	0.16		c0.17				c0.24	0.14
v/s Ratio Perm										
v/c Ratio	0.55	0.79	0.55		0.54				0.89	0.23
Uniform Delay, d1	31.9	34.7	31.9		29.5				37.0	8.6
Progression Factor	0.70	0.71	0.57		1.00				1.00	1.00
Incremental Delay, d2	0.8	2.7	0.9		1.9				17.5	0.2
Delay (s)	23.2	27.3	18.9		31.4				54.5	8.9
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.4			31.4					29.9
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2572	126	466	407	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4789				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4789				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2679	137	501	428	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	69	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2679	68	0	929	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2035				
v/s Ratio Prot					c0.53							
v/s Ratio Perm						0.04		0.19				
v/c Ratio					1.11	0.09		0.46				
Uniform Delay, d1					21.0	11.5		16.4				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					55.9	0.2		0.7				
Delay (s)					76.9	11.8		17.1				
Level of Service					E	B		B				
Approach Delay (s)		0.0			73.7			17.1			0.0	
Approach LOS		A			E			B			A	

Intersection Summary			
HCM Average Control Delay	59.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1189	1734	0	0	0	0	0	1210	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4759						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4759						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1226	1885	0	0	0	0	0	1287	39
RTOR Reduction (vph)	0	0	0	2	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	758	2349	0	0	0	0	0	1323	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2736						1145	
v/s Ratio Prot											c0.38	
v/s Ratio Perm				c0.50	0.49							
v/c Ratio				0.87	0.86						1.16	
Uniform Delay, d1				14.4	14.3						27.0	
Progression Factor				1.41	1.41						1.00	
Incremental Delay, d2				1.2	0.4						80.3	
Delay (s)				21.4	20.5						107.3	
Level of Service				C	C						F	
Approach Delay (s)		0.0			20.8			0.0			107.3	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	46.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	231	7	11	478	16	11	7	10	22	17	16
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	246	8	12	520	17	12	8	11	24	18	17

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	98	253	549	30	60
Volume Left (vph)	98	0	12	12	24
Volume Right (vph)	0	8	17	11	17
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.8	5.3	4.7	6.0	6.0
Degree Utilization, x	0.16	0.37	0.72	0.05	0.10
Capacity (veh/h)	607	665	752	531	534
Control Delay (s)	8.7	10.1	18.8	9.3	9.6
Approach Delay (s)	9.7		18.8	9.3	9.6
Approach LOS	A		C	A	A

Intersection Summary			
Delay	14.7		
HCM Level of Service	B		
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      4.3       Worst Case Level Of Service: B[ 14.2]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0  781     0     0    0   343     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0  781     0     0    0   343     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0  781     0     0    0   343     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:     0    0     0     0  849     0     0    0   373     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0  849     0     0    0   373     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   283  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   761  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   761  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.49  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   2.7  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  14.2 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     B     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx              14.2            xxxxxx
ApproachLOS:       *                *                  B                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	738	349	1244	597	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1738	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1738	3539	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	802	379	1352	649	107
RTOR Reduction (vph)	41	34	0	0	0
Lane Group Flow (vph)	544	562	1352	756	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	463	2153	356	
v/s Ratio Prot			c0.38	c0.48	
v/s Ratio Perm	c0.32	0.32			
v/c Ratio	1.21	1.21	0.63	2.12	
Uniform Delay, d1	22.0	22.0	7.4	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	115.4	114.3	1.4	515.0	
Delay (s)	137.4	136.3	8.8	538.3	
Level of Service	F	F	A	F	
Approach Delay (s)		136.9	198.7		
Approach LOS		F	F		

Intersection Summary			
HCM Average Control Delay	176.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c	Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	212	425	99	20	52	16	180	206	10	342	978	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1522		3433	3476	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1522		3433	3476	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	452	105	21	57	17	196	224	11	372	1063	112
RTOR Reduction (vph)	0	0	8	0	0	0	0	187	0	0	9	0
Lane Group Flow (vph)	226	452	118	0	0	74	196	37	0	383	1166	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	18.9	26.1	26.1			7.7	14.9	14.9		13.9	27.2	
Effective Green, g (s)	18.9	26.1	26.1			7.7	14.9	14.9		13.9	27.2	
Actuated g/C Ratio	0.21	0.29	0.29			0.09	0.17	0.17		0.15	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	372	1026	459			151	308	252		530	1051	
v/s Ratio Prot	c0.13	0.13				0.04	c0.11			0.11	c0.34	
v/s Ratio Perm			0.07					0.02				
v/c Ratio	0.61	0.44	0.26			0.49	0.64	0.15		0.72	1.11	
Uniform Delay, d1	32.2	26.0	24.5			39.3	35.0	32.1		36.2	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.3	0.3			2.5	4.3	0.3		4.8	62.8	
Delay (s)	35.0	26.3	24.8			41.8	39.3	32.4		41.1	94.2	
Level of Service	C	C	C			D	D	C		D	F	
Approach Delay (s)		28.5					36.5				81.1	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	59.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	222	475	47	78
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3428		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3428		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	239	511	51	84
RTOR Reduction (vph)	0	13	0	0
Lane Group Flow (vph)	239	633	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	23.3		
Effective Green, g (s)	11.0	23.3		
Actuated g/C Ratio	0.12	0.26		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	887		
v/s Ratio Prot	c0.14	0.18		
v/s Ratio Perm				
v/c Ratio	1.11	0.71		
Uniform Delay, d1	39.5	30.3		
Progression Factor	1.00	1.00		
Incremental Delay, d2	92.7	4.9		
Delay (s)	132.2	35.2		
Level of Service	F	D		
Approach Delay (s)		61.4		
Approach LOS		E		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	248	70	48	341	269	141	643	33	202	616	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1743	3386			3514	1536	1767	3509		1767	3446	
Flt Permitted	0.50	1.00			0.86	1.00	0.28	1.00		0.30	1.00	
Satd. Flow (perm)	912	3386			3048	1536	523	3509		559	3446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	270	76	52	355	292	153	699	36	220	670	103
RTOR Reduction (vph)	0	31	0	0	0	77	0	4	0	0	14	0
Lane Group Flow (vph)	99	315	0	0	407	215	153	731	0	220	759	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	386	1434			1291	651	234	1569		250	1541	
v/s Ratio Prot		0.09						0.21			0.22	
v/s Ratio Perm	0.11				0.13	c0.14	0.29			c0.39		
v/c Ratio	0.26	0.22			0.32	0.33	0.65	0.47		0.88	0.49	
Uniform Delay, d1	15.8	15.6			16.3	16.4	18.4	16.4		21.4	16.7	
Progression Factor	0.86	0.84			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.3			0.6	1.4	13.4	1.0		32.8	1.1	
Delay (s)	15.0	13.4			16.9	17.8	31.7	17.4		54.3	17.8	
Level of Service	B	B			B	B	C	B		D	B	
Approach Delay (s)		13.8			17.3			19.9			25.9	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	403	136	64	530	114	175	479	46	133	459	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1554	1769	1863	1552	1763	3481		1763	3257	
Flt Permitted	0.12	1.00	1.00	0.36	1.00	1.00	0.20	1.00		0.37	1.00	
Satd. Flow (perm)	226	1863	1554	664	1863	1552	373	3481		690	3257	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	438	148	70	576	124	190	521	50	145	499	380
RTOR Reduction (vph)	0	0	90	0	0	83	0	9	0	0	163	0
Lane Group Flow (vph)	228	438	58	70	576	41	190	562	0	145	716	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.40	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	298	725	605	334	622	519	145	1351		268	1264	
v/s Ratio Prot	c0.09	0.24		0.01	c0.31			0.16			0.22	
v/s Ratio Perm	0.30		0.04	0.07		0.03	c0.51			0.21		
v/c Ratio	0.77	0.60	0.10	0.21	0.93	0.08	1.31	0.42		0.54	0.57	
Uniform Delay, d1	17.4	20.7	16.5	16.5	27.3	19.4	26.0	19.0		20.1	20.4	
Progression Factor	1.00	1.00	1.00	1.52	1.39	2.65	0.75	0.66		1.00	1.00	
Incremental Delay, d2	10.1	3.7	0.3	0.1	21.2	0.3	177.9	0.1		1.2	0.3	
Delay (s)	27.5	24.4	16.8	25.2	59.1	51.5	197.6	12.6		21.3	20.7	
Level of Service	C	C	B	C	E	D	F	B		C	C	
Approach Delay (s)		23.9			54.8			58.8			20.8	
Approach LOS		C			D			E			C	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	653	0	0	257	904	21	811	75	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1609	3384			3539	2787		5008				
Flt Permitted	0.58	0.94			1.00	1.00		1.00				
Satd. Flow (perm)	983	3181			3539	2787		5008				
Peak-hour factor, PHF	0.93	0.92	0.25	0.25	0.92	0.97	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	265	710	0	0	279	932	23	882	82	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	59	0	26	0	0	0	0
Lane Group Flow (vph)	238	737	0	0	279	873	0	961	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	393	1272			1416	1115		2003				
v/s Ratio Prot					0.08							
v/s Ratio Perm	0.24	0.23				c0.31		0.19				
v/c Ratio	0.61	0.58			0.20	0.78		0.48				
Uniform Delay, d1	9.5	9.4			7.8	10.5		8.9				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	6.8	1.9			0.3	5.5		0.8				
Delay (s)	16.3	11.3			8.1	16.0		9.7				
Level of Service	B	B			A	B		A				
Approach Delay (s)		12.5			14.2			9.7			0.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	492	38	12	243	0	0	0	0	404	288	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		3539	1552		3531					1605	3322	1558
Flt Permitted		1.00	1.00		0.93					0.95	0.98	1.00
Satd. Flow (perm)		3539	1552		3285					1605	3322	1558
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	518	41	13	264	0	0	0	0	439	313	223
RTOR Reduction (vph)	0	0	27	0	0	0	0	0	0	0	0	108
Lane Group Flow (vph)	0	518	14	0	277	0	0	0	0	246	506	115
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	543		1150					829	1716	805
v/s Ratio Prot		c0.15										
v/s Ratio Perm			0.01		0.08					c0.15	0.15	0.07
v/c Ratio		0.42	0.03		0.24					0.30	0.29	0.14
Uniform Delay, d1		14.8	12.8		13.8					8.3	8.3	7.6
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		1.0	0.1		0.5					0.9	0.4	0.4
Delay (s)		15.9	12.9		14.3					9.2	8.7	7.9
Level of Service		B	B		B					A	A	A
Approach Delay (s)		15.7			14.3			0.0			8.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	274	567	617	428	188	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3281		3412	1421
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3281		3412	1421
Peak-hour factor, PHF	0.92	0.93	0.92	0.97	0.92	0.92
Adj. Flow (vph)	298	610	671	441	204	115
RTOR Reduction (vph)	0	0	103	0	10	87
Lane Group Flow (vph)	298	610	1009	0	210	12
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	18.9	62.7	39.8		9.3	9.3
Effective Green, g (s)	18.9	62.7	39.8		9.3	9.3
Actuated g/C Ratio	0.24	0.78	0.50		0.12	0.12
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	418	2774	1632		397	165
v/s Ratio Prot	c0.17	0.17	c0.31		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.71	0.22	0.62		0.53	0.07
Uniform Delay, d1	28.1	2.3	14.6		33.3	31.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.7	0.2	1.8		0.6	0.1
Delay (s)	32.8	2.4	16.4		33.9	31.6
Level of Service	C	A	B		C	C
Approach Delay (s)		12.4	16.4		33.2	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	677	32	19	810	116	95	531	33	137	429	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1760	3347		1769	3504		1760	3406	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.37	1.00		0.42	1.00	
Satd. Flow (perm)	308	3427	1532	315	3347		682	3504		778	3406	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	29	736	35	21	880	126	103	577	36	149	452	115
RTOR Reduction (vph)	0	0	25	0	13	0	0	5	0	0	23	0
Lane Group Flow (vph)	29	736	10	21	993	0	103	608	0	149	544	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		50.3	50.3		40.2	40.2	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		50.3	50.3		40.2	40.2	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.59	0.59		0.47	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	90	953		475	2074		368	1611	
v/s Ratio Prot		0.21			c0.30		0.01	c0.17			0.16	
v/s Ratio Perm	0.09		0.01	0.07			0.11			c0.19		
v/c Ratio	0.33	0.75	0.02	0.23	1.04		0.22	0.29		0.40	0.34	
Uniform Delay, d1	24.0	27.7	21.9	23.3	30.4		7.9	8.6		14.6	14.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.27	1.29	
Incremental Delay, d2	9.7	5.4	0.1	6.0	40.7		0.1	0.4		2.9	0.5	
Delay (s)	33.7	33.1	22.0	29.3	71.1		8.0	8.9		21.4	18.6	
Level of Service	C	C	C	C	E		A	A		C	B	
Approach Delay (s)		32.6			70.3			8.8			19.2	
Approach LOS		C			E			A			B	

Intersection Summary			
HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	456	36	105	343	34	247	622	172	51	499	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99			0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1764	3384			3350		1765	3539	1551	1750	3414	
Flt Permitted	0.31	1.00			0.62		0.38	1.00	1.00	0.38	1.00	
Satd. Flow (perm)	579	3384			2110		697	3539	1551	695	3414	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	496	39	114	373	37	268	655	187	55	542	117
RTOR Reduction (vph)	0	9	0	0	9	0	0	0	71	0	16	0
Lane Group Flow (vph)	88	526	0	0	515	0	268	655	116	55	643	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	22.3	22.3			22.3		49.7	49.7	49.7	49.7	49.7	
Effective Green, g (s)	22.3	22.3			22.3		49.7	49.7	49.7	49.7	49.7	
Actuated g/C Ratio	0.28	0.28			0.28		0.62	0.62	0.62	0.62	0.62	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	161	943			588		433	2199	964	432	2121	
v/s Ratio Prot		0.16						0.19			0.19	
v/s Ratio Perm	0.15				c0.24		c0.38		0.07	0.08		
v/c Ratio	0.55	0.56			0.88		0.62	0.30	0.12	0.13	0.30	
Uniform Delay, d1	24.5	24.6			27.5		9.3	7.0	6.2	6.2	7.1	
Progression Factor	1.00	1.00			1.05		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.0	0.4			13.2		6.5	0.3	0.3	0.6	0.4	
Delay (s)	26.6	25.0			42.2		15.8	7.4	6.5	6.8	7.4	
Level of Service	C	C			D		B	A	A	A	A	
Approach Delay (s)		25.3			42.2			9.3			7.4	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	666	191	117	373	2	0	0	0	80	249	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						1.00	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.96		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3149		1770	3424						3385	
Flt Permitted		0.95		0.16	1.00						0.99	
Satd. Flow (perm)		2998		300	3424						3385	
Peak-hour factor, PHF	0.92	0.99	0.92	0.93	0.92	0.92	0.25	0.25	0.25	0.92	0.94	0.92
Adj. Flow (vph)	7	673	208	126	405	2	0	0	0	87	265	77
RTOR Reduction (vph)	0	31	0	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	0	857	0	126	407	0	0	0	0	0	406	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.7		43.0	43.0						29.0	
Effective Green, g (s)		31.7		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1188		277	1840						1227	
v/s Ratio Prot				c0.04	0.12							
v/s Ratio Perm		c0.29		0.21							0.12	
v/c Ratio		0.72		0.45	0.22						0.33	
Uniform Delay, d1		20.4		11.7	9.7						18.5	
Progression Factor		1.66		1.00	1.00						1.00	
Incremental Delay, d2		3.7		0.4	0.3						0.7	
Delay (s)		37.7		12.1	10.0						19.2	
Level of Service		D		B	A						B	
Approach Delay (s)		37.7			10.5			0.0			19.2	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	629	129	326	846	42	11	1150	997	2	604	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1484	3433	3539	1460		5082	1466		4984	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.94	
Satd. Flow (perm)	3433	3539	1484	3433	3539	1460		4731	1466		4670	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.93	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	145	684	140	333	910	46	12	1250	1084	2	629	65
RTOR Reduction (vph)	0	0	50	0	0	27	0	0	251	0	12	0
Lane Group Flow (vph)	145	684	90	333	910	19	0	1262	833	0	684	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	8.6	35.4	35.4	13.6	41.4	41.4		36.0	36.0		36.0	
Effective Green, g (s)	8.6	35.4	35.4	13.6	41.4	41.4		36.0	36.0		36.0	
Actuated g/C Ratio	0.09	0.35	0.35	0.14	0.41	0.41		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	295	1253	525	467	1465	604		1703	528		1681	
v/s Ratio Prot	0.04	0.19		c0.10	c0.26							
v/s Ratio Perm			0.06			0.01		0.27	c0.57		0.15	
v/c Ratio	0.49	0.55	0.17	0.71	0.62	0.03		0.74	1.58		0.41	
Uniform Delay, d1	43.6	25.9	22.2	41.3	23.1	17.4		27.9	32.0		24.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.5	1.7	0.7	4.3	2.0	0.1		2.9	269.0		0.7	
Delay (s)	44.1	27.6	22.9	45.6	25.1	17.5		30.9	301.0		24.7	
Level of Service	D	C	C	D	C	B		C	F		C	
Approach Delay (s)		29.4			30.1			155.7			24.7	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM Average Control Delay	84.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	118.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	309	83	101	1512	917	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.99		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.99	1.00	1.00	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	3340		1757	3725	6323	
Flt Permitted	0.96		0.22	1.00	1.00	
Satd. Flow (perm)	3340		404	3725	6323	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.92
Adj. Flow (vph)	336	90	110	1575	997	97
RTOR Reduction (vph)	44	0	0	0	12	0
Lane Group Flow (vph)	382	0	110	1575	1082	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	14.5		52.0	45.8	45.8	
Effective Green, g (s)	14.5		52.0	45.8	45.8	
Actuated g/C Ratio	0.18		0.65	0.57	0.57	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	605		367	2133	3620	
v/s Ratio Prot	c0.11		c0.02	c0.42	0.17	
v/s Ratio Perm			0.17			
v/c Ratio	0.63		0.30	0.74	0.30	
Uniform Delay, d1	30.3		5.3	12.7	8.8	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	2.2		0.5	2.3	0.2	
Delay (s)	32.4		5.8	15.0	9.0	
Level of Service	C		A	B	A	
Approach Delay (s)	32.4			14.4	9.0	
Approach LOS	C			B	A	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	301	10	22	180	11	55
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	320	11	24	196	12	60
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			331		587	344
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			331		587	344
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	91
cM capacity (veh/h)			1228		456	689

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	331	220	72
Volume Left	0	24	12
Volume Right	11	0	60
cSH	1700	1228	635
Volume to Capacity	0.19	0.02	0.11
Queue Length 95th (ft)	0	1	10
Control Delay (s)	0.0	1.0	11.4
Lane LOS		A	B
Approach Delay (s)	0.0	1.0	11.4
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	249	9	9	183	30	62
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	271	10	10	199	33	67
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			280		521	303
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			280		521	303
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		93	91
cM capacity (veh/h)			1282		500	721

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	280	209	100
Volume Left	0	10	33
Volume Right	10	0	67
cSH	1700	1282	630
Volume to Capacity	0.16	0.01	0.16
Queue Length 95th (ft)	0	1	14
Control Delay (s)	0.0	0.4	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	11.8
Approach LOS			B

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	366	3	15	150	46	84
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.92	0.92	0.94	0.92	0.92
Hourly flow rate (vph)	377	3	16	160	50	91
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.90		0.90	0.90
vC, conflicting volume			381		591	399
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			257		491	277
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		89	86
cM capacity (veh/h)			1178		469	674

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	381	176	25	25	46	46
Volume Left	0	16	25	25	0	0
Volume Right	3	0	0	0	46	46
cSH	1700	1178	469	469	674	674
Volume to Capacity	0.22	0.01	0.05	0.05	0.07	0.07
Queue Length 95th (ft)	0	1	4	4	5	5
Control Delay (s)	0.0	0.9	13.1	13.1	10.7	10.7
Lane LOS		A	B	B	B	B
Approach Delay (s)	0.0	0.9	11.6			
Approach LOS			B			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	203	102	75	170	0	0	0	0	51	521	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.97						0.98	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						1.00	
Satd. Flow (prot)		1863	1435		1786						4856	
Flt Permitted		1.00	1.00		0.74						1.00	
Satd. Flow (perm)		1863	1435		1339						4856	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	221	111	82	185	0	0	0	0	55	537	32
RTOR Reduction (vph)	0	0	21	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	221	90	0	267	0	0	0	0	0	620	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		20.7	20.7		20.7						51.3	
Effective Green, g (s)		20.7	20.7		20.7						51.3	
Actuated g/C Ratio		0.26	0.26		0.26						0.64	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		482	371		346						3114	
v/s Ratio Prot		0.12										
v/s Ratio Perm			0.06		c0.20						0.13	
v/c Ratio		0.46	0.24		0.77						0.20	
Uniform Delay, d1		24.9	23.5		27.5						5.9	
Progression Factor		1.00	1.00		1.00						1.20	
Incremental Delay, d2		0.7	0.3		10.2						0.1	
Delay (s)		25.6	23.8		37.7						7.2	
Level of Service		C	C		D						A	
Approach Delay (s)		25.0			37.7			0.0			7.2	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	106	1	0	102	72	21	342	181	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.81			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		0.99			1.00			1.00	1.00			
Satd. Flow (prot)		1841			1706			3506	1283			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1801			1706			3506	1283			
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	14	115	1	0	111	78	23	368	197	0	0	0
RTOR Reduction (vph)	0	0	0	0	31	0	0	0	155	0	0	0
Lane Group Flow (vph)	0	130	0	0	158	0	0	391	42	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		27.4			27.4			9.6	9.6			
Effective Green, g (s)		27.4			27.4			9.6	9.6			
Actuated g/C Ratio		0.61			0.61			0.21	0.21			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1097			1039			748	274			
v/s Ratio Prot					c0.09							
v/s Ratio Perm		0.07						0.11	0.03			
v/c Ratio		0.12			0.15			0.52	0.15			
Uniform Delay, d1		3.7			3.8			15.7	14.4			
Progression Factor		0.39			1.00			1.00	1.00			
Incremental Delay, d2		0.2			0.3			0.3	0.1			
Delay (s)		1.7			4.1			16.0	14.5			
Level of Service		A			A			B	B			
Approach Delay (s)		1.7			4.1			15.5			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	47	22	64	0	64	0	548	45	32	477	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.95			0.93			0.99			1.00	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1747	1757			1657			3476			3521	
Flt Permitted	0.74	1.00			0.85			1.00			0.88	
Satd. Flow (perm)	1358	1757			1446			3476			3125	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.99	0.92
Adj. Flow (vph)	15	51	24	70	0	70	0	596	49	35	482	0
RTOR Reduction (vph)	0	14	0	0	40	0	0	14	0	0	0	0
Lane Group Flow (vph)	15	61	0	0	100	0	0	631	0	0	517	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	573	742			611			1313			1181	
v/s Ratio Prot		0.03						c0.18				
v/s Ratio Perm	0.01				c0.07						0.17	
v/c Ratio	0.03	0.08			0.16			0.48			0.44	
Uniform Delay, d1	7.6	7.8			8.1			10.6			10.4	
Progression Factor	1.00	1.00			1.15			1.00			1.00	
Incremental Delay, d2	0.1	0.2			0.6			1.3			1.2	
Delay (s)	7.7	8.0			9.8			11.9			11.6	
Level of Service	A	A			A			B			B	
Approach Delay (s)		7.9			9.8			11.9			11.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	165	30	12	196	193	26	657	27	40	180	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.93			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3417			3219			3506		1767	3370	
Flt Permitted		0.81			0.94			0.94		0.28	1.00	
Satd. Flow (perm)		2783			3031			3297		529	3370	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	32	179	33	13	213	210	28	714	29	41	196	70
RTOR Reduction (vph)	0	26	0	0	173	0	0	3	0	0	23	0
Lane Group Flow (vph)	0	218	0	0	263	0	0	768	0	41	243	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.7			10.7			33.1		40.3	40.3	
Effective Green, g (s)		10.7			10.7			33.1		40.3	40.3	
Actuated g/C Ratio		0.18			0.18			0.55		0.67	0.67	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		496			541			1819		411	2264	
v/s Ratio Prot										0.00	c0.07	
v/s Ratio Perm		0.08			c0.09			c0.23		0.06		
v/c Ratio		0.44			0.49			0.42		0.10	0.11	
Uniform Delay, d1		22.0			22.2			7.9		3.9	3.5	
Progression Factor		1.00			0.73			1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.6			0.7		0.1	0.1	
Delay (s)		22.6			16.7			8.6		4.0	3.6	
Level of Service		C			B			A		A	A	
Approach Delay (s)		22.6			16.7			8.6			3.6	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	152	95	61	237	102	109	803	113	44	554	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.97			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3215			3229			3413			4988	
Flt Permitted		0.91			0.86			0.73			0.81	
Satd. Flow (perm)		2922			2807			2494			4033	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	25	165	103	66	258	111	118	873	119	48	602	42
RTOR Reduction (vph)	0	65	0	0	46	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	228	0	0	389	0	0	1095	0	0	680	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1071			1029			1313			1210	
v/s Ratio Prot								c0.10				
v/s Ratio Perm		0.08			c0.14			c0.31			0.17	
v/c Ratio		0.21			0.38			0.83			0.56	
Uniform Delay, d1		13.1			14.0			13.4			17.7	
Progression Factor		2.17			1.00			1.00			1.00	
Incremental Delay, d2		0.4			1.1			6.3			1.9	
Delay (s)		28.7			15.0			19.7			19.6	
Level of Service		C			B			B			B	
Approach Delay (s)		28.7			15.0			19.7			19.6	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	331	0	0	389	97	65	391	257	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3510			3372	1319		5003	1458			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3119			3372	1319		5003	1458			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	41	360	0	0	423	103	71	425	276	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	25	0	0	226	0	0	0
Lane Group Flow (vph)	0	401	0	0	432	68	0	496	50	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		58.4			58.4	58.4		14.6	14.6			
Effective Green, g (s)		58.4			58.4	58.4		14.6	14.6			
Actuated g/C Ratio		0.73			0.73	0.73		0.18	0.18			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2277			2462	963		913	266			
v/s Ratio Prot					0.13							
v/s Ratio Perm		c0.13				0.05		0.10	0.03			
v/c Ratio		0.18			0.18	0.07		0.54	0.19			
Uniform Delay, d1		3.3			3.3	3.1		29.7	27.7			
Progression Factor		1.00			0.71	0.31		1.00	1.00			
Incremental Delay, d2		0.2			0.1	0.1		0.7	0.3			
Delay (s)		3.5			2.5	1.1		30.3	28.0			
Level of Service		A			A	A		C	C			
Approach Delay (s)		3.5			2.3			29.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	408	178	141	366	0	0	0	0	82	522	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.97	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3376						4521	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1439	1610	3196						4521	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	443	193	153	398	0	0	0	0	89	567	129
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	36	0
Lane Group Flow (vph)	0	443	148	138	413	0	0	0	0	0	749	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1700						1695	
v/s Ratio Prot		c0.13		c0.09	0.03							
v/s Ratio Perm			0.10		0.10						0.17	
v/c Ratio		0.36	0.29	0.69	0.24						0.44	
Uniform Delay, d1		19.3	18.8	33.5	10.3						18.7	
Progression Factor		1.11	1.16	1.00	1.00						1.37	
Incremental Delay, d2		0.8	1.4	7.5	0.0						0.1	
Delay (s)		22.2	23.3	41.0	10.4						25.7	
Level of Service		C	C	D	B						C	
Approach Delay (s)		22.6			18.0			0.0			25.7	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations										
Volume (vph)	389	103	97	21	828	188	268	51	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0	4.0	4.0		
Lane Util. Factor	0.94				0.95	0.91	0.91	1.00		
Frpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Frt	0.97				1.00	0.94	0.85	0.85		
Flt Protected	0.96				0.99	1.00	1.00	1.00		
Satd. Flow (prot)	4894				3517	3186	1441	1583		
Flt Permitted	0.96				0.99	1.00	1.00	1.00		
Satd. Flow (perm)	4894				3517	3186	1441	1583		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	423	112	105	23	900	204	291	55	0	0
RTOR Reduction (vph)	66	0	0	0	0	0	0	27	0	0
Lane Group Flow (vph)	469	0	0	0	1028	341	154	28	0	0
Confl. Peds. (#/hr)								74		
Confl. Bikes (#/hr)					7			8		
Turn Type			Split	Split			custom	custom		
Protected Phases	1		8	8	8	2	6	6		
Permitted Phases	1						6			
Actuated Green, G (s)	18.1				25.9	14.0	36.1	36.1		
Effective Green, g (s)	18.1				25.9	14.0	36.1	36.1		
Actuated g/C Ratio	0.26				0.37	0.20	0.52	0.52		
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0		
Vehicle Extension (s)	2.0				2.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	1265				1301	637	743	816		
v/s Ratio Prot	c0.10				c0.29	c0.11	0.11	0.02		
v/s Ratio Perm										
v/c Ratio	0.37				0.79	0.54	0.21	0.03		
Uniform Delay, d1	21.3				19.6	25.1	9.2	8.4		
Progression Factor	1.00				1.00	0.84	0.88	0.74		
Incremental Delay, d2	0.8				3.1	0.4	0.6	0.1		
Delay (s)	22.1				22.8	21.5	8.7	6.3		
Level of Service	C				C	C	A	A		
Approach Delay (s)	22.1				22.8	16.4			0.0	
Approach LOS	C				C	B			A	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	493	365	0	0	96
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	536	397	0	0	104
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		420	110			
pX, platoon unblocked					0.99	
vC, conflicting volume	397				575	198
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	397				541	198
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	87
cM capacity (veh/h)	1158				467	809

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	0	179	179	179	198	198	104
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	104
cSH	1700	1700	1700	1700	1700	1700	809
Volume to Capacity	0.00	0.11	0.11	0.11	0.12	0.12	0.13
Queue Length 95th (ft)	0	0	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.1
Lane LOS							B
Approach Delay (s)	0.0				0.0		10.1
Approach LOS							B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	22.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1069	71	747	326	153	842
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5036		3433	5085	3174	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5036		3433	5085	3174	1441
Peak-hour factor, PHF	0.95	0.92	0.99	0.92	0.92	0.93
Adj. Flow (vph)	1125	77	755	354	166	905
RTOR Reduction (vph)	11	0	0	0	317	316
Lane Group Flow (vph)	1191	0	755	354	302	136
Confl. Bikes (#/hr)				16		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	18.0		19.0	41.0	21.0	21.0
Effective Green, g (s)	18.0		19.0	41.0	21.0	21.0
Actuated g/C Ratio	0.26		0.27	0.59	0.30	0.30
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1295		932	2978	952	432
v/s Ratio Prot	c0.24		c0.22	0.07	c0.10	
v/s Ratio Perm						0.09
v/c Ratio	0.92		0.81	0.12	0.32	0.31
Uniform Delay, d1	25.3		23.8	6.5	19.0	18.9
Progression Factor	0.73		1.00	1.00	1.00	1.00
Incremental Delay, d2	9.8		7.6	0.1	0.9	1.9
Delay (s)	28.3		31.4	6.5	19.8	20.8
Level of Service	C		C	A	B	C
Approach Delay (s)	28.3			23.5	20.3	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	146	151	0	0	0	0	0	1270	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6292	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6292	
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	0	0	159	164	0	0	0	0	0	1309	160
RTOR Reduction (vph)	0	0	0	3	0	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	156	164	0	0	0	0	0	1450	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				23.5	23.5						42.5	
Effective Green, g (s)				23.5	23.5						42.5	
Actuated g/C Ratio				0.31	0.31						0.57	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				553	1109						3565	
v/s Ratio Prot					0.05						c0.23	
v/s Ratio Perm				c0.09								
v/c Ratio				0.28	0.15						0.41	
Uniform Delay, d1				19.4	18.5						9.2	
Progression Factor				1.00	1.00						0.73	
Incremental Delay, d2				1.3	0.3						0.1	
Delay (s)				20.7	18.8						6.8	
Level of Service				C	B						A	
Approach Delay (s)		0.0			19.7			0.0			6.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	396	1220	76	346	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5029		3404	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5029		3404	
Peak-hour factor, PHF	0.92	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	217	426	1312	83	376	45
RTOR Reduction (vph)	2	0	9	0	0	0
Lane Group Flow (vph)	215	426	1386	0	421	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	15.9	15.9	26.0		21.1	
Effective Green, g (s)	15.9	15.9	26.0		21.1	
Actuated g/C Ratio	0.21	0.21	0.35		0.28	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	375	1078	1743		958	
v/s Ratio Prot		0.08	c0.28		c0.12	
v/s Ratio Perm	c0.12					
v/c Ratio	0.57	0.40	0.80		0.44	
Uniform Delay, d1	26.5	25.4	22.1		22.1	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.2	1.1	2.6		0.3	
Delay (s)	32.7	26.5	24.7		22.4	
Level of Service	C	C	C		C	
Approach Delay (s)		28.6	24.7		22.4	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	262	878	1024	528	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3041	1417	1403	5828				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3041	1417	1403	5828				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	285	954	1113	568	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	61	61	351	272	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	701	416	205	853	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					42.8	42.8	22.2	22.2				
Effective Green, g (s)					42.8	42.8	22.2	22.2				
Actuated g/C Ratio					0.57	0.57	0.30	0.30				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1735	809	415	1725				
v/s Ratio Prot					0.23							
v/s Ratio Perm						c0.29	0.15	0.15				
v/c Ratio					0.40	0.51	0.49	0.49				
Uniform Delay, d1					9.0	9.8	21.8	21.8				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.7	2.3	0.9	0.2				
Delay (s)					9.7	12.1	22.7	22.0				
Level of Service					A	B	C	C				
Approach Delay (s)		0.0			10.6			22.2			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	249	72	0	0	0	0	0	0	561	908	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3406								1522	4729	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3406								1522	4729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	271	78	0	0	0	0	0	0	610	987	60
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	231	42	0
Lane Group Flow (vph)	0	323	0	0	0	0	0	0	0	172	1212	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1589								649	2018	
v/s Ratio Prot		c0.09										
v/s Ratio Perm										0.11	0.26	
v/c Ratio		0.20								0.26	0.60	
Uniform Delay, d1		11.8								13.9	16.6	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.3								1.0	1.3	
Delay (s)		12.1								14.9	17.9	
Level of Service		B								B	B	
Approach Delay (s)		12.1			0.0			0.0			17.2	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	918	0	0	425	261	205	632	42	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3524			3539	1461		3472	1520			
Flt Permitted		0.89			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3130			3539	1461		3472	1520			
Peak-hour factor, PHF	0.92	0.92	0.25	0.99	0.96	0.96	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	68	998	0	0	443	272	223	687	46	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	118	0	0	4	0	0	0
Lane Group Flow (vph)	0	1066	0	0	443	154	0	910	42	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		939			1062	438		1852	811			
v/s Ratio Prot					0.13							
v/s Ratio Perm		c0.34				0.11		0.26	0.03			
v/c Ratio		1.14			0.42	0.35		0.49	0.05			
Uniform Delay, d1		21.0			16.8	16.4		8.9	6.7			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		74.1			1.2	2.2		0.9	0.1			
Delay (s)		95.1			18.0	18.6		9.8	6.8			
Level of Service		F			B	B		A	A			
Approach Delay (s)		95.1			18.2			9.6			0.0	
Approach LOS		F			B			A			A	

Intersection Summary			
HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	644	73	26	560	0	0	0	0	344	600	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	1.00	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3464			3531					1734	3518	
Flt Permitted		1.00			0.91					0.95	1.00	
Satd. Flow (perm)		3464			3232					1734	3518	
Peak-hour factor, PHF	0.25	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.94	0.96	0.92
Adj. Flow (vph)	0	700	79	28	609	0	0	0	0	366	625	21
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	760	0	0	637	0	0	0	0	366	641	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1463			1365					732	1485	
v/s Ratio Prot		c0.22									0.18	
v/s Ratio Perm					0.20					c0.21		
v/c Ratio		0.52			0.47					0.50	0.43	
Uniform Delay, d1		9.6			9.4					9.5	9.2	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.3			1.1					2.4	0.9	
Delay (s)		10.9			10.5					12.0	10.1	
Level of Service		B			B					B	B	
Approach Delay (s)		10.9			10.5			0.0			10.8	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	430	8	19	401	44	69	445	25	114	178	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3484			3457			3474			3361	
Flt Permitted		0.84			0.93			0.86			0.64	
Satd. Flow (perm)		2949			3221			3009			2203	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92
Adj. Flow (vph)	79	467	9	21	436	48	75	484	27	124	184	54
RTOR Reduction (vph)	0	2	0	0	15	0	0	9	0	0	36	0
Lane Group Flow (vph)	0	553	0	0	490	0	0	577	0	0	326	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		22.9			22.9			14.6			14.6	
Effective Green, g (s)		22.9			22.9			14.6			14.6	
Actuated g/C Ratio		0.51			0.51			0.32			0.32	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1501			1639			976			715	
v/s Ratio Prot												
v/s Ratio Perm		c0.19			0.15			c0.19			0.15	
v/c Ratio		0.37			0.30			0.59			0.46	
Uniform Delay, d1		6.7			6.4			12.7			12.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.5			1.0			0.5	
Delay (s)		7.4			6.9			13.7			12.5	
Level of Service		A			A			B			B	
Approach Delay (s)		7.4			6.9			13.7			12.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	249	941	0	0	0	0	0	697	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.86	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6270						6331	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6270						6331	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	271	970	0	0	0	0	0	758	50
RTOR Reduction (vph)	0	0	0	0	53	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	0	1188	0	0	0	0	0	792	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2717						2796	
v/s Ratio Prot											c0.13	
v/s Ratio Perm					0.19							
v/c Ratio					0.44						0.28	
Uniform Delay, d1					11.9						10.7	
Progression Factor					0.44						1.00	
Incremental Delay, d2					0.5						0.3	
Delay (s)					5.7						10.9	
Level of Service					A						B	
Approach Delay (s)		0.0			5.7			0.0			10.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1015	60	178	984	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6330			6239				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6330			6239				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1068	65	193	1025	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	28	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1129	0	0	1190	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3154			2142				
v/s Ratio Prot					c0.18							
v/s Ratio Perm								0.19				
v/c Ratio					0.36			0.56				
Uniform Delay, d1					9.2			16.0				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.3			1.0				
Delay (s)					9.5			17.0				
Level of Service					A			B				
Approach Delay (s)		0.0			9.5			17.0			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	68	0	0	1079	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	74	0	0	1173	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	299	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	299	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	665	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	74	293	293	293	293
Volume Left	74	0	0	0	0
Volume Right	0	0	0	0	0
cSH	665	1700	1700	1700	1700
Volume to Capacity	0.11	0.17	0.17	0.17	0.17
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.1	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	910	194	0	0	0	0	0	0	51	873	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.97									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6193									5066	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6193									5066	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	948	211	0	0	0	0	0	0	55	939	0
RTOR Reduction (vph)	0	33	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	1126	0	0	0	0	0	0	0	0	983	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2374									2195	
v/s Ratio Prot		c0.18										
v/s Ratio Perm											0.19	
v/c Ratio		0.47									0.45	
Uniform Delay, d1		13.9									12.0	
Progression Factor		0.83									0.62	
Incremental Delay, d2		0.7									0.6	
Delay (s)		12.2									8.0	
Level of Service		B									A	
Approach Delay (s)		12.2			0.0			0.0			8.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	724	0	0	0	0	0	319	134	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6389						6032				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6389						6032				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	26	787	0	0	0	0	0	347	138	0	0	0
RTOR Reduction (vph)	0	9	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	804	0	0	0	0	0	465	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		13.3						39.7				
Effective Green, g (s)		13.3						39.7				
Actuated g/C Ratio		0.22						0.66				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1416						3991				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.13										
v/c Ratio		0.57						0.12				
Uniform Delay, d1		20.8						3.7				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.3						0.1				
Delay (s)		21.1						3.8				
Level of Service		C						A				
Approach Delay (s)		21.1			0.0			3.8			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	1074	0	0	0	0	0	940	394	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6345						4830				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6345						4830				
Peak-hour factor, PHF	0.92	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	193	1096	0	0	0	0	0	1000	410	0	0	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	1269	0	0	0	0	0	1396	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2538						1932				
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.20										
v/c Ratio		0.50						0.72				
Uniform Delay, d1		10.1						11.4				
Progression Factor		0.95						1.56				
Incremental Delay, d2		0.5						1.8				
Delay (s)		10.1						19.6				
Level of Service		B						B				
Approach Delay (s)		10.1			0.0			19.6			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	972	285	0	0	0	0	0	0	433	1471	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6153									5017	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6153									5017	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.95	0.25
Adj. Flow (vph)	0	982	310	0	0	0	0	0	0	471	1548	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	1287	0	0	0	0	0	0	0	0	1997	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2461									2230	
v/s Ratio Prot		c0.21										
v/s Ratio Perm											0.40	
v/c Ratio		0.52									0.90	
Uniform Delay, d1		10.2									11.5	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.8									6.1	
Delay (s)		11.0									17.7	
Level of Service		B									B	
Approach Delay (s)		11.0			0.0			0.0			17.7	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	7	369	56	351	352	0	0	216	1629
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1817			1863	1559
Flt Permitted				0.95	1.00	1.00		0.72			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1350			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	8	401	61	382	383	0	0	235	1662
RTOR Reduction (vph)	0	0	0	0	0	46	0	0	0	0	0	41
Lane Group Flow (vph)	0	0	0	8	401	15	0	765	0	0	235	1621
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.4	14.4	14.4		34.6			34.6	34.6
Effective Green, g (s)				14.4	14.4	14.4		34.6			34.6	34.6
Actuated g/C Ratio				0.24	0.24	0.24		0.58			0.58	0.58
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				414	447	353		779			1074	899
v/s Ratio Prot					c0.22						0.13	
v/s Ratio Perm				0.00		0.01		0.57				c1.04
v/c Ratio				0.02	0.90	0.04		0.98			0.22	1.80
Uniform Delay, d1				17.4	22.1	17.5		12.4			6.2	12.7
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	20.2	0.0		28.2			0.5	365.8
Delay (s)				17.4	42.2	17.6		40.6			6.6	378.5
Level of Service				B	D	B		D			A	F
Approach Delay (s)		0.0			38.6			40.6			332.4	
Approach LOS		A			D			D			F	

Intersection Summary			
HCM Average Control Delay	217.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	172.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	184	627	66	56	728
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.89	0.85
Flt Protected			0.99		0.99	1.00
Satd. Flow (prot)			3500		3170	1441
Flt Permitted			0.99		0.99	1.00
Satd. Flow (perm)			3500		3170	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94
Adj. Flow (vph)	0	200	682	72	61	774
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	882	0	520	387
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1268		1141	519
v/s Ratio Prot						
v/s Ratio Perm			0.25		0.16	c0.27
v/c Ratio			0.70		0.46	0.75
Uniform Delay, d1			12.2		11.0	12.6
Progression Factor			0.75		1.00	1.00
Incremental Delay, d2			0.3		1.3	9.4
Delay (s)			9.5		12.3	22.0
Level of Service			A		B	C
Approach Delay (s)			9.5		16.5	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	291	570	83	0	0	0	0	534	74	1	69	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.98			1.00	
Flt Protected		0.98						1.00			1.00	
Satd. Flow (prot)		4917						1832			1862	
Flt Permitted		0.98						1.00			0.84	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.92	0.93	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.25
Adj. Flow (vph)	316	613	90	0	0	0	0	580	80	1	75	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	994	0	0	0	0	0	649	0	0	76	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						631			448	
v/s Ratio Prot								c0.35				
v/s Ratio Perm		c0.99									0.06	
v/c Ratio		1.99						1.03			0.17	
Uniform Delay, d1		11.2						14.8			10.3	
Progression Factor		1.00						1.00			0.08	
Incremental Delay, d2		451.3						43.3			0.8	
Delay (s)		462.5						58.0			1.5	
Level of Service		F						E			A	
Approach Delay (s)		462.5			0.0			58.0			1.5	
Approach LOS		F			A			E			A	

Intersection Summary			
HCM Average Control Delay	290.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.60		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1168	831	149	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3316		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3316		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	209	185	1243	903	162	895
RTOR Reduction (vph)	0	152	135	0	0	0
Lane Group Flow (vph)	209	33	2011	0	162	895
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0	39.9		22.1	66.0
Effective Green, g (s)	16.0	16.0	39.9		22.1	66.0
Actuated g/C Ratio	0.18	0.18	0.44		0.25	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	315	281	1470		435	2595
v/s Ratio Prot	c0.12		c0.61		c0.09	0.25
v/s Ratio Perm		0.02				
v/c Ratio	0.66	0.12	1.37		0.37	0.34
Uniform Delay, d1	34.5	31.1	25.0		28.2	4.3
Progression Factor	1.00	1.00	1.00		0.66	0.46
Incremental Delay, d2	5.2	0.2	170.0		1.9	0.3
Delay (s)	39.7	31.3	195.0		20.4	2.3
Level of Service	D	C	F		C	A
Approach Delay (s)	35.7		195.0			5.1
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	121.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	254	299	247	109	460	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3377		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3377		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	325	268	118	500	486
RTOR Reduction (vph)	0	0	81	0	0	308
Lane Group Flow (vph)	276	325	305	0	500	178
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.5	27.1	10.6		20.2	20.2
Effective Green, g (s)	12.5	27.1	10.6		20.2	20.2
Actuated g/C Ratio	0.23	0.49	0.19		0.37	0.37
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	400	1734	647		647	578
v/s Ratio Prot	c0.16	0.09	c0.09		c0.28	
v/s Ratio Perm						0.11
v/c Ratio	0.69	0.19	0.47		0.77	0.31
Uniform Delay, d1	19.6	7.9	19.9		15.5	12.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.1	0.1	0.5		5.7	0.3
Delay (s)	24.7	8.0	20.4		21.2	12.9
Level of Service	C	A	C		C	B
Approach Delay (s)		15.6	20.4		17.1	
Approach LOS		B	C		B	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	55.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	672	490	1038	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4962			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4962			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	329	1480	154	0	614	730	533	1128	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	52	0	0	0
Lane Group Flow (vph)	0	0	0	1952	0	0	614	678	533	1128	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	308	580	2005	
v/s Ratio Prot				c0.39			0.17		c0.30	0.32	
v/s Ratio Perm								c0.43			
v/c Ratio				1.18			0.89	2.20	0.92	0.56	
Uniform Delay, d1				30.0			35.3	36.2	29.1	12.4	
Progression Factor				1.00			1.47	1.55	1.00	1.00	
Incremental Delay, d2				87.6			1.9	542.2	19.6	0.4	
Delay (s)				117.6			54.0	598.3	48.7	12.8	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			117.6			349.6			24.3	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	149.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1167	609	169	346	550	71	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3135	1441		3198				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3135	1441		3198				1770	3539
Peak-hour factor, PHF	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	1241	662	184	376	598	77	358	26	264
RTOR Reduction (vph)	0	0	16	0	6	0	0	0	0	0
Lane Group Flow (vph)	405	1485	631	0	1045	0	0	0	384	264
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	975	448		1315				236	2084
v/s Ratio Prot	0.25	c0.47	0.44		c0.33				c0.22	0.07
v/s Ratio Perm										
v/c Ratio	0.81	1.52	1.41		1.01dr				1.63	0.13
Uniform Delay, d1	28.5	31.0	31.0		23.2				39.0	8.2
Progression Factor	0.65	0.66	0.64		1.00				1.00	1.00
Incremental Delay, d2	1.3	235.9	185.2		5.0				300.8	0.1
Delay (s)	19.8	256.4	205.1		28.2				339.8	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		205.5			28.2					204.7
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	161.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1650	234	329	1013	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4860				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4860				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1719	254	336	1078	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	10	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1719	244	0	1408	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1782				
v/s Ratio Prot					c0.34							
v/s Ratio Perm						0.15		0.29				
v/c Ratio					0.68	0.31		0.79				
Uniform Delay, d1					11.3	8.9		16.9				
Progression Factor					1.00	1.00		1.18				
Incremental Delay, d2					1.5	1.0		1.9				
Delay (s)					12.8	9.9		21.9				
Level of Service					B	A		C				
Approach Delay (s)		0.0			12.4			21.9			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	646	1371	0	0	0	0	0	715	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4778						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4778						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	702	1413	0	0	0	0	0	777	71
RTOR Reduction (vph)	0	0	0	38	26	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	474	1577	0	0	0	0	0	837	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2309						1340	
v/s Ratio Prot											c0.24	
v/s Ratio Perm				0.31	0.33							
v/c Ratio				0.64	0.68						0.62	
Uniform Delay, d1				11.6	12.0						15.0	
Progression Factor				1.43	1.37						1.00	
Incremental Delay, d2				3.2	1.2						2.2	
Delay (s)				19.8	17.6						17.2	
Level of Service				B	B						B	
Approach Delay (s)		0.0			18.1			0.0			17.2	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	492	11	18	242	20	16	24	30	68	50	45
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	250	523	12	20	263	22	17	26	33	74	54	49

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	250	535	304	76	177
Volume Left (vph)	250	0	20	17	74
Volume Right (vph)	0	12	22	33	49
Hadj (s)	0.53	0.02	0.00	-0.18	-0.05
Departure Headway (s)	6.3	5.8	5.8	6.7	6.5
Degree Utilization, x	0.44	0.86	0.49	0.14	0.32
Capacity (veh/h)	555	612	581	490	517
Control Delay (s)	13.0	33.6	14.4	10.8	12.5
Approach Delay (s)	27.0		14.4	10.8	12.5
Approach LOS	D		B	B	B

Intersection Summary			
Delay	21.3		
HCM Level of Service	C		
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

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-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
*******************************************************************************
Average Delay (sec/veh):      9.7       Worst Case Level Of Service: D[ 30.8]
*******************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1121     0     0    0   506     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1121     0     0    0   506     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1121     0     0    0   506     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.95  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1180     0     0    0   544     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1180     0     0    0   544     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   393  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   660  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   660  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.82  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   8.8  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  30.8 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     D     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             30.8            xxxxxx
ApproachLOS:         *                *                D                 *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	468	165	1006	447	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1730	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1730	3539	1583	
Peak-hour factor, PHF	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	482	179	1093	486	30
RTOR Reduction (vph)	79	55	0	0	0
Lane Group Flow (vph)	249	278	1093	516	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	12.9	12.9	39.6	16.6	
Effective Green, g (s)	12.9	12.9	39.6	16.6	
Actuated g/C Ratio	0.22	0.22	0.66	0.28	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	361	372	2336	438	
v/s Ratio Prot			c0.31	c0.33	
v/s Ratio Perm	0.15	0.16			
v/c Ratio	0.69	0.75	0.47	1.18	
Uniform Delay, d1	21.7	22.0	5.0	21.7	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.3	7.0	0.7	101.6	
Delay (s)	26.0	29.0	5.7	123.3	
Level of Service	C	C	A	F	
Approach Delay (s)		27.5	43.4		
Approach LOS		C	D		

Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	38	110	85	20	45	15	150	134	14	243	334	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.93			1.00	1.00	0.91		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1478			1770	1863	1443		3433	3497	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1478			1770	1863	1443		3433	3497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	120	92	22	49	16	163	141	15	264	363	28
RTOR Reduction (vph)	0	0	11	0	0	0	0	117	0	0	5	0
Lane Group Flow (vph)	41	120	103	0	0	65	163	24	0	279	386	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	5.2	12.9	12.9			7.4	15.1	15.1		12.6	44.4	
Effective Green, g (s)	5.2	12.9	12.9			7.4	15.1	15.1		12.6	44.4	
Actuated g/C Ratio	0.06	0.14	0.14			0.08	0.17	0.17		0.14	0.49	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	102	507	212			146	313	242		481	1725	
v/s Ratio Prot	0.02	0.03				0.04	c0.09			c0.08	c0.11	
v/s Ratio Perm			c0.07					0.02				
v/c Ratio	0.40	0.24	0.49			0.45	0.52	0.10		0.58	0.22	
Uniform Delay, d1	40.9	34.2	35.5			39.3	34.2	31.7		36.2	13.0	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.2	1.7			2.2	1.6	0.2		1.8	0.3	
Delay (s)	43.5	34.4	37.2			41.5	35.7	31.9		38.0	13.3	
Level of Service	D	C	D			D	D	C		D	B	
Approach Delay (s)		36.9					35.3				23.6	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	96	1015	95	94
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.98		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3456		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3456		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	1103	103	102
RTOR Reduction (vph)	0	5	0	0
Lane Group Flow (vph)	104	1303	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	9.3	41.1		
Effective Green, g (s)	9.3	41.1		
Actuated g/C Ratio	0.10	0.46		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	183	1578		
v/s Ratio Prot	0.06	c0.38		
v/s Ratio Perm				
v/c Ratio	0.57	0.83		
Uniform Delay, d1	38.4	21.3		
Progression Factor	1.00	1.00		
Incremental Delay, d2	4.0	5.1		
Delay (s)	42.4	26.4		
Level of Service	D	C		
Approach Delay (s)		27.6		
Approach LOS		C		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	172	77	33	288	289	49	459	37	94	547	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1746	3330			3517	1543	1760	3484		1766	3495	
Flt Permitted	0.55	1.00			0.90	1.00	0.35	1.00		0.43	1.00	
Satd. Flow (perm)	1007	3330			3168	1543	649	3484		797	3495	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.95	0.92	0.92	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	185	84	36	303	314	53	473	40	102	595	47
RTOR Reduction (vph)	0	48	0	0	0	147	0	7	0	0	7	0
Lane Group Flow (vph)	61	221	0	0	339	167	53	506	0	102	635	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	426	1410			1342	654	290	1558		356	1562	
v/s Ratio Prot		0.07						0.15			c0.18	
v/s Ratio Perm	0.06				0.11	c0.11	0.08			0.13		
v/c Ratio	0.14	0.16			0.25	0.26	0.18	0.32		0.29	0.41	
Uniform Delay, d1	15.0	15.1			15.8	15.8	14.2	15.2		14.9	15.9	
Progression Factor	1.05	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.2			0.5	0.9	1.4	0.6		2.0	0.8	
Delay (s)	16.5	15.4			16.3	16.8	15.5	15.8		16.9	16.7	
Level of Service	B	B			B	B	B	B		B	B	
Approach Delay (s)		15.6			16.5			15.7			16.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	343	365	134	43	253	107	83	362	22	46	341	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1561	1765	1863	1546	1761	3498		1764	3367	
Flt Permitted	0.48	1.00	1.00	0.53	1.00	1.00	0.28	1.00		0.39	1.00	
Satd. Flow (perm)	893	1863	1561	981	1863	1546	512	3498		716	3367	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	373	397	146	47	275	116	86	393	24	50	371	145
RTOR Reduction (vph)	0	0	58	0	0	59	0	7	0	0	64	0
Lane Group Flow (vph)	373	397	88	47	275	57	86	410	0	50	452	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	59.4	51.4	51.4	45.6	42.1	42.1	16.6	16.6		16.6	16.6	
Effective Green, g (s)	59.4	51.4	51.4	45.6	42.1	42.1	16.6	16.6		16.6	16.6	
Actuated g/C Ratio	0.70	0.60	0.60	0.54	0.50	0.50	0.20	0.20		0.20	0.20	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	756	1127	944	559	923	766	100	683		140	658	
v/s Ratio Prot	c0.07	0.21		0.00	0.15			0.12			0.13	
v/s Ratio Perm	c0.27		0.06	0.04		0.04	c0.17			0.07		
v/c Ratio	0.49	0.35	0.09	0.08	0.30	0.08	0.86	0.60		0.36	0.69	
Uniform Delay, d1	5.6	8.4	7.0	9.4	12.7	11.2	33.1	31.2		29.6	31.8	
Progression Factor	1.00	1.00	1.00	0.65	0.67	0.33	0.91	0.89		1.00	1.00	
Incremental Delay, d2	0.2	0.9	0.2	0.0	0.8	0.2	46.1	0.9		0.6	2.4	
Delay (s)	5.7	9.3	7.2	6.1	9.4	3.9	76.2	28.7		30.2	34.2	
Level of Service	A	A	A	A	A	A	E	C		C	C	
Approach Delay (s)		7.5			7.6			36.9			33.8	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	155	834	0	0	149	297	5	263	25	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1608	3387			3539	2787		5008				
Flt Permitted	0.65	0.95			1.00	1.00		1.00				
Satd. Flow (perm)	1099	3219			3539	2787		5008				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	907	0	0	162	323	5	286	27	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	194	0	16	0	0	0	0
Lane Group Flow (vph)	151	924	0	0	162	129	0	302	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	440	1288			1416	1115		2003				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.14	c0.29				0.05		0.06				
v/c Ratio	0.34	0.72			0.11	0.12		0.15				
Uniform Delay, d1	8.3	10.1			7.5	7.5		7.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.1	3.5			0.2	0.2		0.2				
Delay (s)	10.5	13.6			7.7	7.8		7.8				
Level of Service	B	B			A	A		A				
Approach Delay (s)		13.1			7.7			7.8			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	280	27	11	158	0	0	0	0	692	1033	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1558		3526					1610	3370	1583
Flt Permitted		1.00	1.00		0.93					0.95	0.99	1.00
Satd. Flow (perm)		3539	1558		3296					1610	3370	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	0	304	29	12	172	0	0	0	0	752	1111	382
RTOR Reduction (vph)	0	0	19	0	0	0	0	0	0	0	0	185
Lane Group Flow (vph)	0	304	10	0	184	0	0	0	0	602	1261	197
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	545		1154					832	1741	818
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.01		0.06					0.37	0.37	0.12
v/c Ratio		0.25	0.02		0.16					0.72	0.72	0.24
Uniform Delay, d1		13.9	12.8		13.4					11.2	11.2	8.0
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.1		0.3					5.4	2.7	0.7
Delay (s)		14.3	12.8		13.7					16.6	13.9	8.7
Level of Service		B	B		B					B	B	A
Approach Delay (s)		14.2			13.7			0.0			13.7	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	195	584	670	126	808	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3438		3432	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3438		3432	1414
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	635	728	137	878	214
RTOR Reduction (vph)	0	0	18	0	2	134
Lane Group Flow (vph)	212	635	847	0	897	59
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.8	47.6	30.8		24.4	24.4
Effective Green, g (s)	12.8	47.6	30.8		24.4	24.4
Actuated g/C Ratio	0.16	0.60	0.38		0.30	0.30
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	283	2106	1324		1047	431
v/s Ratio Prot	c0.12	0.18	c0.25		c0.26	
v/s Ratio Perm						0.04
v/c Ratio	0.75	0.30	0.64		0.86	0.14
Uniform Delay, d1	32.1	8.0	20.1		26.2	20.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.1	0.4	2.4		6.8	0.1
Delay (s)	41.2	8.4	22.5		32.9	20.2
Level of Service	D	A	C		C	C
Approach Delay (s)		16.6	22.5		30.7	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	835	357	68	424	67	201	258	31	100	354	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1766	3427	1553	1768	3347		1768	3471		1757	3430	
Flt Permitted	0.32	1.00	1.00	0.16	1.00		0.41	1.00		0.57	1.00	
Satd. Flow (perm)	592	3427	1553	300	3347		759	3471		1046	3430	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	870	388	74	461	73	218	272	34	109	385	84
RTOR Reduction (vph)	0	0	275	0	14	0	0	8	0	0	20	0
Lane Group Flow (vph)	117	870	113	74	520	0	218	298	0	109	449	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.8	24.8	24.8	24.8	24.8		49.7	49.7		35.9	35.9	
Effective Green, g (s)	24.8	24.8	24.8	24.8	24.8		49.7	49.7		35.9	35.9	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29		0.58	0.58		0.42	0.42	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	173	1000	453	88	977		554	2030		442	1449	
v/s Ratio Prot		c0.25			0.16		c0.04	0.09			0.13	
v/s Ratio Perm	0.20		0.07	0.25			c0.19			0.10		
v/c Ratio	0.68	0.87	0.25	0.84	0.53		0.39	0.15		0.25	0.31	
Uniform Delay, d1	26.6	28.6	23.0	28.2	25.2		8.7	8.0		15.8	16.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.14	1.17	
Incremental Delay, d2	19.2	10.3	1.3	59.2	2.1		0.2	0.2		1.3	0.5	
Delay (s)	45.8	38.8	24.3	87.4	27.3		8.8	8.2		19.4	19.6	
Level of Service	D	D	C	F	C		A	A		B	B	
Approach Delay (s)		35.3			34.6			8.4			19.6	
Approach LOS		D			C			A			B	

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	710	78	94	484	72	107	420	90	77	378	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			0.99		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1753	3360			3324		1763	3539	1529	1761	3434	
Flt Permitted	0.26	1.00			0.61		0.44	1.00	1.00	0.47	1.00	
Satd. Flow (perm)	478	3360			2053		820	3539	1529	864	3434	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	772	85	102	526	78	116	457	98	84	411	85
RTOR Reduction (vph)	0	12	0	0	13	0	0	0	47	0	19	0
Lane Group Flow (vph)	95	845	0	0	693	0	116	457	51	84	477	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	30.5	30.5			30.5		41.5	41.5	41.5	41.5	41.5	
Effective Green, g (s)	30.5	30.5			30.5		41.5	41.5	41.5	41.5	41.5	
Actuated g/C Ratio	0.38	0.38			0.38		0.52	0.52	0.52	0.52	0.52	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	182	1281			783		425	1836	793	448	1781	
v/s Ratio Prot		0.25						0.13			0.14	
v/s Ratio Perm	0.20				c0.34		c0.14		0.03	0.10		
v/c Ratio	0.52	0.66			0.89		0.27	0.25	0.06	0.19	0.27	
Uniform Delay, d1	19.1	20.5			23.1		10.8	10.6	9.6	10.3	10.8	
Progression Factor	1.00	1.00			1.21		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.9			11.3		1.6	0.3	0.2	0.9	0.4	
Delay (s)	20.4	21.4			39.2		12.4	11.0	9.7	11.2	11.1	
Level of Service	C	C			D		B	B	A	B	B	
Approach Delay (s)		21.3			39.2			11.0			11.1	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	386	386	119	439	0	0	0	0	10	158	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.92		1.00	1.00						0.98	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		3077		1770	3427						3416	
Flt Permitted		1.00		0.18	1.00						1.00	
Satd. Flow (perm)		3077		339	3427						3416	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	415	420	129	477	0	0	0	0	11	172	21
RTOR Reduction (vph)	0	203	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	632	0	129	477	0	0	0	0	0	193	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.6		43.0	43.0						29.0	
Effective Green, g (s)		31.6		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1215		297	1842						1238	
v/s Ratio Prot		c0.21		c0.03	0.14							
v/s Ratio Perm				0.20							0.06	
v/c Ratio		0.52		0.43	0.26						0.16	
Uniform Delay, d1		18.4		11.3	9.9						17.2	
Progression Factor		2.61		1.00	1.00						1.00	
Incremental Delay, d2		1.4		0.4	0.3						0.3	
Delay (s)		49.6		11.7	10.3						17.5	
Level of Service		D		B	B						B	
Approach Delay (s)		49.6			10.6			0.0			17.5	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	148	77	535	547	119	121	776	341	33	773	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	3539	1479	3433	3539	1485		5041	1419		4973	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.66	1.00		0.85	
Satd. Flow (perm)	3433	3539	1479	3433	3539	1485		3370	1419		4250	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	67	161	84	582	595	129	132	843	371	36	831	97
RTOR Reduction (vph)	0	0	20	0	0	72	0	0	237	0	13	0
Lane Group Flow (vph)	67	161	64	582	595	57	0	975	134	0	951	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	5.5	33.0	33.0	16.0	44.5	44.5		36.0	36.0		36.0	
Effective Green, g (s)	5.5	33.0	33.0	16.0	44.5	44.5		36.0	36.0		36.0	
Actuated g/C Ratio	0.06	0.33	0.33	0.16	0.44	0.44		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	189	1168	488	549	1575	661		1213	511		1530	
v/s Ratio Prot	0.02	0.05		c0.17	c0.17							
v/s Ratio Perm			0.04			0.04		c0.29	0.09		0.22	
v/c Ratio	0.35	0.14	0.13	1.06	0.38	0.09		0.98dl	0.26		0.62	
Uniform Delay, d1	45.5	23.5	23.5	42.0	18.5	16.0		28.8	22.6		26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.2	0.6	55.3	0.7	0.3		5.7	1.2		1.9	
Delay (s)	46.0	23.8	24.0	97.3	19.2	16.3		34.5	23.8		28.3	
Level of Service	D	C	C	F	B	B		C	C		C	
Approach Delay (s)		28.6			53.7			31.6			28.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	94	44	106	947	1088	530
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.95		1.00	1.00	0.95	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3253		1768	3725	6091	
Flt Permitted	0.97		0.10	1.00	1.00	
Satd. Flow (perm)	3253		183	3725	6091	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.93	0.92
Adj. Flow (vph)	102	48	115	986	1170	576
RTOR Reduction (vph)	43	0	0	0	54	0
Lane Group Flow (vph)	107	0	115	986	1692	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	8.0		58.5	52.3	52.3	
Effective Green, g (s)	8.0		58.5	52.3	52.3	
Actuated g/C Ratio	0.10		0.73	0.65	0.65	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	325		257	2435	3982	
v/s Ratio Prot	c0.03		c0.03	0.26	0.28	
v/s Ratio Perm			c0.29			
v/c Ratio	0.33		0.45	0.40	0.42	
Uniform Delay, d1	33.5		3.7	6.5	6.6	
Progression Factor	1.00		1.23	1.50	1.00	
Incremental Delay, d2	0.6		1.1	0.5	0.3	
Delay (s)	34.1		5.6	10.3	7.0	
Level of Service	C		A	B	A	
Approach Delay (s)	34.1			9.8	7.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	132	30	102	534	1	11
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	33	111	580	1	12
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			178		971	169
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			178		971	169
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		100	99
cM capacity (veh/h)			1395		256	869

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	176	691	13
Volume Left	0	111	1
Volume Right	33	0	12
cSH	1700	1395	724
Volume to Capacity	0.10	0.08	0.02
Queue Length 95th (ft)	0	6	1
Control Delay (s)	0.0	2.0	10.1
Lane LOS		A	B
Approach Delay (s)	0.0	2.0	10.1
Approach LOS			B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	140	190	294	242	2	20
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	152	207	320	263	2	22
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			361		1184	281
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			361		1184	281
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			73		99	97
cM capacity (veh/h)			1196		150	741

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	359	583	24
Volume Left	0	320	2
Volume Right	207	0	22
cSH	1700	1196	546
Volume to Capacity	0.21	0.27	0.04
Queue Length 95th (ft)	0	27	3
Control Delay (s)	0.0	6.3	11.9
Lane LOS		A	B
Approach Delay (s)	0.0	6.3	11.9
Approach LOS			B

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	180	88	91	396	30	30
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	1.00	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	196	88	99	430	33	33
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked						
vC, conflicting volume			286		886	258
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			286		886	258
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		89	96
cM capacity (veh/h)			1274		286	769

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	284	529	16	16	16	16
Volume Left	0	99	16	16	0	0
Volume Right	88	0	0	0	16	16
cSH	1700	1274	286	286	769	769
Volume to Capacity	0.17	0.08	0.06	0.06	0.02	0.02
Queue Length 95th (ft)	0	6	5	5	2	2
Control Delay (s)	0.0	2.2	18.3	18.3	9.8	9.8
Lane LOS		A	C	C	A	A
Approach Delay (s)	0.0	2.2	14.1			
Approach LOS			B			

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	283	56	50	56	0	0	0	0	228	400	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.96						0.96	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1342		1744						4736	
Flt Permitted		1.00	1.00		0.58						0.98	
Satd. Flow (perm)		1863	1342		1041						4736	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	308	61	54	61	0	0	0	0	248	435	33
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	308	15	0	115	0	0	0	0	0	713	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		19.8	19.8		19.8						52.2	
Effective Green, g (s)		19.8	19.8		19.8						52.2	
Actuated g/C Ratio		0.25	0.25		0.25						0.65	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		461	332		258						3090	
v/s Ratio Prot		c0.17										
v/s Ratio Perm			0.01		0.11						0.15	
v/c Ratio		0.67	0.05		0.45						0.23	
Uniform Delay, d1		27.1	22.9		25.5						5.7	
Progression Factor		1.00	1.00		1.00						0.74	
Incremental Delay, d2		3.7	0.1		1.2						0.2	
Delay (s)		30.8	23.0		26.7						4.4	
Level of Service		C	C		C						A	
Approach Delay (s)		29.5			26.7			0.0			4.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	213	4	0	40	38	10	204	133	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			1.00	1.00			
Frt		1.00			0.93			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1850			1635			3514	1376			
Flt Permitted		0.99			1.00			1.00	1.00			
Satd. Flow (perm)		1843			1635			3514	1376			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	232	4	0	43	41	11	222	145	0	0	0
RTOR Reduction (vph)	0	1	0	0	14	0	0	0	121	0	0	0
Lane Group Flow (vph)	0	243	0	0	70	0	0	233	24	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		29.6			29.6			7.4	7.4			
Effective Green, g (s)		29.6			29.6			7.4	7.4			
Actuated g/C Ratio		0.66			0.66			0.16	0.16			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1212			1075			578	226			
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.13						0.07	0.02			
v/c Ratio		0.20			0.07			0.40	0.11			
Uniform Delay, d1		3.0			2.8			16.8	16.0			
Progression Factor		0.53			1.00			1.00	1.00			
Incremental Delay, d2		0.4			0.1			0.2	0.1			
Delay (s)		2.0			2.9			17.0	16.1			
Level of Service		A			A			B	B			
Approach Delay (s)		2.0			2.9			16.6			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	121	17	25	0	35	0	320	38	76	354	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			0.99	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1751	1824			1651			3455			3487	
Flt Permitted	0.71	1.00			0.89			1.00			0.82	
Satd. Flow (perm)	1317	1824			1493			3455			2878	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	132	18	27	0	38	0	348	41	83	385	0
RTOR Reduction (vph)	0	10	0	0	22	0	0	20	0	0	0	0
Lane Group Flow (vph)	12	140	0	0	43	0	0	369	0	0	468	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	556	770			630			1305			1087	
v/s Ratio Prot		c0.08						0.11				
v/s Ratio Perm	0.01				0.03						c0.16	
v/c Ratio	0.02	0.18			0.07			0.28			0.43	
Uniform Delay, d1	7.6	8.1			7.7			9.8			10.4	
Progression Factor	1.00	1.00			1.26			1.00			1.00	
Incremental Delay, d2	0.1	0.5			0.2			0.5			1.2	
Delay (s)	7.7	8.7			10.0			10.3			11.6	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.6			10.0			10.3			11.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	90	20	12	198	101	34	458	37	158	163	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.95			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3414			3324			3483		1769	3383	
Flt Permitted		0.87			0.94			0.92		0.38	1.00	
Satd. Flow (perm)		2980			3130			3226		698	3383	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	98	22	13	211	110	37	467	40	172	177	63
RTOR Reduction (vph)	0	18	0	0	92	0	0	8	0	0	20	0
Lane Group Flow (vph)	0	123	0	0	242	0	0	537	0	172	220	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.9			9.9			30.0		41.1	41.1	
Effective Green, g (s)		9.9			9.9			30.0		41.1	41.1	
Actuated g/C Ratio		0.16			0.16			0.50		0.68	0.68	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		492			516			1613		596	2317	
v/s Ratio Prot										c0.03	0.07	
v/s Ratio Perm		0.04			c0.08			c0.17		0.17		
v/c Ratio		0.25			0.47			0.33		0.29	0.10	
Uniform Delay, d1		21.8			22.7			9.0		3.6	3.2	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.6			0.6		0.3	0.1	
Delay (s)		22.1			23.3			9.6		3.9	3.3	
Level of Service		C			C			A		A	A	
Approach Delay (s)		22.1			23.3			9.6			3.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	177	61	48	157	112	60	478	78	63	414	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.96			0.95			0.98			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		3340			3153			3400			4981	
Flt Permitted		0.94			0.88			0.86			0.80	
Satd. Flow (perm)		3154			2783			2950			4002	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	192	66	52	171	122	65	514	85	68	450	28
RTOR Reduction (vph)	0	42	0	0	77	0	0	19	0	0	10	0
Lane Group Flow (vph)	0	225	0	0	268	0	0	645	0	0	536	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1156			1020			1478			1201	
v/s Ratio Prot								c0.05				
v/s Ratio Perm		0.07			c0.10			c0.16			0.13	
v/c Ratio		0.19			0.26			0.44			0.45	
Uniform Delay, d1		13.0			13.3			10.1			17.0	
Progression Factor		0.89			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.6			0.9			1.2	
Delay (s)		11.8			13.9			11.1			18.2	
Level of Service		B			B			B			B	
Approach Delay (s)		11.8			13.9			11.1			18.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	313	0	0	257	88	32	242	96	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3364	1337		5023	1458			
Flt Permitted		0.92			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3237			3364	1337		5023	1458			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	340	0	0	279	96	35	263	104	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	19	0	0	91	0	0	0
Lane Group Flow (vph)	0	370	0	0	288	67	0	298	13	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		62.7			62.7	62.7		10.3	10.3			
Effective Green, g (s)		62.7			62.7	62.7		10.3	10.3			
Actuated g/C Ratio		0.78			0.78	0.78		0.13	0.13			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2537			2637	1048		647	188			
v/s Ratio Prot					0.09							
v/s Ratio Perm		c0.11				0.05		0.06	0.01			
v/c Ratio		0.15			0.11	0.06		0.46	0.07			
Uniform Delay, d1		2.1			2.0	2.0		32.3	30.6			
Progression Factor		1.00			1.89	4.21		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.5	0.2			
Delay (s)		2.2			3.9	8.4		32.8	30.8			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.2			5.0			32.3			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	264	150	159	256	0	0	0	0	67	340	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.94	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1422	1610	3354						4452	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1422	1610	3152						4452	
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	287	158	173	278	0	0	0	0	73	370	97
RTOR Reduction (vph)	0	0	111	0	0	0	0	0	0	0	43	0
Lane Group Flow (vph)	0	287	47	145	306	0	0	0	0	0	497	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1656						1725	
v/s Ratio Prot		c0.08		c0.09	0.04							
v/s Ratio Perm			0.03		0.06						0.11	
v/c Ratio		0.31	0.13	0.45	0.18						0.29	
Uniform Delay, d1		23.7	22.5	28.1	10.5						16.9	
Progression Factor		1.07	1.68	1.48	0.47						1.13	
Incremental Delay, d2		0.9	0.7	0.3	0.0						0.0	
Delay (s)		26.2	38.5	42.1	5.0						19.2	
Level of Service		C	D	D	A						B	
Approach Delay (s)		30.5			16.9			0.0			19.2	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	22.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	72	122	171	61	56	318	400	337	59	0	22	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.94
Flpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.91				1.00	0.97	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.98				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	4696				3491	3286	1441	1583		1583	1490
Flt Permitted	0.95	0.98				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	4696				3491	3286	1441	1583		1583	1490
Peak-hour factor, PHF	0.95	0.92	0.92	0.94	0.94	0.96	0.92	0.96	0.96	0.92	0.95	0.95
Adj. Flow (vph)	76	133	186	65	60	331	435	351	61	0	23	28
RTOR Reduction (vph)	0	139	0	0	0	0	0	0	38	0	0	22
Lane Group Flow (vph)	76	180	0	0	0	456	547	239	23	0	23	6
Confl. Peds. (#/hr)	16								102			32
Confl. Bikes (#/hr)						6			10			2
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	6.8	20.4				24.0	16.8	30.4	30.4		2.8	16.8
Effective Green, g (s)	6.8	20.4				24.0	16.8	30.4	30.4		2.8	16.8
Actuated g/C Ratio	0.08	0.26				0.30	0.21	0.38	0.38		0.03	0.21
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	150	1197				1047	690	548	602		55	313
v/s Ratio Prot	c0.04	0.04				c0.13	c0.17	c0.17	0.01			
v/s Ratio Perm											c0.01	0.00
v/c Ratio	0.51	0.15				0.44	0.79	0.44	0.04		0.42	0.02
Uniform Delay, d1	35.0	23.1				22.5	30.0	18.4	15.6		37.8	25.1
Progression Factor	0.90	2.08				1.00	1.28	1.55	3.02		1.00	1.00
Incremental Delay, d2	2.6	0.3				0.1	5.7	2.5	0.1		1.9	0.0
Delay (s)	34.1	48.2				22.7	44.1	31.1	47.3		39.7	25.1
Level of Service	C	D				C	D	C	D		D	C
Approach Delay (s)		45.5				22.7	40.7			31.7		
Approach LOS		D				C	D			C		

Intersection Summary			
HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	391	29	451	587	143	776
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5032		3433	5085	3179	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5032		3433	5085	3179	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.97
Adj. Flow (vph)	425	32	470	638	155	800
RTOR Reduction (vph)	11	0	0	0	333	333
Lane Group Flow (vph)	446	0	470	638	222	67
Confl. Bikes (#/hr)				2		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	33.0		20.6	58.6	13.4	13.4
Effective Green, g (s)	33.0		20.6	58.6	13.4	13.4
Actuated g/C Ratio	0.41		0.26	0.73	0.17	0.17
Clearance Time (s)	5.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2076		884	3725	532	241
v/s Ratio Prot	c0.09		c0.14	0.13	c0.07	
v/s Ratio Perm						0.05
v/c Ratio	0.22		0.53	0.17	0.42	0.28
Uniform Delay, d1	15.2		25.6	3.3	29.8	29.1
Progression Factor	0.43		0.77	1.06	1.00	1.00
Incremental Delay, d2	0.2		2.1	0.0	0.5	0.6
Delay (s)	6.7		21.8	3.5	30.3	29.7
Level of Service	A		C	A	C	C
Approach Delay (s)	6.7			11.3	30.1	
Approach LOS	A			B	C	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	111	0	0	0	0	0	2982	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6403	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	0	0	88	121	0	0	0	0	0	3106	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	121	0	0	0	0	0	3119	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4849	
v/s Ratio Prot					0.03						c0.49	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.28						0.64	
Uniform Delay, d1				30.4	29.9						4.3	
Progression Factor				1.00	1.00						0.95	
Incremental Delay, d2				5.5	1.6						0.3	
Delay (s)				35.9	31.5						4.4	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.4			0.0			4.4	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1172	528	75	486	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4960		3377	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4960		3377	
Peak-hour factor, PHF	0.92	0.96	0.95	0.92	0.94	0.92
Adj. Flow (vph)	238	1221	556	82	517	116
RTOR Reduction (vph)	50	0	30	0	0	0
Lane Group Flow (vph)	188	1221	608	0	633	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	33.6	33.6	15.1		14.3	
Effective Green, g (s)	33.6	33.6	15.1		14.3	
Actuated g/C Ratio	0.45	0.45	0.20		0.19	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	793	2278	999		644	
v/s Ratio Prot		c0.24	c0.12		c0.19	
v/s Ratio Perm	0.11					
v/c Ratio	0.24	0.54	0.61		0.98	
Uniform Delay, d1	12.8	15.0	27.3		30.2	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.9	1.1		31.0	
Delay (s)	13.5	15.9	28.3		61.2	
Level of Service	B	B	C		E	
Approach Delay (s)		15.5	28.3		61.2	
Approach LOS		B	C		E	

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	155	241	314	316	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3150	1423	1425	5925				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3150	1423	1425	5925				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	165	262	341	343	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	48	50	135	136	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	245	84	35	378	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.6	37.6	12.4	12.4				
Effective Green, g (s)					37.6	37.6	12.4	12.4				
Actuated g/C Ratio					0.63	0.63	0.21	0.21				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1974	892	295	1225				
v/s Ratio Prot					c0.08							
v/s Ratio Perm						0.06	0.02	0.06				
v/c Ratio					0.12	0.09	0.12	0.31				
Uniform Delay, d1					4.5	4.4	19.4	20.2				
Progression Factor					4.13	7.37	1.00	1.00				
Incremental Delay, d2					0.1	0.2	0.2	0.1				
Delay (s)					18.8	32.9	19.5	20.3				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			23.2			20.1			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	177	37	0	0	0	0	0	0	1085	1218	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3433								1522	4722	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3433								1522	4722	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	190	40	0	0	0	0	0	0	1179	1324	37
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	345	63	0
Lane Group Flow (vph)	0	223	0	0	0	0	0	0	0	280	1852	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1774								634	1968	
v/s Ratio Prot		c0.07										
v/s Ratio Perm										0.18	0.39	
v/c Ratio		0.13								0.44	0.94	
Uniform Delay, d1		15.0								25.0	33.6	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.1								2.2	10.5	
Delay (s)		15.1								27.3	44.1	
Level of Service		B								C	D	
Approach Delay (s)		15.1			0.0			0.0			39.9	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	307	0	0	644	565	136	605	27	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3539	1548		3492	1531			
Flt Permitted		0.79			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2782			3539	1548		3492	1531			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	334	0	0	700	589	148	630	29	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	144	0	0	14	0	0	0
Lane Group Flow (vph)	0	377	0	0	700	446	0	778	15	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		835			1062	464		1862	817			
v/s Ratio Prot					0.20							
v/s Ratio Perm		0.14				c0.29		0.22	0.01			
v/c Ratio		0.45			0.66	0.96		0.42	0.02			
Uniform Delay, d1		17.0			18.3	20.6		8.4	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.8			3.2	32.9		0.7	0.0			
Delay (s)		18.8			21.5	53.6		9.1	6.6			
Level of Service		B			C	D		A	A			
Approach Delay (s)		18.8			36.2			9.0			0.0	
Approach LOS		B			D			A			A	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	274	46	25	731	0	0	0	0	59	368	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3441			3531					1746	3505	
Flt Permitted		1.00			0.94					0.95	1.00	
Satd. Flow (perm)		3441			3321					1746	3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	298	50	27	761	0	0	0	0	64	383	22
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	319	0	0	788	0	0	0	0	64	396	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1453			1402					737	1480	
v/s Ratio Prot		0.09									c0.11	
v/s Ratio Perm					c0.24					0.04		
v/c Ratio		0.22			0.56					0.09	0.27	
Uniform Delay, d1		8.3			9.8					7.8	8.5	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.3			1.6					0.2	0.4	
Delay (s)		8.6			11.5					8.0	8.9	
Level of Service		A			B					A	A	
Approach Delay (s)		8.6			11.5			0.0			8.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	166	12	8	400	99	66	425	27	29	75	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3460			3387			3468			3346	
Flt Permitted		0.83			0.95			0.90			0.82	
Satd. Flow (perm)		2907			3224			3133			2778	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	180	13	9	435	108	72	462	29	32	82	30
RTOR Reduction (vph)	0	6	0	0	40	0	0	10	0	0	20	0
Lane Group Flow (vph)	0	236	0	0	512	0	0	553	0	0	124	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.1			23.1			14.4			14.4	
Effective Green, g (s)		23.1			23.1			14.4			14.4	
Actuated g/C Ratio		0.51			0.51			0.32			0.32	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1492			1655			1003			889	
v/s Ratio Prot												
v/s Ratio Perm		0.08			c0.16			c0.18			0.04	
v/c Ratio		0.16			0.31			0.55			0.14	
Uniform Delay, d1		5.8			6.3			12.6			10.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.5			0.7			0.1	
Delay (s)		6.0			6.8			13.3			11.0	
Level of Service		A			A			B			B	
Approach Delay (s)		6.0			6.8			13.3			11.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	415	1502	0	0	0	0	0	378	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6291						4914	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6291						4914	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	451	1548	0	0	0	0	0	386	83
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	1911	0	0	0	0	0	466	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2170	
v/s Ratio Prot											c0.09	
v/s Ratio Perm					0.30							
v/c Ratio					0.70						0.21	
Uniform Delay, d1					13.8						10.3	
Progression Factor					0.48						1.00	
Incremental Delay, d2					1.3						0.2	
Delay (s)					7.9						10.6	
Level of Service					A						B	
Approach Delay (s)		0.0			7.9			0.0			10.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1684	78	324	797	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6341			6165				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6341			6165				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1736	85	348	866	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1812	0	0	1211	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3160			2117				
v/s Ratio Prot					c0.29							
v/s Ratio Perm								0.20				
v/c Ratio					0.57			0.57				
Uniform Delay, d1					10.6			16.1				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.8			1.1				
Delay (s)					11.3			17.2				
Level of Service					B			B				
Approach Delay (s)		0.0			11.3			17.2			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	66	0	0	1073	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	72	0	0	1084	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	283	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	283	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	677	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	72	271	271	271	271
Volume Left	72	0	0	0	0
Volume Right	0	0	0	0	0
cSH	677	1700	1700	1700	1700
Volume to Capacity	0.11	0.16	0.16	0.16	0.16
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	10.9	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	10.9	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	398	142	0	0	0	0	0	0	26	778	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6074									5074	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6074									5074	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	433	154	0	0	0	0	0	0	28	819	0
RTOR Reduction (vph)	0	49	0	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	538	0	0	0	0	0	0	0	0	841	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2328									2199	
v/s Ratio Prot		c0.09										
v/s Ratio Perm											0.17	
v/c Ratio		0.23									0.38	
Uniform Delay, d1		12.5									11.5	
Progression Factor		0.77									1.16	
Incremental Delay, d2		0.2									0.5	
Delay (s)		9.9									13.8	
Level of Service		A									B	
Approach Delay (s)		9.9			0.0			0.0			13.8	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	104	402	0	0	0	0	0	364	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6288						6247				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6288						6247				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	432	0	0	0	0	0	396	64	0	0	0
RTOR Reduction (vph)	0	96	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	449	0	0	0	0	0	443	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		9.0						44.0				
Effective Green, g (s)		9.0						44.0				
Actuated g/C Ratio		0.15						0.73				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		943						4581				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.07										
v/c Ratio		0.48						0.10				
Uniform Delay, d1		23.3						2.3				
Progression Factor		1.01						1.00				
Incremental Delay, d2		0.1						0.0				
Delay (s)		23.8						2.3				
Level of Service		C						A				
Approach Delay (s)		23.8			0.0			2.3			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	571	0	0	0	0	0	1115	291	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.97				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6328						4905				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6328						4905				
Peak-hour factor, PHF	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	621	0	0	0	0	0	1212	316	0	0	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	73	0	0	0	0
Lane Group Flow (vph)	0	756	0	0	0	0	0	1455	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2531						1962				
v/s Ratio Prot								c0.30				
v/s Ratio Perm		0.12										
v/c Ratio		0.30						0.74				
Uniform Delay, d1		9.2						11.5				
Progression Factor		0.78						0.75				
Incremental Delay, d2		0.3						1.9				
Delay (s)		7.5						10.6				
Level of Service		A						B				
Approach Delay (s)		7.5			0.0			10.6			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	552	282	0	0	0	0	0	0	150	619	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6051									5026	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6051									5026	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	600	307	0	0	0	0	0	0	163	632	0
RTOR Reduction (vph)	0	95	0	0	0	0	0	0	0	0	82	0
Lane Group Flow (vph)	0	812	0	0	0	0	0	0	0	0	713	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2420									2234	
v/s Ratio Prot		c0.13										
v/s Ratio Perm											0.14	
v/c Ratio		0.34									0.32	
Uniform Delay, d1		9.4									8.1	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.4									0.4	
Delay (s)		9.7									8.5	
Level of Service		A									A	
Approach Delay (s)		9.7			0.0			0.0			8.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	24	348	53	226	282	0	0	167	1778
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1821			1863	1558
Flt Permitted				0.95	1.00	1.00		0.77			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1436			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	0	0	0	26	362	58	246	307	0	0	182	1872
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	0	94
Lane Group Flow (vph)	0	0	0	26	362	16	0	553	0	0	182	1778
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				12.2	12.2	12.2		21.8			21.8	21.8
Effective Green, g (s)				12.2	12.2	12.2		21.8			21.8	21.8
Actuated g/C Ratio				0.27	0.27	0.27		0.48			0.48	0.48
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				471	505	407		696			903	755
v/s Ratio Prot					c0.19						0.10	
v/s Ratio Perm				0.01		0.01		0.39				c1.14
v/c Ratio				0.06	0.72	0.04		0.79			0.20	2.35
Uniform Delay, d1				12.1	14.8	12.1		9.7			6.6	11.6
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	4.8	0.0		9.1			0.5	613.6
Delay (s)				12.2	19.7	12.1		18.8			7.1	625.2
Level of Service				B	B	B		B			A	F
Approach Delay (s)		0.0			18.2			18.8			570.5	
Approach LOS		A			B			B			F	

Intersection Summary			
HCM Average Control Delay	389.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	170.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	145	505	141	56	878
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3497		3190	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3497		3190	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	158	526	153	61	954
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	684	0	691	477
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1148	519
v/s Ratio Prot						
v/s Ratio Perm			0.20		0.22	c0.33
v/c Ratio			0.54		0.60	0.92
Uniform Delay, d1			11.4		11.8	13.8
Progression Factor			0.81		1.00	1.00
Incremental Delay, d2			0.5		2.3	23.8
Delay (s)			9.7		14.1	37.6
Level of Service			A		B	D
Approach Delay (s)			9.7		23.7	
Approach LOS			A		C	

Intersection Summary			
HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	356	651	179	0	0	0	0	271	80	4	138	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4857						1800			1860	
Flt Permitted		0.99						1.00			0.99	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	375	708	195	0	0	0	0	295	87	4	150	0
RTOR Reduction (vph)	0	57	0	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	1221	0	0	0	0	0	358	0	0	154	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						620			551	
v/s Ratio Prot								c0.20				
v/s Ratio Perm		c0.66									0.10	
v/c Ratio		1.32						0.58			0.28	
Uniform Delay, d1		11.2						12.1			10.7	
Progression Factor		1.00						1.00			0.94	
Incremental Delay, d2		151.6						3.9			1.0	
Delay (s)		162.9						16.0			11.1	
Level of Service		F						B			B	
Approach Delay (s)		162.9			0.0			16.0			11.1	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	119.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	361	213	521	286	115	1223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3351		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3351		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	232	566	311	125	1329
RTOR Reduction (vph)	0	171	75	0	0	0
Lane Group Flow (vph)	392	61	802	0	125	1329
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	23.5	23.5	40.6		13.9	58.5
Effective Green, g (s)	23.5	23.5	40.6		13.9	58.5
Actuated g/C Ratio	0.26	0.26	0.45		0.15	0.65
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	462	413	1512		273	2300
v/s Ratio Prot	c0.22		0.24		0.07	c0.38
v/s Ratio Perm		0.04				
v/c Ratio	0.85	0.15	0.53		0.46	0.58
Uniform Delay, d1	31.6	25.5	17.8		34.6	8.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	13.5	0.2	1.3		5.4	1.1
Delay (s)	45.1	25.7	19.2		40.1	9.9
Level of Service	D	C	B		D	A
Approach Delay (s)	37.9		19.2			12.5
Approach LOS	D		B			B

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	233	416	206	187	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3363		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3363		1770	1583
Peak-hour factor, PHF	0.94	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	372	243	452	224	203	216
RTOR Reduction (vph)	0	0	90	0	0	167
Lane Group Flow (vph)	372	243	586	0	203	49
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.2	31.5	13.3		11.7	11.7
Effective Green, g (s)	14.2	31.5	13.3		11.7	11.7
Actuated g/C Ratio	0.28	0.62	0.26		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	491	2177	874		404	362
v/s Ratio Prot	c0.21	0.07	c0.17		c0.11	
v/s Ratio Perm						0.03
v/c Ratio	0.76	0.11	0.67		0.50	0.14
Uniform Delay, d1	16.9	4.1	17.0		17.2	15.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.0	2.0		1.0	0.2
Delay (s)	23.5	4.1	19.0		18.2	15.9
Level of Service	C	A	B		B	B
Approach Delay (s)		15.8	19.0		17.0	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	213	282	1299	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4932			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4932			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	729	767	240	0	456	232	307	1412	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	182	0	0	0
Lane Group Flow (vph)	0	0	0	1714	0	0	456	50	307	1412	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.35			0.13		0.17	c0.40	
v/s Ratio Perm								0.03			
v/c Ratio				1.16dl			0.78	0.19	0.47	0.70	
Uniform Delay, d1				34.8			42.4	38.2	25.6	16.2	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				24.2			10.0	1.6	2.4	2.0	
Delay (s)				59.0			52.4	39.8	28.1	18.3	
Level of Service				E			D	D	C	B	
Approach Delay (s)	0.0			59.0			48.1			20.0	
Approach LOS	A			E			D			C	

Intersection Summary			
HCM Average Control Delay	41.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	490	217	198	341	178	21	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3341				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3341				1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	284	533	236	215	363	193	23	375	51	500
RTOR Reduction (vph)	0	0	80	0	3	0	0	0	0	0
Lane Group Flow (vph)	256	703	229	0	576	0	0	0	426	500
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.6	30.6	30.6		34.1				28.8	66.4
Effective Green, g (s)	30.6	30.6	30.6		34.1				28.8	66.4
Actuated g/C Ratio	0.29	0.29	0.29		0.32				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	465	895	416		1075				481	2217
v/s Ratio Prot	0.16	c0.23	0.16		c0.17				c0.24	0.14
v/s Ratio Perm										
v/c Ratio	0.55	0.79	0.55		0.54				0.89	0.23
Uniform Delay, d1	31.9	34.7	31.9		29.5				37.0	8.6
Progression Factor	0.70	0.71	0.57		1.00				1.00	1.00
Incremental Delay, d2	0.8	2.7	0.9		1.9				17.5	0.2
Delay (s)	23.2	27.3	18.9		31.4				54.5	8.9
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.4			31.4					29.9
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2615	126	466	409	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4789				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4789				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2724	137	501	431	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	68	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2724	69	0	932	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2035				
v/s Ratio Prot					c0.54							
v/s Ratio Perm						0.04		0.19				
v/c Ratio					1.13	0.09		0.46				
Uniform Delay, d1					21.0	11.5		16.4				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					63.5	0.2		0.7				
Delay (s)					84.5	11.8		17.2				
Level of Service					F	B		B				
Approach Delay (s)		0.0			81.0			17.2			0.0	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	65.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1232	1734	0	0	0	0	0	1228	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4755						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4755						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1270	1885	0	0	0	0	0	1306	39
RTOR Reduction (vph)	0	0	0	2	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	760	2391	0	0	0	0	0	1342	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2734						1145	
v/s Ratio Prot											c0.38	
v/s Ratio Perm				0.50	0.50							
v/c Ratio				0.87	0.87						1.17	
Uniform Delay, d1				14.4	14.5						27.0	
Progression Factor				1.41	1.41						1.00	
Incremental Delay, d2				1.2	0.4						87.1	
Delay (s)				21.6	20.9						114.1	
Level of Service				C	C						F	
Approach Delay (s)		0.0			21.1			0.0			114.1	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	48.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	233	7	11	496	16	11	7	10	22	17	16
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	248	8	12	539	17	12	8	11	24	18	17

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	98	255	568	30	60
Volume Left (vph)	98	0	12	12	24
Volume Right (vph)	0	8	17	11	17
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.8	5.3	4.7	6.1	6.0
Degree Utilization, x	0.16	0.37	0.75	0.05	0.10
Capacity (veh/h)	605	663	752	530	533
Control Delay (s)	8.7	10.2	20.2	9.4	9.7
Approach Delay (s)	9.8		20.2	9.4	9.7
Approach LOS	A		C	A	A

Intersection Summary			
Delay	15.6		
HCM Level of Service	C		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      4.4       Worst Case Level Of Service: B[ 14.2]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound      East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled     Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0  792     0     0    0   346     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0  792     0     0    0   346     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0  792     0     0    0   346     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.95  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:     0    0     0     0  834     0     0    0   376     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0  834     0     0    0   376     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   278  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   766  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   766  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.49  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   2.7  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  14.2 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     B     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             14.2           xxxxxx
ApproachLOS:         *                *                B                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	738	349	1276	680	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1738	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1738	3539	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	802	379	1387	739	107
RTOR Reduction (vph)	37	34	0	0	0
Lane Group Flow (vph)	548	562	1387	846	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	463	2153	356	
v/s Ratio Prot			c0.39	c0.53	
v/s Ratio Perm	c0.33	0.32			
v/c Ratio	1.22	1.21	0.64	2.38	
Uniform Delay, d1	22.0	22.0	7.6	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	118.7	114.3	1.5	628.0	
Delay (s)	140.7	136.3	9.1	651.2	
Level of Service	F	F	A	F	
Approach Delay (s)		138.5	252.4		
Approach LOS		F	F		

Intersection Summary			
HCM Average Control Delay	213.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	212	425	101	20	52	16	180	206	10	391	1093	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1522		3433	3482	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1522		3433	3482	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	452	107	21	57	17	196	224	11	425	1188	112
RTOR Reduction (vph)	0	0	7	0	0	0	0	187	0	0	8	0
Lane Group Flow (vph)	226	452	121	0	0	74	196	37	0	436	1292	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	18.9	26.1	26.1			7.7	14.9	14.9		14.5	27.2	
Effective Green, g (s)	18.9	26.1	26.1			7.7	14.9	14.9		14.5	27.2	
Actuated g/C Ratio	0.21	0.29	0.29			0.09	0.17	0.17		0.16	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	372	1026	459			151	308	252		553	1052	
v/s Ratio Prot	c0.13	0.13				0.04	c0.11			0.13	c0.37	
v/s Ratio Perm			0.08					0.02				
v/c Ratio	0.61	0.44	0.26			0.49	0.64	0.15		0.79	1.23	
Uniform Delay, d1	32.2	26.0	24.6			39.3	35.0	32.1		36.3	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.3	0.3			2.5	4.3	0.3		7.3	111.3	
Delay (s)	35.0	26.3	24.9			41.8	39.3	32.4		43.6	142.7	
Level of Service	C	C	C			D	D	C		D	F	
Approach Delay (s)		28.5					36.5				117.8	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	76.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	222	489	47	78
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3431		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3431		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	239	526	51	84
RTOR Reduction (vph)	0	13	0	0
Lane Group Flow (vph)	239	648	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	22.7		
Effective Green, g (s)	11.0	22.7		
Actuated g/C Ratio	0.12	0.25		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	865		
v/s Ratio Prot	c0.14	0.19		
v/s Ratio Perm				
v/c Ratio	1.11	0.75		
Uniform Delay, d1	39.5	31.0		
Progression Factor	1.00	1.00		
Incremental Delay, d2	92.7	5.9		
Delay (s)	132.2	36.9		
Level of Service	F	D		
Approach Delay (s)		62.2		
Approach LOS		E		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	250	70	48	390	269	150	659	33	202	623	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	3387			3517	1536	1767	3510		1767	3447	
Flt Permitted	0.46	1.00			0.87	1.00	0.28	1.00		0.29	1.00	
Satd. Flow (perm)	845	3387			3076	1536	517	3510		543	3447	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	272	76	52	406	292	163	716	36	220	677	103
RTOR Reduction (vph)	0	30	0	0	0	73	0	4	0	0	14	0
Lane Group Flow (vph)	99	318	0	0	458	219	163	748	0	220	766	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	358	1434			1303	651	231	1569		243	1541	
v/s Ratio Prot		0.09						0.21			0.22	
v/s Ratio Perm	0.12				c0.15	0.14	0.32			c0.41		
v/c Ratio	0.28	0.22			0.35	0.34	0.71	0.48		0.91	0.50	
Uniform Delay, d1	16.0	15.6			16.6	16.5	19.0	16.5		21.8	16.7	
Progression Factor	0.85	0.84			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.3			0.7	1.4	16.6	1.0		37.6	1.1	
Delay (s)	15.2	13.4			17.3	17.9	35.6	17.6		59.5	17.9	
Level of Service	B	B			B	B	D	B		E	B	
Approach Delay (s)		13.8			17.5			20.8			27.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	405	136	64	588	114	186	491	46	133	461	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1554	1769	1863	1552	1763	3483		1763	3257	
Flt Permitted	0.12	1.00	1.00	0.35	1.00	1.00	0.20	1.00		0.36	1.00	
Satd. Flow (perm)	226	1863	1554	659	1863	1552	371	3483		675	3257	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	440	148	70	639	124	202	534	50	145	501	380
RTOR Reduction (vph)	0	0	90	0	0	83	0	8	0	0	161	0
Lane Group Flow (vph)	228	440	58	70	639	41	202	576	0	145	720	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.40	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	298	725	605	333	622	519	144	1352		262	1264	
v/s Ratio Prot	c0.09	0.24		0.01	c0.34			0.17			0.22	
v/s Ratio Perm	0.30		0.04	0.07		0.03	c0.54			0.21		
v/c Ratio	0.77	0.61	0.10	0.21	1.03	0.08	1.40	0.43		0.55	0.57	
Uniform Delay, d1	17.6	20.7	16.5	16.5	28.3	19.4	26.0	19.1		20.3	20.4	
Progression Factor	1.00	1.00	1.00	1.57	1.42	2.78	0.76	0.66		1.00	1.00	
Incremental Delay, d2	10.1	3.8	0.3	0.1	42.2	0.3	215.0	0.1		1.4	0.4	
Delay (s)	27.7	24.5	16.8	26.0	82.3	54.2	234.7	12.7		21.7	20.8	
Level of Service	C	C	B	C	F	D	F	B		C	C	
Approach Delay (s)		24.0			73.4			69.8			20.9	
Approach LOS		C			E			E			C	

Intersection Summary			
HCM Average Control Delay	45.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	655	0	0	257	973	21	839	75	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1609	3384			3539	2787		5011				
Flt Permitted	0.58	0.94			1.00	1.00		1.00				
Satd. Flow (perm)	983	3181			3539	2787		5011				
Peak-hour factor, PHF	0.93	0.92	0.25	0.25	0.92	0.97	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	265	712	0	0	279	1003	23	912	82	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	53	0	25	0	0	0	0
Lane Group Flow (vph)	238	739	0	0	279	950	0	992	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	393	1272			1416	1115		2004				
v/s Ratio Prot					0.08							
v/s Ratio Perm	0.24	0.23				c0.34		0.20				
v/c Ratio	0.61	0.58			0.20	0.85		0.49				
Uniform Delay, d1	9.5	9.4			7.8	10.9		9.0				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	6.8	1.9			0.3	8.3		0.9				
Delay (s)	16.3	11.3			8.1	19.2		9.9				
Level of Service	B	B			A	B		A				
Approach Delay (s)		12.5			16.8			9.9			0.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	492	38	12	243	0	0	0	0	406	296	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		3539	1552		3531					1605	3324	1558
Flt Permitted		1.00	1.00		0.93					0.95	0.98	1.00
Satd. Flow (perm)		3539	1552		3285					1605	3324	1558
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	518	41	13	264	0	0	0	0	441	322	223
RTOR Reduction (vph)	0	0	27	0	0	0	0	0	0	0	0	108
Lane Group Flow (vph)	0	518	14	0	277	0	0	0	0	251	512	115
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	543		1150					829	1717	805
v/s Ratio Prot		c0.15										
v/s Ratio Perm			0.01		0.08					c0.16	0.15	0.07
v/c Ratio		0.42	0.03		0.24					0.30	0.30	0.14
Uniform Delay, d1		14.8	12.8		13.8					8.3	8.3	7.6
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		1.0	0.1		0.5					0.9	0.4	0.4
Delay (s)		15.9	12.9		14.3					9.2	8.7	7.9
Level of Service		B	B		B					A	A	A
Approach Delay (s)		15.7			14.3			0.0			8.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	274	570	624	456	196	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3273		3417	1421
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3273		3417	1421
Peak-hour factor, PHF	0.92	0.93	0.92	0.97	0.92	0.92
Adj. Flow (vph)	298	613	678	470	213	115
RTOR Reduction (vph)	0	0	117	0	8	89
Lane Group Flow (vph)	298	613	1031	0	219	12
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	18.9	62.5	39.6		9.5	9.5
Effective Green, g (s)	18.9	62.5	39.6		9.5	9.5
Actuated g/C Ratio	0.24	0.78	0.50		0.12	0.12
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	418	2765	1620		406	169
v/s Ratio Prot	c0.17	0.17	c0.31		c0.06	
v/s Ratio Perm						0.01
v/c Ratio	0.71	0.22	0.64		0.54	0.07
Uniform Delay, d1	28.1	2.3	14.9		33.2	31.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.7	0.2	1.9		0.7	0.1
Delay (s)	32.8	2.5	16.8		33.9	31.4
Level of Service	C	A	B		C	C
Approach Delay (s)		12.4	16.8		33.1	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	688	32	19	845	128	95	542	33	139	429	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1760	3343		1769	3505		1761	3406	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.37	1.00		0.41	1.00	
Satd. Flow (perm)	308	3427	1532	306	3343		682	3505		769	3406	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	29	748	35	21	918	139	103	589	36	151	452	115
RTOR Reduction (vph)	0	0	25	0	14	0	0	5	0	0	23	0
Lane Group Flow (vph)	29	748	10	21	1043	0	103	620	0	151	544	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		50.3	50.3		40.2	40.2	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		50.3	50.3		40.2	40.2	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.59	0.59		0.47	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	87	952		475	2074		364	1611	
v/s Ratio Prot		0.22			c0.31		0.01	c0.18			0.16	
v/s Ratio Perm	0.09		0.01	0.07			0.11			c0.20		
v/c Ratio	0.33	0.77	0.02	0.24	1.10		0.22	0.30		0.41	0.34	
Uniform Delay, d1	24.0	27.8	21.9	23.3	30.4		7.9	8.6		14.7	14.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.27	1.29	
Incremental Delay, d2	9.7	5.7	0.1	6.5	59.0		0.1	0.4		3.1	0.5	
Delay (s)	33.7	33.6	22.0	29.8	89.4		8.0	9.0		21.7	18.7	
Level of Service	C	C	C	C	F		A	A		C	B	
Approach Delay (s)		33.1			88.2			8.8			19.3	
Approach LOS		C			F			A			B	

Intersection Summary			
HCM Average Control Delay	42.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	466	39	105	343	34	294	647	172	54	502	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99			0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1764	3382			3350		1765	3539	1551	1751	3415	
Flt Permitted	0.31	1.00			0.62		0.37	1.00	1.00	0.36	1.00	
Satd. Flow (perm)	581	3382			2090		693	3539	1551	672	3415	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	507	42	114	373	37	320	681	187	59	546	117
RTOR Reduction (vph)	0	10	0	0	9	0	0	0	70	0	15	0
Lane Group Flow (vph)	88	539	0	0	515	0	320	681	117	59	648	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	22.4	22.4			22.4		49.6	49.6	49.6	49.6	49.6	
Effective Green, g (s)	22.4	22.4			22.4		49.6	49.6	49.6	49.6	49.6	
Actuated g/C Ratio	0.28	0.28			0.28		0.62	0.62	0.62	0.62	0.62	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	163	947			585		430	2194	962	417	2117	
v/s Ratio Prot		0.16						0.19			0.19	
v/s Ratio Perm	0.15				c0.25		c0.46		0.08	0.09		
v/c Ratio	0.54	0.57			0.88		0.74	0.31	0.12	0.14	0.31	
Uniform Delay, d1	24.4	24.7			27.5		10.7	7.2	6.2	6.3	7.1	
Progression Factor	1.00	1.00			1.06		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	0.5			14.0		11.1	0.4	0.3	0.7	0.4	
Delay (s)	26.2	25.1			43.0		21.8	7.5	6.5	7.0	7.5	
Level of Service	C	C			D		C	A	A	A	A	
Approach Delay (s)		25.3			43.0			11.2			7.5	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	666	205	117	373	2	0	0	0	80	249	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						1.00	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.96		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3134		1770	3424						3385	
Flt Permitted		0.95		0.16	1.00						0.99	
Satd. Flow (perm)		2984		289	3424						3385	
Peak-hour factor, PHF	0.92	0.99	0.92	0.93	0.92	0.92	0.25	0.25	0.25	0.92	0.94	0.92
Adj. Flow (vph)	7	673	223	126	405	2	0	0	0	87	265	77
RTOR Reduction (vph)	0	35	0	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	0	868	0	126	407	0	0	0	0	0	406	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.7		43.0	43.0						29.0	
Effective Green, g (s)		31.7		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1182		272	1840						1227	
v/s Ratio Prot				c0.04	0.12							
v/s Ratio Perm		c0.29		0.21							0.12	
v/c Ratio		0.73		0.46	0.22						0.33	
Uniform Delay, d1		20.6		11.8	9.7						18.5	
Progression Factor		1.66		1.00	1.00						1.00	
Incremental Delay, d2		4.0		0.5	0.3						0.7	
Delay (s)		38.2		12.3	10.0						19.2	
Level of Service		D		B	A						B	
Approach Delay (s)		38.2			10.5			0.0			19.2	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	629	129	350	846	42	11	1314	1058	2	620	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1484	3433	3539	1460		5082	1466		4986	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.94	
Satd. Flow (perm)	3433	3539	1484	3433	3539	1460		4735	1466		4669	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.93	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	145	684	140	357	910	46	12	1428	1150	2	646	65
RTOR Reduction (vph)	0	0	46	0	0	27	0	0	251	0	12	0
Lane Group Flow (vph)	145	684	94	357	910	19	0	1440	899	0	701	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	8.6	35.0	35.0	14.0	41.4	41.4		36.0	36.0		36.0	
Effective Green, g (s)	8.6	35.0	35.0	14.0	41.4	41.4		36.0	36.0		36.0	
Actuated g/C Ratio	0.09	0.35	0.35	0.14	0.41	0.41		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	295	1239	519	481	1465	604		1705	528		1681	
v/s Ratio Prot	0.04	0.19		c0.10	c0.26							
v/s Ratio Perm			0.06			0.01		0.30	c0.61		0.15	
v/c Ratio	0.49	0.55	0.18	0.74	0.62	0.03		0.84	1.70		0.42	
Uniform Delay, d1	43.6	26.2	22.6	41.3	23.1	17.4		29.4	32.0		24.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.5	1.8	0.8	5.4	2.0	0.1		5.3	324.3		0.8	
Delay (s)	44.1	28.0	23.3	46.6	25.1	17.5		34.8	356.3		24.9	
Level of Service	D	C	C	D	C	B		C	F		C	
Approach Delay (s)		29.7			30.7			177.5			24.9	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM Average Control Delay	97.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	122.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	534	121	102	1512	917	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.99		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.99	1.00	1.00	
Frt	0.97		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	3353		1760	3725	6289	
Flt Permitted	0.96		0.19	1.00	1.00	
Satd. Flow (perm)	3353		355	3725	6289	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.92
Adj. Flow (vph)	580	132	111	1575	997	140
RTOR Reduction (vph)	32	0	0	0	24	0
Lane Group Flow (vph)	680	0	111	1575	1113	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	22.5		44.0	37.4	37.4	
Effective Green, g (s)	22.5		44.0	37.4	37.4	
Actuated g/C Ratio	0.28		0.55	0.47	0.47	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	943		311	1741	2940	
v/s Ratio Prot	c0.20		c0.03	c0.42	0.18	
v/s Ratio Perm			0.17			
v/c Ratio	0.72		0.36	0.90	0.38	
Uniform Delay, d1	25.9		8.9	19.7	13.8	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	2.7		0.7	8.2	0.4	
Delay (s)	28.7		9.6	27.9	14.2	
Level of Service	C		A	C	B	
Approach Delay (s)	28.7			26.7	14.2	
Approach LOS	C			C	B	

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	424	10	25	218	11	196
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	451	11	27	237	12	213
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			462		766	474
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			462		766	474
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	63
cM capacity (veh/h)			1099		356	581

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	462	264	225
Volume Left	0	27	12
Volume Right	11	0	213
cSH	1700	1099	562
Volume to Capacity	0.27	0.02	0.40
Queue Length 95th (ft)	0	2	48
Control Delay (s)	0.0	1.1	15.6
Lane LOS		A	C
Approach Delay (s)	0.0	1.1	15.6
Approach LOS			C

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	291	25	38	193	30	142
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	27	41	210	33	154
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			343		649	357
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			343		649	357
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		92	77
cM capacity (veh/h)			1216		410	672

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	343	251	187
Volume Left	0	41	33
Volume Right	27	0	154
cSH	1700	1216	604
Volume to Capacity	0.20	0.03	0.31
Queue Length 95th (ft)	0	3	33
Control Delay (s)	0.0	1.6	13.6
Lane LOS		A	B
Approach Delay (s)	0.0	1.6	13.6
Approach LOS			B

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	382	18	25	150	80	146
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.92	0.92	0.94	0.92	0.92
Hourly flow rate (vph)	394	20	27	160	87	159
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.90		0.90	0.90
vC, conflicting volume			413		638	424
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			286		536	297
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		80	76
cM capacity (veh/h)			1142		434	653

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	413	187	43	43	79	79
Volume Left	0	27	43	43	0	0
Volume Right	20	0	0	0	79	79
cSH	1700	1142	434	434	653	653
Volume to Capacity	0.24	0.02	0.10	0.10	0.12	0.12
Queue Length 95th (ft)	0	2	8	8	10	10
Control Delay (s)	0.0	1.4	14.2	14.2	11.3	11.3
Lane LOS		A	B	B	B	B
Approach Delay (s)	0.0	1.4	12.3			
Approach LOS			B			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	220	102	75	204	0	0	0	0	65	521	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1436		1797						4827	
Flt Permitted		1.00	1.00		0.77						0.99	
Satd. Flow (perm)		1863	1436		1398						4827	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	239	111	82	222	0	0	0	0	71	537	32
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	239	91	0	304	0	0	0	0	0	636	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		22.9	22.9		22.9						49.1	
Effective Green, g (s)		22.9	22.9		22.9						49.1	
Actuated g/C Ratio		0.29	0.29		0.29						0.61	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		533	411		400						2963	
v/s Ratio Prot		0.13										
v/s Ratio Perm			0.06		c0.22						0.13	
v/c Ratio		0.45	0.22		0.76						0.21	
Uniform Delay, d1		23.4	21.8		26.0						6.9	
Progression Factor		1.00	1.00		1.00						1.23	
Incremental Delay, d2		0.6	0.3		8.3						0.1	
Delay (s)		24.0	22.0		34.3						8.6	
Level of Service		C	C		C						A	
Approach Delay (s)		23.4			34.3			0.0			8.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	113	1	0	109	99	21	358	191	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.81			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		0.99			1.00			1.00	1.00			
Satd. Flow (prot)		1843			1682			3507	1285			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1800			1682			3507	1285			
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	14	123	1	0	118	108	23	385	208	0	0	0
RTOR Reduction (vph)	0	0	0	0	43	0	0	0	163	0	0	0
Lane Group Flow (vph)	0	138	0	0	183	0	0	408	45	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		27.2			27.2			9.8	9.8			
Effective Green, g (s)		27.2			27.2			9.8	9.8			
Actuated g/C Ratio		0.60			0.60			0.22	0.22			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1088			1017			764	280			
v/s Ratio Prot					c0.11							
v/s Ratio Perm		0.08						0.12	0.04			
v/c Ratio		0.13			0.18			0.53	0.16			
Uniform Delay, d1		3.8			4.0			15.6	14.3			
Progression Factor		0.38			1.00			1.00	1.00			
Incremental Delay, d2		0.2			0.4			0.4	0.1			
Delay (s)		1.7			4.3			15.9	14.4			
Level of Service		A			A			B	B			
Approach Delay (s)		1.7			4.3			15.4			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	48	22	71	0	64	0	558	45	38	477	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.95			0.94			0.99			1.00	
Flt Protected	0.95	1.00			0.97			1.00			1.00	
Satd. Flow (prot)	1747	1758			1662			3477			3519	
Flt Permitted	0.73	1.00			0.84			1.00			0.87	
Satd. Flow (perm)	1342	1758			1433			3477			3072	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.99	0.92
Adj. Flow (vph)	15	52	24	77	0	70	0	607	49	41	482	0
RTOR Reduction (vph)	0	14	0	0	40	0	0	13	0	0	0	0
Lane Group Flow (vph)	15	62	0	0	107	0	0	643	0	0	523	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	567	742			605			1314			1161	
v/s Ratio Prot		0.04						c0.18				
v/s Ratio Perm	0.01				c0.07						0.17	
v/c Ratio	0.03	0.08			0.18			0.49			0.45	
Uniform Delay, d1	7.6	7.8			8.1			10.7			10.5	
Progression Factor	1.00	1.00			1.12			1.00			1.00	
Incremental Delay, d2	0.1	0.2			0.6			1.3			1.3	
Delay (s)	7.7	8.0			9.8			12.0			11.8	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.0			9.8			12.0			11.8	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	167	30	12	207	204	26	657	29	40	180	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.93			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3419			3219			3504		1767	3370	
Flt Permitted		0.80			0.94			0.94		0.28	1.00	
Satd. Flow (perm)		2754			3033			3295		525	3370	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	32	182	33	13	225	222	28	714	32	41	196	70
RTOR Reduction (vph)	0	25	0	0	181	0	0	4	0	0	23	0
Lane Group Flow (vph)	0	222	0	0	279	0	0	770	0	41	243	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.0			11.0			32.8		40.0	40.0	
Effective Green, g (s)		11.0			11.0			32.8		40.0	40.0	
Actuated g/C Ratio		0.18			0.18			0.55		0.67	0.67	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		505			556			1801		406	2247	
v/s Ratio Prot										0.00	c0.07	
v/s Ratio Perm		0.08			c0.09			c0.23		0.06		
v/c Ratio		0.44			0.50			0.43		0.10	0.11	
Uniform Delay, d1		21.8			22.0			8.0		4.0	3.6	
Progression Factor		1.00			0.68			1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.6			0.7		0.1	0.1	
Delay (s)		22.4			15.5			8.8		4.1	3.7	
Level of Service		C			B			A		A	A	
Approach Delay (s)		22.4			15.5			8.8			3.7	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	157	95	61	260	112	109	803	115	44	561	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.97			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3222			3230			3411			4989	
Flt Permitted		0.90			0.87			0.72			0.81	
Satd. Flow (perm)		2921			2821			2484			4036	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	25	171	103	66	283	122	118	873	121	48	610	42
RTOR Reduction (vph)	0	65	0	0	46	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	234	0	0	425	0	0	1097	0	0	688	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1071			1034			1309			1211	
v/s Ratio Prot								c0.10				
v/s Ratio Perm		0.08			c0.15			c0.31			0.17	
v/c Ratio		0.22			0.41			0.84			0.57	
Uniform Delay, d1		13.1			14.2			13.5			17.7	
Progression Factor		2.14			1.00			1.00			1.00	
Incremental Delay, d2		0.5			1.2			6.5			1.9	
Delay (s)		28.5			15.4			20.0			19.7	
Level of Service		C			B			B			B	
Approach Delay (s)		28.5			15.4			20.0			19.7	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	338	0	0	421	113	65	401	257	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3511			3370	1319		5005	1458			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3108			3370	1319		5005	1458			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	41	367	0	0	458	120	71	436	276	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	29	0	0	223	0	0	0
Lane Group Flow (vph)	0	408	0	0	469	79	0	507	53	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		58.2			58.2	58.2		14.8	14.8			
Effective Green, g (s)		58.2			58.2	58.2		14.8	14.8			
Actuated g/C Ratio		0.73			0.73	0.73		0.18	0.18			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2261			2452	960		926	270			
v/s Ratio Prot					c0.14							
v/s Ratio Perm		0.13				0.06		0.10	0.04			
v/c Ratio		0.18			0.19	0.08		0.55	0.20			
Uniform Delay, d1		3.4			3.5	3.2		29.6	27.6			
Progression Factor		1.00			0.72	0.30		1.00	1.00			
Incremental Delay, d2		0.2			0.2	0.2		0.7	0.4			
Delay (s)		3.6			2.6	1.1		30.2	27.9			
Level of Service		A			A	A		C	C			
Approach Delay (s)		3.6			2.4			29.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	415	178	147	414	0	0	0	0	82	522	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.97	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3377						4521	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1439	1610	3195						4521	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	451	193	160	450	0	0	0	0	89	567	129
RTOR Reduction (vph)	0	0	43	0	0	0	0	0	0	0	36	0
Lane Group Flow (vph)	0	451	150	144	466	0	0	0	0	0	749	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1700						1695	
v/s Ratio Prot		c0.13		c0.09	0.03							
v/s Ratio Perm			0.10		0.11						0.17	
v/c Ratio		0.36	0.30	0.72	0.27						0.44	
Uniform Delay, d1		19.4	18.9	33.6	10.5						18.7	
Progression Factor		1.10	1.14	1.00	1.00						1.38	
Incremental Delay, d2		0.8	1.5	9.7	0.0						0.1	
Delay (s)		22.1	22.9	43.3	10.6						25.9	
Level of Service		C	C	D	B						C	
Approach Delay (s)		22.3			18.3			0.0			25.9	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	7	389	103	97	26	828	188	268	51	0	128	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	0.48	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.97				1.00	0.94	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	841	4894				3517	3186	1441	1583		1583	1554
Flt Permitted	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	841	4894				3517	3186	1441	1583		1583	1554
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	7	423	112	105	28	900	204	291	55	0	135	58
RTOR Reduction (vph)	0	72	0	0	0	0	0	0	32	0	0	44
Lane Group Flow (vph)	7	463	0	0	0	1033	341	154	23	0	135	14
Confl. Peds. (#/hr)	22								74			
Confl. Bikes (#/hr)						7			8			7
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	0.8	13.1				16.0	17.2	29.5	29.5		7.7	17.2
Effective Green, g (s)	0.8	13.1				16.0	17.2	29.5	29.5		7.7	17.2
Actuated g/C Ratio	0.01	0.19				0.23	0.25	0.42	0.42		0.11	0.25
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	10	916				804	783	607	667		174	382
v/s Ratio Prot	0.01	c0.09				c0.29	c0.11	0.11	0.01			
v/s Ratio Perm											c0.09	0.01
v/c Ratio	0.70	0.51				1.28	0.44	0.25	0.03		0.78	0.04
Uniform Delay, d1	34.5	25.5				27.0	22.3	13.1	11.9		30.3	20.1
Progression Factor	1.00	1.00				1.00	1.41	1.63	2.67		1.00	1.00
Incremental Delay, d2	120.0	2.0				137.6	0.1	1.0	0.1		17.7	0.0
Delay (s)	154.5	27.5				164.6	31.6	22.3	31.8		48.0	20.1
Level of Service	F	C				F	C	C	C		D	C
Approach Delay (s)		29.2				164.6	29.0			39.6		
Approach LOS		C				F	C			D		

Intersection Summary			
HCM Average Control Delay	90.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1069	71	785	326	153	843
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5036		3433	5085	3174	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5036		3433	5085	3174	1441
Peak-hour factor, PHF	0.95	0.92	0.99	0.92	0.92	0.93
Adj. Flow (vph)	1125	77	793	354	166	906
RTOR Reduction (vph)	11	0	0	0	317	317
Lane Group Flow (vph)	1191	0	793	354	302	136
Confl. Bikes (#/hr)				16		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	18.0		19.0	41.0	21.0	21.0
Effective Green, g (s)	18.0		19.0	41.0	21.0	21.0
Actuated g/C Ratio	0.26		0.27	0.59	0.30	0.30
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1295		932	2978	952	432
v/s Ratio Prot	c0.24		c0.23	0.07	c0.10	
v/s Ratio Perm						0.09
v/c Ratio	0.92		0.85	0.12	0.32	0.31
Uniform Delay, d1	25.3		24.2	6.5	19.0	18.9
Progression Factor	0.99		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4		9.6	0.1	0.9	1.9
Delay (s)	26.3		33.8	6.5	19.8	20.8
Level of Service	C		C	A	B	C
Approach Delay (s)	26.3			25.4	20.3	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	148	158	0	0	0	0	0	1270	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6292	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6292	
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	0	0	161	172	0	0	0	0	0	1309	160
RTOR Reduction (vph)	0	0	0	3	0	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	158	172	0	0	0	0	0	1450	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				23.6	23.6						42.4	
Effective Green, g (s)				23.6	23.6						42.4	
Actuated g/C Ratio				0.31	0.31						0.57	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				556	1114						3557	
v/s Ratio Prot					0.05						c0.23	
v/s Ratio Perm				c0.09								
v/c Ratio				0.28	0.15						0.41	
Uniform Delay, d1				19.3	18.5						9.2	
Progression Factor				1.00	1.00						0.73	
Incremental Delay, d2				1.3	0.3						0.1	
Delay (s)				20.6	18.8						6.8	
Level of Service				C	B						A	
Approach Delay (s)		0.0			19.7			0.0			6.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	396	1220	77	346	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5028		3404	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5028		3404	
Peak-hour factor, PHF	0.92	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	217	426	1312	84	376	45
RTOR Reduction (vph)	2	0	9	0	0	0
Lane Group Flow (vph)	215	426	1387	0	421	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	15.9	15.9	26.0		21.1	
Effective Green, g (s)	15.9	15.9	26.0		21.1	
Actuated g/C Ratio	0.21	0.21	0.35		0.28	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	375	1078	1743		958	
v/s Ratio Prot		0.08	c0.28		c0.12	
v/s Ratio Perm	c0.12					
v/c Ratio	0.57	0.40	0.80		0.44	
Uniform Delay, d1	26.5	25.4	22.1		22.1	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.2	1.1	2.6		0.3	
Delay (s)	32.7	26.5	24.7		22.4	
Level of Service	C	C	C		C	
Approach Delay (s)		28.6	24.7		22.4	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	268	878	1024	528	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3043	1417	1403	5828				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3043	1417	1403	5828				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	291	954	1113	568	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	62	62	344	271	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	706	415	212	854	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					42.7	42.7	22.3	22.3				
Effective Green, g (s)					42.7	42.7	22.3	22.3				
Actuated g/C Ratio					0.57	0.57	0.30	0.30				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1732	807	417	1733				
v/s Ratio Prot					0.23							
v/s Ratio Perm						c0.29	c0.15	0.15				
v/c Ratio					0.41	0.51	0.51	0.49				
Uniform Delay, d1					9.1	9.8	21.8	21.7				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.7	2.3	1.0	0.2				
Delay (s)					9.8	12.2	22.8	21.9				
Level of Service					A	B	C	C				
Approach Delay (s)		0.0			10.7			22.2			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	250	72	0	0	0	0	0	0	561	908	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3407								1522	4729	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3407								1522	4729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	272	78	0	0	0	0	0	0	610	987	60
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	231	42	0
Lane Group Flow (vph)	0	324	0	0	0	0	0	0	0	172	1212	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1590								649	2018	
v/s Ratio Prot		c0.10										
v/s Ratio Perm										0.11	0.26	
v/c Ratio		0.20								0.26	0.60	
Uniform Delay, d1		11.8								13.9	16.6	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.3								1.0	1.3	
Delay (s)		12.1								14.9	17.9	
Level of Service		B								B	B	
Approach Delay (s)		12.1			0.0			0.0			17.2	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↰↑	↱		↰↑	↱			
Volume (vph)	63	918	0	0	425	261	205	634	42	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3524			3539	1461		3472	1520			
Flt Permitted		0.89			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3130			3539	1461		3472	1520			
Peak-hour factor, PHF	0.92	0.92	0.25	0.99	0.96	0.96	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	68	998	0	0	443	272	223	689	46	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	118	0	0	4	0	0	0
Lane Group Flow (vph)	0	1066	0	0	443	154	0	912	42	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		939			1062	438		1852	811			
v/s Ratio Prot					0.13							
v/s Ratio Perm		c0.34				0.11		0.26	0.03			
v/c Ratio		1.14			0.42	0.35		0.49	0.05			
Uniform Delay, d1		21.0			16.8	16.4		8.9	6.7			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		74.1			1.2	2.2		0.9	0.1			
Delay (s)		95.1			18.0	18.7		9.8	6.8			
Level of Service		F			B	B		A	A			
Approach Delay (s)		95.1			18.3			9.7			0.0	
Approach LOS		F			B			A			A	

Intersection Summary			
HCM Average Control Delay	45.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	644	73	26	560	0	0	0	0	344	638	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	1.00	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3464			3531					1734	3520	
Flt Permitted		1.00			0.91					0.95	1.00	
Satd. Flow (perm)		3464			3232					1734	3520	
Peak-hour factor, PHF	0.25	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.94	0.96	0.92
Adj. Flow (vph)	0	700	79	28	609	0	0	0	0	366	665	21
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	760	0	0	637	0	0	0	0	366	681	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1463			1365					732	1486	
v/s Ratio Prot		c0.22									0.19	
v/s Ratio Perm					0.20					c0.21		
v/c Ratio		0.52			0.47					0.50	0.46	
Uniform Delay, d1		9.6			9.4					9.5	9.3	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.3			1.1					2.4	1.0	
Delay (s)		10.9			10.5					12.0	10.3	
Level of Service		B			B					B	B	
Approach Delay (s)		10.9			10.5			0.0			10.9	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	430	8	19	401	44	69	447	25	114	187	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3484			3457			3474			3365	
Flt Permitted		0.84			0.93			0.86			0.65	
Satd. Flow (perm)		2949			3221			3005			2216	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92
Adj. Flow (vph)	79	467	9	21	436	48	75	486	27	124	193	54
RTOR Reduction (vph)	0	2	0	0	15	0	0	9	0	0	34	0
Lane Group Flow (vph)	0	553	0	0	490	0	0	579	0	0	337	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		22.8			22.8			14.7			14.7	
Effective Green, g (s)		22.8			22.8			14.7			14.7	
Actuated g/C Ratio		0.51			0.51			0.33			0.33	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1494			1632			982			724	
v/s Ratio Prot												
v/s Ratio Perm		c0.19			0.15			c0.19			0.15	
v/c Ratio		0.37			0.30			0.59			0.46	
Uniform Delay, d1		6.7			6.5			12.6			12.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.5			0.9			0.5	
Delay (s)		7.4			6.9			13.5			12.5	
Level of Service		A			A			B			B	
Approach Delay (s)		7.4			6.9			13.5			12.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	249	941	0	0	0	0	0	735	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6270						5027	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6270						5027	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	271	970	0	0	0	0	0	799	50
RTOR Reduction (vph)	0	0	0	0	47	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	1194	0	0	0	0	0	837	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2717						2220	
v/s Ratio Prot											c0.17	
v/s Ratio Perm					0.19							
v/c Ratio					0.44						0.38	
Uniform Delay, d1					11.9						11.2	
Progression Factor					0.45						1.00	
Incremental Delay, d2					0.5						0.5	
Delay (s)					5.8						11.7	
Level of Service					A						B	
Approach Delay (s)		0.0			5.8			0.0			11.7	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1015	60	178	986	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6330			6239				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6330			6239				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1068	65	193	1027	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	28	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1129	0	0	1192	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3154			2142				
v/s Ratio Prot					c0.18							
v/s Ratio Perm								0.19				
v/c Ratio					0.36			0.56				
Uniform Delay, d1					9.2			16.0				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.3			1.0				
Delay (s)					9.5			17.0				
Level of Service					A			B				
Approach Delay (s)		0.0			9.5			17.0			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	68	0	0	1081	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	74	0	0	1175	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	300	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	300	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	664	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	74	294	294	294	294
Volume Left	74	0	0	0	0
Volume Right	0	0	0	0	0
cSH	664	1700	1700	1700	1700
Volume to Capacity	0.11	0.17	0.17	0.17	0.17
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.1	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	910	194	0	0	0	0	0	0	51	911	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.97									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6193									5067	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6193									5067	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	948	211	0	0	0	0	0	0	55	980	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1130	0	0	0	0	0	0	0	0	1025	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2374									2196	
v/s Ratio Prot		c0.18										
v/s Ratio Perm											0.20	
v/c Ratio		0.48									0.47	
Uniform Delay, d1		14.0									12.1	
Progression Factor		0.83									0.58	
Incremental Delay, d2		0.7									0.7	
Delay (s)		12.2									7.7	
Level of Service		B									A	
Approach Delay (s)		12.2			0.0			0.0			7.7	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	724	0	0	0	0	0	326	134	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6387						6038				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6387						6038				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	29	787	0	0	0	0	0	354	138	0	0	0
RTOR Reduction (vph)	0	11	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	805	0	0	0	0	0	472	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		13.3						39.7				
Effective Green, g (s)		13.3						39.7				
Actuated g/C Ratio		0.22						0.66				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1416						3995				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.13										
v/c Ratio		0.57						0.12				
Uniform Delay, d1		20.8						3.7				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.3						0.1				
Delay (s)		21.1						3.8				
Level of Service		C						A				
Approach Delay (s)		21.1			0.0			3.8			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	1092	0	0	0	0	0	942	394	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6345						4831				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6345						4831				
Peak-hour factor, PHF	0.92	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	193	1114	0	0	0	0	0	1002	410	0	0	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	1287	0	0	0	0	0	1399	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2538						1932				
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.20										
v/c Ratio		0.51						0.72				
Uniform Delay, d1		10.2						11.4				
Progression Factor		0.96						1.56				
Incremental Delay, d2		0.5						1.8				
Delay (s)		10.3						19.6				
Level of Service		B						B				
Approach Delay (s)		10.3			0.0			19.6			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	972	285	0	0	0	0	0	0	451	1491	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6153									5016	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6153									5016	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.95	0.25
Adj. Flow (vph)	0	982	310	0	0	0	0	0	0	490	1569	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	1287	0	0	0	0	0	0	0	0	2037	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2461									2229	
v/s Ratio Prot		c0.21										
v/s Ratio Perm											0.41	
v/c Ratio		0.52									0.91	
Uniform Delay, d1		10.2									11.7	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.8									7.2	
Delay (s)		11.0									18.9	
Level of Service		B									B	
Approach Delay (s)		11.0			0.0			0.0			18.9	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	7	369	56	351	352	0	0	216	1638
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1817			1863	1559
Flt Permitted				0.95	1.00	1.00		0.72			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1350			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	8	401	61	382	383	0	0	235	1671
RTOR Reduction (vph)	0	0	0	0	0	46	0	0	0	0	0	41
Lane Group Flow (vph)	0	0	0	8	401	15	0	765	0	0	235	1630
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.4	14.4	14.4		34.6			34.6	34.6
Effective Green, g (s)				14.4	14.4	14.4		34.6			34.6	34.6
Actuated g/C Ratio				0.24	0.24	0.24		0.58			0.58	0.58
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				414	447	353		779			1074	899
v/s Ratio Prot					c0.22						0.13	
v/s Ratio Perm				0.00		0.01		0.57				c1.05
v/c Ratio				0.02	0.90	0.04		0.98			0.22	1.81
Uniform Delay, d1				17.4	22.1	17.5		12.4			6.2	12.7
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	20.2	0.0		28.2			0.5	370.3
Delay (s)				17.4	42.2	17.6		40.6			6.6	383.0
Level of Service				B	D	B		D			A	F
Approach Delay (s)		0.0			38.6			40.6			336.6	
Approach LOS		A			D			D			F	

Intersection Summary			
HCM Average Control Delay	219.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	173.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	184	627	66	56	730
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.89	0.85
Flt Protected			0.99		0.99	1.00
Satd. Flow (prot)			3500		3169	1441
Flt Permitted			0.99		0.99	1.00
Satd. Flow (perm)			3500		3169	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94
Adj. Flow (vph)	0	200	682	72	61	777
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	882	0	522	388
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1268		1141	519
v/s Ratio Prot						
v/s Ratio Perm			0.25		0.16	c0.27
v/c Ratio			0.70		0.46	0.75
Uniform Delay, d1			12.2		11.0	12.6
Progression Factor			0.75		1.00	1.00
Incremental Delay, d2			0.3		1.3	9.5
Delay (s)			9.5		12.4	22.1
Level of Service			A		B	C
Approach Delay (s)			9.5		16.5	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	291	590	83	0	0	0	0	534	74	1	69	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.98			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4920						1832			1862	
Flt Permitted		0.99						1.00			0.84	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.92	0.93	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.25
Adj. Flow (vph)	316	634	90	0	0	0	0	580	80	1	75	0
RTOR Reduction (vph)	0	25	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	1016	0	0	0	0	0	649	0	0	76	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						631			448	
v/s Ratio Prot								c0.35				
v/s Ratio Perm		c1.02									0.06	
v/c Ratio		2.03						1.03			0.17	
Uniform Delay, d1		11.2						14.8			10.3	
Progression Factor		1.00						1.00			0.08	
Incremental Delay, d2		470.9						43.3			0.8	
Delay (s)		482.2						58.0			1.5	
Level of Service		F						E			A	
Approach Delay (s)		482.2			0.0			58.0			1.5	
Approach LOS		F			A			E			A	

Intersection Summary			
HCM Average Control Delay	304.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1199	862	149	847
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3314		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3314		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	209	185	1276	937	162	921
RTOR Reduction (vph)	0	152	136	0	0	0
Lane Group Flow (vph)	209	33	2077	0	162	921
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0	39.9		22.1	66.0
Effective Green, g (s)	16.0	16.0	39.9		22.1	66.0
Actuated g/C Ratio	0.18	0.18	0.44		0.25	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	315	281	1469		435	2595
v/s Ratio Prot	c0.12		c0.63		0.09	c0.26
v/s Ratio Perm		0.02				
v/c Ratio	0.66	0.12	1.41		0.37	0.35
Uniform Delay, d1	34.5	31.1	25.0		28.2	4.3
Progression Factor	1.00	1.00	1.00		0.66	0.46
Incremental Delay, d2	5.2	0.2	190.2		1.9	0.3
Delay (s)	39.7	31.3	215.3		20.3	2.3
Level of Service	D	C	F		C	A
Approach Delay (s)	35.7		215.3			5.0
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	134.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	254	299	247	109	491	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3377		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3377		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	325	268	118	534	486
RTOR Reduction (vph)	0	0	81	0	0	304
Lane Group Flow (vph)	276	325	305	0	534	182
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.5	27.1	10.6		21.1	21.1
Effective Green, g (s)	12.5	27.1	10.6		21.1	21.1
Actuated g/C Ratio	0.22	0.48	0.19		0.38	0.38
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	394	1707	637		665	594
v/s Ratio Prot	c0.16	0.09	c0.09		c0.30	
v/s Ratio Perm						0.12
v/c Ratio	0.70	0.19	0.48		0.80	0.31
Uniform Delay, d1	20.1	8.3	20.3		15.7	12.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.5	0.1	0.6		7.0	0.3
Delay (s)	25.7	8.4	20.9		22.6	12.7
Level of Service	C	A	C		C	B
Approach Delay (s)		16.3	20.9		17.9	
Approach LOS		B	C		B	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	56.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	703	490	1062	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4962			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4962			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	329	1480	154	0	614	764	533	1154	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	52	0	0	0
Lane Group Flow (vph)	0	0	0	1952	0	0	614	712	533	1154	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	308	580	2005	
v/s Ratio Prot				c0.39			0.17		c0.30	0.33	
v/s Ratio Perm								c0.45			
v/c Ratio				1.18			0.89	2.31	0.92	0.58	
Uniform Delay, d1				30.0			35.3	36.2	29.1	12.5	
Progression Factor				1.00			1.48	1.55	1.00	1.00	
Incremental Delay, d2				87.6			1.9	591.8	19.6	0.4	
Delay (s)				117.6			54.1	648.0	48.7	12.9	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			117.6			383.3			24.2	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	159.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1198	609	169	346	550	102	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3138	1441		3192				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3138	1441		3192				1770	3539
Peak-hour factor, PHF	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	1274	662	184	376	598	111	358	26	264
RTOR Reduction (vph)	0	0	16	0	9	0	0	0	0	0
Lane Group Flow (vph)	405	1511	638	0	1076	0	0	0	384	264
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	976	448		1312				236	2084
v/s Ratio Prot	0.25	c0.48	0.44		c0.34				c0.22	0.07
v/s Ratio Perm										
v/c Ratio	0.81	1.55	1.42		1.06dr				1.63	0.13
Uniform Delay, d1	28.5	31.0	31.0		23.5				39.0	8.2
Progression Factor	0.65	0.66	0.65		1.00				1.00	1.00
Incremental Delay, d2	1.3	247.1	192.2		5.8				300.8	0.1
Delay (s)	19.9	267.7	212.2		29.4				339.8	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		214.5			29.4					204.7
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	166.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1658	234	329	1045	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4861				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4861				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1727	254	336	1112	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	9	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1727	246	0	1442	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1782				
v/s Ratio Prot					c0.34							
v/s Ratio Perm						0.16		0.30				
v/c Ratio					0.68	0.31		0.81				
Uniform Delay, d1					11.4	8.9		17.1				
Progression Factor					1.00	1.00		1.19				
Incremental Delay, d2					1.5	1.0		2.1				
Delay (s)					12.8	9.9		22.4				
Level of Service					B	A		C				
Approach Delay (s)		0.0			12.5			22.4			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	654	1371	0	0	0	0	0	718	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4776						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4776						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	711	1413	0	0	0	0	0	780	71
RTOR Reduction (vph)	0	0	0	37	28	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	475	1584	0	0	0	0	0	840	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2308						1340	
v/s Ratio Prot											c0.24	
v/s Ratio Perm				0.31	0.33							
v/c Ratio				0.65	0.69						0.63	
Uniform Delay, d1				11.6	12.0						15.0	
Progression Factor				1.43	1.37						1.00	
Incremental Delay, d2				3.2	1.2						2.2	
Delay (s)				19.8	17.7						17.2	
Level of Service				B	B						B	
Approach Delay (s)		0.0			18.2			0.0			17.2	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	524	11	18	245	20	16	24	30	68	50	45
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	250	557	12	20	266	22	17	26	33	74	54	49

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	250	569	308	76	177
Volume Left (vph)	250	0	20	17	74
Volume Right (vph)	0	12	22	33	49
Hadj (s)	0.53	0.02	0.00	-0.18	-0.05
Departure Headway (s)	6.4	5.8	5.9	6.8	6.6
Degree Utilization, x	0.44	0.92	0.50	0.14	0.32
Capacity (veh/h)	554	603	593	488	518
Control Delay (s)	13.1	42.4	14.7	10.9	12.7
Approach Delay (s)	33.4		14.7	10.9	12.7
Approach LOS	D		B	B	B

Intersection Summary			
Delay	25.4		
HCM Level of Service	D		
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

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                     Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):     13.0       Worst Case Level Of Service: E[ 45.4]
********************************************************************************
Street Name:          Harrison Street         Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1270     0     0    0   517     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1270     0     0    0   517     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1270     0     0    0   517     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1380     0     0    0   556     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1380     0     0    0   556     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   460  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   605  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   605  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.92  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  11.7  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  45.4 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     E     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx            xxxxxx              45.4            xxxxxx
ApproachLOS:       *                 *                  E                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	468	165	1011	473	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1730	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1730	3539	1583	
Peak-hour factor, PHF	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	482	179	1099	514	30
RTOR Reduction (vph)	79	55	0	0	0
Lane Group Flow (vph)	250	278	1099	544	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	12.9	12.9	39.6	16.6	
Effective Green, g (s)	12.9	12.9	39.6	16.6	
Actuated g/C Ratio	0.22	0.22	0.66	0.28	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	361	372	2336	438	
v/s Ratio Prot			c0.31	c0.34	
v/s Ratio Perm	0.15	0.16			
v/c Ratio	0.69	0.75	0.47	1.24	
Uniform Delay, d1	21.7	22.0	5.0	21.7	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.6	7.0	0.7	127.0	
Delay (s)	26.3	29.0	5.7	148.7	
Level of Service	C	C	A	F	
Approach Delay (s)		27.7	53.1		
Approach LOS		C	D		

Intersection Summary			
HCM Average Control Delay	45.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	40	110	93	20	45	15	150	134	14	253	363	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.91	
Frpb, ped/bikes	1.00	1.00	0.93			1.00	1.00	0.91		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1479			1770	1863	1444		3433	5029	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1479			1770	1863	1444		3433	5029	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	120	101	22	49	16	163	141	15	275	395	28
RTOR Reduction (vph)	0	0	10	0	0	0	0	117	0	0	7	0
Lane Group Flow (vph)	43	120	113	0	0	65	163	24	0	290	416	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	5.3	13.1	13.1			7.4	15.2	15.2		12.8	44.2	
Effective Green, g (s)	5.3	13.1	13.1			7.4	15.2	15.2		12.8	44.2	
Actuated g/C Ratio	0.06	0.15	0.15			0.08	0.17	0.17		0.14	0.49	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	104	515	215			146	315	244		488	2470	
v/s Ratio Prot	0.02	0.03				0.04	c0.09			c0.08	c0.08	
v/s Ratio Perm			c0.08					0.02				
v/c Ratio	0.41	0.23	0.52			0.45	0.52	0.10		0.59	0.17	
Uniform Delay, d1	40.9	34.0	35.6			39.3	34.1	31.6		36.2	12.7	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.2	2.3			2.2	1.4	0.2		1.9	0.1	
Delay (s)	43.5	34.2	37.9			41.5	35.5	31.8		38.1	12.9	
Level of Service	D	C	D			D	D	C		D	B	
Approach Delay (s)		37.2					35.1				23.1	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	96	1176	95	94
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.98		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3466		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3466		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	1278	103	102
RTOR Reduction (vph)	0	4	0	0
Lane Group Flow (vph)	104	1479	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	9.3	40.7		
Effective Green, g (s)	9.3	40.7		
Actuated g/C Ratio	0.10	0.45		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	183	1567		
v/s Ratio Prot	0.06	c0.43		
v/s Ratio Perm				
v/c Ratio	0.57	0.94		
Uniform Delay, d1	38.4	23.6		
Progression Factor	1.00	1.00		
Incremental Delay, d2	4.0	12.8		
Delay (s)	42.4	36.3		
Level of Service	D	D		
Approach Delay (s)		36.7		
Approach LOS		D		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	180	98	33	294	289	54	462	37	94	584	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1746	3302			3517	1543	1760	3484		1766	3498	
Flt Permitted	0.54	1.00			0.89	1.00	0.33	1.00		0.43	1.00	
Satd. Flow (perm)	1001	3302			3157	1543	608	3484		793	3498	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.95	0.92	0.92	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	194	107	36	309	314	59	476	40	102	635	47
RTOR Reduction (vph)	0	62	0	0	0	146	0	7	0	0	7	0
Lane Group Flow (vph)	61	239	0	0	345	168	59	509	0	102	675	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	424	1398			1337	654	272	1558		355	1564	
v/s Ratio Prot		0.07						0.15			c0.19	
v/s Ratio Perm	0.06				c0.11	0.11	0.10			0.13		
v/c Ratio	0.14	0.17			0.26	0.26	0.22	0.33		0.29	0.43	
Uniform Delay, d1	15.0	15.2			15.9	15.8	14.4	15.2		14.9	16.1	
Progression Factor	1.12	1.08			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.3			0.5	0.9	1.8	0.6		2.0	0.9	
Delay (s)	17.6	16.7			16.3	16.8	16.2	15.8		16.9	17.0	
Level of Service	B	B			B	B	B	B		B	B	
Approach Delay (s)		16.9			16.6			15.8			17.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	343	392	145	43	263	107	87	364	22	48	356	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1561	1765	1863	1546	1761	3499		1764	3372	
Flt Permitted	0.46	1.00	1.00	0.51	1.00	1.00	0.28	1.00		0.39	1.00	
Satd. Flow (perm)	865	1863	1561	955	1863	1546	511	3499		730	3372	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	373	426	158	47	286	116	91	396	24	52	387	145
RTOR Reduction (vph)	0	0	64	0	0	60	0	6	0	0	59	0
Lane Group Flow (vph)	373	426	94	47	286	56	91	414	0	52	473	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	58.4	50.4	50.4	44.4	40.9	40.9	17.6	17.6		17.6	17.6	
Effective Green, g (s)	58.4	50.4	50.4	44.4	40.9	40.9	17.6	17.6		17.6	17.6	
Actuated g/C Ratio	0.69	0.59	0.59	0.52	0.48	0.48	0.21	0.21		0.21	0.21	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	733	1105	926	532	896	744	106	724		151	698	
v/s Ratio Prot	c0.08	0.23		0.00	0.15			0.12			0.14	
v/s Ratio Perm	c0.27		0.06	0.04		0.04	c0.18			0.07		
v/c Ratio	0.51	0.39	0.10	0.09	0.32	0.08	0.86	0.57		0.34	0.68	
Uniform Delay, d1	6.1	9.1	7.5	10.0	13.5	11.9	32.5	30.3		28.8	31.1	
Progression Factor	1.00	1.00	1.00	0.65	0.67	0.33	0.92	0.90		1.00	1.00	
Incremental Delay, d2	0.2	1.0	0.2	0.0	0.9	0.2	43.2	0.7		0.5	2.1	
Delay (s)	6.3	10.1	7.7	6.5	9.9	4.1	73.0	27.8		29.3	33.2	
Level of Service	A	B	A	A	A	A	E	C		C	C	
Approach Delay (s)		8.2			8.1			35.9			32.8	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	155	872	0	0	149	312	5	269	25	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1608	3387			3539	2787		5010				
Flt Permitted	0.65	0.95			1.00	1.00		1.00				
Satd. Flow (perm)	1099	3220			3539	2787		5010				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	948	0	0	162	339	5	292	27	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	203	0	16	0	0	0	0
Lane Group Flow (vph)	151	965	0	0	162	136	0	308	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	440	1288			1416	1115		2004				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.14	c0.30				0.05		0.06				
v/c Ratio	0.34	0.75			0.11	0.12		0.15				
Uniform Delay, d1	8.3	10.3			7.5	7.6		7.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.1	4.0			0.2	0.2		0.2				
Delay (s)	10.5	14.3			7.7	7.8		7.8				
Level of Service	B	B			A	A		A				
Approach Delay (s)		13.8			7.8			7.8			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	280	27	11	158	0	0	0	0	730	1092	351
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1558		3526					1610	3370	1583
Flt Permitted		1.00	1.00		0.93					0.95	0.99	1.00
Satd. Flow (perm)		3539	1558		3296					1610	3370	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	0	304	29	12	172	0	0	0	0	793	1174	382
RTOR Reduction (vph)	0	0	19	0	0	0	0	0	0	0	0	185
Lane Group Flow (vph)	0	304	10	0	184	0	0	0	0	634	1333	197
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	545		1154					832	1741	818
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.01		0.06					0.39	0.40	0.12
v/c Ratio		0.25	0.02		0.16					0.76	0.77	0.24
Uniform Delay, d1		13.9	12.8		13.4					11.6	11.6	8.0
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		0.5	0.1		0.3					6.5	3.3	0.7
Delay (s)		14.3	12.8		13.7					18.1	14.9	8.7
Level of Service		B	B		B					B	B	A
Approach Delay (s)		14.2			13.7			0.0			14.7	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	195	602	672	132	857	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3435		3432	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3435		3432	1414
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	654	730	143	932	214
RTOR Reduction (vph)	0	0	19	0	2	132
Lane Group Flow (vph)	212	654	854	0	951	61
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	12.8	46.8	30.0		25.2	25.2
Effective Green, g (s)	12.8	46.8	30.0		25.2	25.2
Actuated g/C Ratio	0.16	0.58	0.38		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	283	2070	1288		1081	445
v/s Ratio Prot	c0.12	0.18	c0.25		c0.28	
v/s Ratio Perm						0.04
v/c Ratio	0.75	0.32	0.66		0.88	0.14
Uniform Delay, d1	32.1	8.5	20.8		26.0	19.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.1	0.4	2.7		8.1	0.1
Delay (s)	41.2	8.9	23.5		34.1	19.7
Level of Service	D	A	C		C	B
Approach Delay (s)		16.8	23.5		31.6	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	903	357	68	431	69	201	262	31	119	368	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1766	3427	1553	1768	3346		1768	3472		1757	3433	
Flt Permitted	0.31	1.00	1.00	0.16	1.00		0.40	1.00		0.56	1.00	
Satd. Flow (perm)	584	3427	1553	297	3346		739	3472		1042	3433	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	941	388	74	468	75	218	276	34	129	400	84
RTOR Reduction (vph)	0	0	273	0	14	0	0	5	0	0	19	0
Lane Group Flow (vph)	117	941	115	74	529	0	218	305	0	129	465	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	25.1	25.1	25.1	25.1	25.1		49.4	49.4		35.6	35.6	
Effective Green, g (s)	25.1	25.1	25.1	25.1	25.1		49.4	49.4		35.6	35.6	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.58	0.58		0.42	0.42	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	172	1012	459	88	988		542	2018		436	1438	
v/s Ratio Prot		c0.27			0.16		c0.04	0.09			0.14	
v/s Ratio Perm	0.20		0.07	0.25			c0.19			0.12		
v/c Ratio	0.68	0.93	0.25	0.84	0.54		0.40	0.15		0.30	0.32	
Uniform Delay, d1	26.4	29.1	22.8	28.1	25.1		8.8	8.2		16.4	16.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.14	1.16	
Incremental Delay, d2	19.6	15.7	1.3	59.2	2.1		0.2	0.2		1.7	0.6	
Delay (s)	46.0	44.8	24.1	87.3	27.1		9.0	8.3		20.3	19.8	
Level of Service	D	D	C	F	C		A	A		C	B	
Approach Delay (s)		39.4			34.4			8.6			19.9	
Approach LOS		D			C			A			B	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	779	90	94	487	72	113	436	97	96	397	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99			0.99		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98			0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1753	3357			3325		1764	3539	1529	1762	3438	
Flt Permitted	0.26	1.00			0.59		0.43	1.00	1.00	0.45	1.00	
Satd. Flow (perm)	485	3357			1981		793	3539	1529	840	3438	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	847	98	102	529	78	123	474	105	104	432	85
RTOR Reduction (vph)	0	12	0	0	13	0	0	0	38	0	18	0
Lane Group Flow (vph)	100	933	0	0	696	0	123	474	67	104	499	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	31.3	31.3			31.3		40.7	40.7	40.7	40.7	40.7	
Effective Green, g (s)	31.3	31.3			31.3		40.7	40.7	40.7	40.7	40.7	
Actuated g/C Ratio	0.39	0.39			0.39		0.51	0.51	0.51	0.51	0.51	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	190	1313			775		403	1800	778	427	1749	
v/s Ratio Prot		0.28						0.13			0.15	
v/s Ratio Perm	0.21				c0.35		c0.16		0.04	0.12		
v/c Ratio	0.53	0.71			0.90		0.31	0.26	0.09	0.24	0.29	
Uniform Delay, d1	18.7	20.5			22.9		11.4	11.1	10.1	11.0	11.3	
Progression Factor	1.00	1.00			1.23		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	1.5			12.8		1.9	0.4	0.2	1.4	0.4	
Delay (s)	19.9	22.1			40.9		13.4	11.5	10.3	12.4	11.7	
Level of Service	B	C			D		B	B	B	B	B	
Approach Delay (s)		21.9			40.9			11.7			11.8	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	414	453	119	441	0	0	0	0	12	159	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.92		1.00	1.00						0.98	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		3062		1770	3427						3409	
Flt Permitted		1.00		0.14	1.00						1.00	
Satd. Flow (perm)		3062		264	3427						3409	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	445	492	129	479	0	0	0	0	13	173	22
RTOR Reduction (vph)	0	197	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	740	0	129	479	0	0	0	0	0	197	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.6		43.0	43.0						29.0	
Effective Green, g (s)		31.6		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1209		262	1842						1236	
v/s Ratio Prot		c0.24		c0.04	0.14							
v/s Ratio Perm				0.23							0.06	
v/c Ratio		0.61		0.49	0.26						0.16	
Uniform Delay, d1		19.3		12.2	9.9						17.3	
Progression Factor		2.36		1.00	1.00						1.00	
Incremental Delay, d2		2.0		0.5	0.3						0.3	
Delay (s)		47.6		12.7	10.3						17.5	
Level of Service		D		B	B						B	
Approach Delay (s)		47.6			10.8			0.0			17.5	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	150	78	634	547	119	121	812	343	33	890	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	3539	1479	3433	3539	1485		5045	1419		4972	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.65	1.00		0.85	
Satd. Flow (perm)	3433	3539	1479	3433	3539	1485		3285	1419		4239	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	70	163	85	689	595	129	132	883	373	36	957	114
RTOR Reduction (vph)	0	0	11	0	0	72	0	0	239	0	14	0
Lane Group Flow (vph)	70	163	74	689	595	57	0	1015	134	0	1093	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	5.5	33.0	33.0	16.0	44.5	44.5		36.0	36.0		36.0	
Effective Green, g (s)	5.5	33.0	33.0	16.0	44.5	44.5		36.0	36.0		36.0	
Actuated g/C Ratio	0.06	0.33	0.33	0.16	0.44	0.44		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	189	1168	488	549	1575	661		1183	511		1526	
v/s Ratio Prot	0.02	0.05		c0.20	c0.17							
v/s Ratio Perm			0.05			0.04		c0.31	0.09		0.26	
v/c Ratio	0.37	0.14	0.15	1.26	0.38	0.09		1.28dl	0.26		0.72	
Uniform Delay, d1	45.6	23.5	23.6	42.0	18.5	16.0		29.6	22.6		27.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.2	0.7	129.1	0.7	0.3		8.2	1.3		2.9	
Delay (s)	46.0	23.8	24.3	171.1	19.2	16.3		37.8	23.9		30.5	
Level of Service	D	C	C	F	B	B		D	C		C	
Approach Delay (s)		28.8			93.0			34.0			30.5	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	121	49	113	958	1139	696
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.96		1.00	1.00	0.94	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3274		1769	3725	6041	
Flt Permitted	0.97		0.08	1.00	1.00	
Satd. Flow (perm)	3274		145	3725	6041	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.93	0.92
Adj. Flow (vph)	132	53	123	998	1225	757
RTOR Reduction (vph)	47	0	0	0	70	0
Lane Group Flow (vph)	138	0	123	998	1912	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	8.6		57.9	51.5	51.5	
Effective Green, g (s)	8.6		57.9	51.5	51.5	
Actuated g/C Ratio	0.11		0.72	0.64	0.64	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	352		235	2398	3889	
v/s Ratio Prot	c0.04		c0.04	0.27	0.32	
v/s Ratio Perm			c0.34			
v/c Ratio	0.39		0.52	0.42	0.49	
Uniform Delay, d1	33.3		5.0	6.9	7.4	
Progression Factor	1.00		1.07	1.50	1.00	
Incremental Delay, d2	0.7		1.9	0.5	0.4	
Delay (s)	34.0		7.2	10.9	7.9	
Level of Service	C		A	B	A	
Approach Delay (s)	34.0			10.5	7.9	
Approach LOS	C			B	A	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	156	30	113	695	1	19
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	170	33	123	755	1	21
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			204		1196	195
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			204		1196	195
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		99	98
cM capacity (veh/h)			1365		186	840

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	202	878	22
Volume Left	0	123	1
Volume Right	33	0	21
cSH	1700	1365	714
Volume to Capacity	0.12	0.09	0.03
Queue Length 95th (ft)	0	7	2
Control Delay (s)	0.0	2.2	10.2
Lane LOS		A	B
Approach Delay (s)	0.0	2.2	10.2
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	150	256	412	286	2	34
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	163	278	448	311	2	37
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			443		1535	328
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			443		1535	328
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			60		97	95
cM capacity (veh/h)			1115		75	698

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	441	759	39
Volume Left	0	448	2
Volume Right	278	0	37
cSH	1700	1115	477
Volume to Capacity	0.26	0.40	0.08
Queue Length 95th (ft)	0	49	7
Control Delay (s)	0.0	8.2	13.2
Lane LOS		A	B
Approach Delay (s)	0.0	8.2	13.2
Approach LOS			B

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	246	149	131	400	34	42
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	1.00	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	267	149	142	435	37	46
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.85		0.85	0.85
vC, conflicting volume			418		1079	360
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			220		1002	151
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		81	94
cM capacity (veh/h)			1138		196	745

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	416	577	18	18	23	23
Volume Left	0	142	18	18	0	0
Volume Right	149	0	0	0	23	23
cSH	1700	1138	196	196	745	745
Volume to Capacity	0.24	0.13	0.09	0.09	0.03	0.03
Queue Length 95th (ft)	0	11	8	8	2	2
Control Delay (s)	0.0	3.2	25.3	25.3	10.0	10.0
Lane LOS		A	D	D	A	A
Approach Delay (s)	0.0	3.2	16.8			
Approach LOS			C			

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	354	65	50	64	0	0	0	0	285	412	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.97						0.95	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1342		1766						4705	
Flt Permitted		1.00	1.00		0.57						0.98	
Satd. Flow (perm)		1863	1342		1035						4705	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	385	71	54	70	0	0	0	0	310	448	33
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	385	25	0	124	0	0	0	0	0	788	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		23.8	23.8		23.8						48.2	
Effective Green, g (s)		23.8	23.8		23.8						48.2	
Actuated g/C Ratio		0.30	0.30		0.30						0.60	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		554	399		308						2835	
v/s Ratio Prot		c0.21										
v/s Ratio Perm			0.02		0.12						0.17	
v/c Ratio		0.69	0.06		0.40						0.28	
Uniform Delay, d1		24.9	20.1		22.4						7.6	
Progression Factor		1.00	1.00		1.00						0.82	
Incremental Delay, d2		3.8	0.1		0.9						0.2	
Delay (s)		28.7	20.2		23.3						6.4	
Level of Service		C	C		C						A	
Approach Delay (s)		27.3			23.3			0.0			6.4	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	253	4	0	43	43	10	213	173	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			1.00	1.00			
Frt		1.00			0.93			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1852			1629			3515	1377			
Flt Permitted		1.00			1.00			1.00	1.00			
Satd. Flow (perm)		1846			1629			3515	1377			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	275	4	0	47	47	11	232	188	0	0	0
RTOR Reduction (vph)	0	1	0	0	16	0	0	0	156	0	0	0
Lane Group Flow (vph)	0	286	0	0	78	0	0	243	32	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		29.4			29.4			7.6	7.6			
Effective Green, g (s)		29.4			29.4			7.6	7.6			
Actuated g/C Ratio		0.65			0.65			0.17	0.17			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1206			1064			594	233			
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.16						0.07	0.02			
v/c Ratio		0.24			0.07			0.41	0.14			
Uniform Delay, d1		3.2			2.8			16.7	15.9			
Progression Factor		0.46			1.00			1.00	1.00			
Incremental Delay, d2		0.4			0.1			0.2	0.1			
Delay (s)		1.9			3.0			16.9	16.0			
Level of Service		A			A			B	B			
Approach Delay (s)		1.9			3.0			16.5			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	135	17	26	0	37	0	331	38	102	359	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			0.99	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1751	1827			1650			3457			3475	
Flt Permitted	0.71	1.00			0.88			1.00			0.78	
Satd. Flow (perm)	1314	1827			1485			3457			2726	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	147	18	28	0	40	0	360	41	111	390	0
RTOR Reduction (vph)	0	10	0	0	23	0	0	19	0	0	0	0
Lane Group Flow (vph)	12	155	0	0	45	0	0	382	0	0	501	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	555	771			627			1306			1030	
v/s Ratio Prot		c0.08						0.11				
v/s Ratio Perm	0.01				0.03						c0.18	
v/c Ratio	0.02	0.20			0.07			0.29			0.49	
Uniform Delay, d1	7.6	8.2			7.7			9.8			10.7	
Progression Factor	1.00	1.00			1.23			1.00			1.00	
Incremental Delay, d2	0.1	0.6			0.2			0.6			1.6	
Delay (s)	7.7	8.8			9.7			10.4			12.3	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.7			9.7			10.4			12.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	101	20	12	199	105	34	458	47	163	163	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.95			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3424			3320			3472		1769	3383	
Flt Permitted		0.87			0.94			0.92		0.37	1.00	
Satd. Flow (perm)		3003			3125			3218		688	3383	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	110	22	13	212	114	37	467	51	177	177	63
RTOR Reduction (vph)	0	18	0	0	95	0	0	10	0	0	20	0
Lane Group Flow (vph)	0	135	0	0	244	0	0	546	0	177	220	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.9			9.9			30.0		41.1	41.1	
Effective Green, g (s)		9.9			9.9			30.0		41.1	41.1	
Actuated g/C Ratio		0.16			0.16			0.50		0.68	0.68	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		495			516			1609		590	2317	
v/s Ratio Prot										c0.03	0.07	
v/s Ratio Perm		0.04			c0.08			c0.17		0.17		
v/c Ratio		0.27			0.47			0.34		0.30	0.10	
Uniform Delay, d1		21.9			22.7			9.0		3.7	3.2	
Progression Factor		1.00			1.01			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.7			0.6		0.3	0.1	
Delay (s)		22.2			23.7			9.6		4.0	3.3	
Level of Service		C			C			A		A	A	
Approach Delay (s)		22.2			23.7			9.6			3.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	202	61	48	162	114	60	487	86	67	415	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.97			0.95			0.98			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		3359			3157			3393			4980	
Flt Permitted		0.94			0.87			0.86			0.79	
Satd. Flow (perm)		3174			2775			2948			3945	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	220	66	52	176	124	65	524	93	73	451	28
RTOR Reduction (vph)	0	42	0	0	79	0	0	21	0	0	10	0
Lane Group Flow (vph)	0	253	0	0	273	0	0	661	0	0	542	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1164			1018			1477			1184	
v/s Ratio Prot								c0.05				
v/s Ratio Perm		0.08			c0.10			c0.16			0.14	
v/c Ratio		0.22			0.27			0.45			0.46	
Uniform Delay, d1		13.1			13.3			10.2			17.0	
Progression Factor		0.91			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.6			1.0			1.3	
Delay (s)		12.3			14.0			11.2			18.3	
Level of Service		B			B			B			B	
Approach Delay (s)		12.3			14.0			11.2			18.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	350	0	0	261	90	35	289	113	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3517			3365	1337		5028	1460			
Flt Permitted		0.92			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3248			3365	1337		5028	1460			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	380	0	0	284	98	38	314	123	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	20	0	0	106	0	0	0
Lane Group Flow (vph)	0	410	0	0	293	68	0	352	17	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		61.8			61.8	61.8		11.2	11.2			
Effective Green, g (s)		61.8			61.8	61.8		11.2	11.2			
Actuated g/C Ratio		0.77			0.77	0.77		0.14	0.14			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2509			2599	1033		704	204			
v/s Ratio Prot					0.09							
v/s Ratio Perm		c0.13				0.05		0.07	0.01			
v/c Ratio		0.16			0.11	0.07		0.50	0.08			
Uniform Delay, d1		2.4			2.3	2.2		31.8	29.9			
Progression Factor		1.00			1.87	4.06		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.6	0.2			
Delay (s)		2.5			4.3	9.0		32.4	30.1			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.5			5.4			31.8			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	301	167	194	259	0	0	0	0	67	361	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	0.99						0.99	
Satd. Flow (prot)		3539	1422	1610	3334						4475	
Flt Permitted		1.00	1.00	0.95	0.89						0.99	
Satd. Flow (perm)		3539	1422	1610	2995						4475	
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	327	176	211	282	0	0	0	0	73	392	97
RTOR Reduction (vph)	0	0	94	0	0	0	0	0	0	0	40	0
Lane Group Flow (vph)	0	327	82	160	333	0	0	0	0	0	522	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1603						1734	
v/s Ratio Prot		c0.09		c0.10	0.04							
v/s Ratio Perm			0.06		0.06						0.12	
v/c Ratio		0.35	0.22	0.50	0.21						0.30	
Uniform Delay, d1		24.0	23.1	28.4	10.6						17.0	
Progression Factor		1.05	1.34	1.50	0.46						1.13	
Incremental Delay, d2		1.0	1.4	0.4	0.0						0.0	
Delay (s)		26.1	32.3	43.0	4.9						19.1	
Level of Service		C	C	D	A						B	
Approach Delay (s)		28.3			17.3			0.0			19.1	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	103	128	171	61	76	318	415	371	59	0	26	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.94
Flpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.91				1.00	0.97	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.98				0.98	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	4701				3486	3276	1441	1583		1583	1490
Flt Permitted	0.95	0.98				0.98	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	4701				3486	3276	1441	1583		1583	1490
Peak-hour factor, PHF	0.95	0.92	0.92	0.94	0.94	0.96	0.92	0.96	0.96	0.92	0.95	0.95
Adj. Flow (vph)	108	139	186	65	81	331	451	386	61	0	27	35
RTOR Reduction (vph)	0	139	0	0	0	0	0	0	38	0	0	28
Lane Group Flow (vph)	108	186	0	0	0	477	582	255	23	0	27	7
Confl. Peds. (#/hr)	16								102			32
Confl. Bikes (#/hr)						6			10			2
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	7.3	20.3				24.0	16.8	29.8	29.8		2.9	16.8
Effective Green, g (s)	7.3	20.3				24.0	16.8	29.8	29.8		2.9	16.8
Actuated g/C Ratio	0.09	0.25				0.30	0.21	0.37	0.37		0.04	0.21
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	162	1193				1046	688	537	590		57	313
v/s Ratio Prot	c0.06	0.04				c0.14	c0.18	c0.18	0.01			
v/s Ratio Perm											c0.02	0.00
v/c Ratio	0.67	0.16				0.46	0.85	0.47	0.04		0.47	0.02
Uniform Delay, d1	35.2	23.2				22.7	30.4	19.1	16.0		37.8	25.1
Progression Factor	0.90	2.09				1.00	1.28	1.55	3.09		1.00	1.00
Incremental Delay, d2	9.6	0.3				0.1	8.9	2.9	0.1		2.3	0.0
Delay (s)	41.1	48.7				22.8	47.8	32.6	49.5		40.1	25.1
Level of Service	D	D				C	D	C	D		D	C
Approach Delay (s)		46.8				22.8	43.6			31.6		
Approach LOS		D				C	D			C		

Intersection Summary			
HCM Average Control Delay	38.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	398	29	457	636	143	788
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5033		3433	5085	3178	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5033		3433	5085	3178	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.97
Adj. Flow (vph)	433	32	476	691	155	812
RTOR Reduction (vph)	11	0	0	0	338	338
Lane Group Flow (vph)	454	0	476	691	223	68
Confl. Bikes (#/hr)				2		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	33.0		20.6	58.6	13.4	13.4
Effective Green, g (s)	33.0		20.6	58.6	13.4	13.4
Actuated g/C Ratio	0.41		0.26	0.73	0.17	0.17
Clearance Time (s)	5.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2076		884	3725	532	241
v/s Ratio Prot	c0.09		c0.14	0.14	c0.07	
v/s Ratio Perm						0.05
v/c Ratio	0.22		0.54	0.19	0.42	0.28
Uniform Delay, d1	15.2		25.6	3.3	29.8	29.1
Progression Factor	0.45		0.74	0.88	1.00	1.00
Incremental Delay, d2	0.2		2.1	0.1	0.5	0.6
Delay (s)	7.0		21.1	3.0	30.4	29.7
Level of Service	A		C	A	C	C
Approach Delay (s)	7.0			10.4	30.1	
Approach LOS	A			B	C	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	113	0	0	0	0	0	2984	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6403	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	0	0	88	123	0	0	0	0	0	3108	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	123	0	0	0	0	0	3121	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4849	
v/s Ratio Prot					0.03						c0.49	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.28						0.64	
Uniform Delay, d1				30.4	29.9						4.3	
Progression Factor				1.00	1.00						0.95	
Incremental Delay, d2				5.5	1.6						0.3	
Delay (s)				35.9	31.5						4.4	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.4			0.0			4.4	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1178	528	80	486	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4953		3377	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4953		3377	
Peak-hour factor, PHF	0.92	0.96	0.95	0.92	0.94	0.92
Adj. Flow (vph)	238	1227	556	87	517	116
RTOR Reduction (vph)	50	0	30	0	0	0
Lane Group Flow (vph)	188	1227	613	0	633	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	33.7	33.7	15.2		14.1	
Effective Green, g (s)	33.7	33.7	15.2		14.1	
Actuated g/C Ratio	0.45	0.45	0.20		0.19	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	795	2285	1004		635	
v/s Ratio Prot		c0.24	c0.12		c0.19	
v/s Ratio Perm	0.11					
v/c Ratio	0.24	0.54	0.61		1.00	
Uniform Delay, d1	12.7	15.0	27.2		30.4	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.9	1.1		34.7	
Delay (s)	13.4	15.9	28.3		65.1	
Level of Service	B	B	C		E	
Approach Delay (s)		15.5	28.3		65.1	
Approach LOS		B	C		E	

Intersection Summary			
HCM Average Control Delay	30.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	156	241	314	316	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3151	1423	1425	5925				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3151	1423	1425	5925				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	166	262	341	343	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	48	50	135	136	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	246	84	35	378	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.6	37.6	12.4	12.4				
Effective Green, g (s)					37.6	37.6	12.4	12.4				
Actuated g/C Ratio					0.63	0.63	0.21	0.21				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1975	892	295	1225				
v/s Ratio Prot					c0.08							
v/s Ratio Perm						0.06	0.02	0.06				
v/c Ratio					0.12	0.09	0.12	0.31				
Uniform Delay, d1					4.5	4.4	19.4	20.2				
Progression Factor					4.12	7.37	1.00	1.00				
Incremental Delay, d2					0.1	0.2	0.2	0.1				
Delay (s)					18.8	32.9	19.5	20.3				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			23.2			20.1			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	28.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	182	37	0	0	0	0	0	0	1085	1218	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3435								1522	4722	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3435								1522	4722	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	196	40	0	0	0	0	0	0	1179	1324	37
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	345	63	0
Lane Group Flow (vph)	0	229	0	0	0	0	0	0	0	280	1852	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1775								634	1968	
v/s Ratio Prot		c0.07										
v/s Ratio Perm										0.18	0.39	
v/c Ratio		0.13								0.44	0.94	
Uniform Delay, d1		15.0								25.0	33.6	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.2								2.2	10.5	
Delay (s)		15.2								27.3	44.1	
Level of Service		B								C	D	
Approach Delay (s)		15.2			0.0			0.0			39.9	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM Average Control Delay	37.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	307	0	0	644	565	136	622	27	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3539	1548		3493	1531			
Flt Permitted		0.79			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2782			3539	1548		3493	1531			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	334	0	0	700	589	148	648	29	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	137	0	0	14	0	0	0
Lane Group Flow (vph)	0	377	0	0	700	452	0	796	15	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		835			1062	464		1863	817			
v/s Ratio Prot					0.20							
v/s Ratio Perm		0.14				c0.29		0.23	0.01			
v/c Ratio		0.45			0.66	0.97		0.43	0.02			
Uniform Delay, d1		17.0			18.3	20.8		8.5	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		1.8			3.2	35.7		0.7	0.0			
Delay (s)		18.8			21.5	56.5		9.2	6.6			
Level of Service		B			C	E		A	A			
Approach Delay (s)		18.8			37.5			9.1			0.0	
Approach LOS		B			D			A			A	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	274	46	25	731	0	0	0	0	59	374	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3441			3531					1746	3506	
Flt Permitted		1.00			0.94					0.95	1.00	
Satd. Flow (perm)		3441			3321					1746	3506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	298	50	27	761	0	0	0	0	64	390	22
RTOR Reduction (vph)	0	29	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	319	0	0	788	0	0	0	0	64	403	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1453			1402					737	1480	
v/s Ratio Prot		0.09									c0.11	
v/s Ratio Perm					c0.24					0.04		
v/c Ratio		0.22			0.56					0.09	0.27	
Uniform Delay, d1		8.3			9.8					7.8	8.5	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.3			1.6					0.2	0.5	
Delay (s)		8.6			11.5					8.0	8.9	
Level of Service		A			B					A	A	
Approach Delay (s)		8.6			11.5			0.0			8.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	166	12	8	400	99	66	437	27	29	76	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3460			3387			3470			3348	
Flt Permitted		0.83			0.95			0.90			0.82	
Satd. Flow (perm)		2906			3224			3137			2776	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	180	13	9	435	108	72	475	29	32	83	30
RTOR Reduction (vph)	0	6	0	0	41	0	0	9	0	0	20	0
Lane Group Flow (vph)	0	236	0	0	511	0	0	567	0	0	125	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.0			23.0			14.5			14.5	
Effective Green, g (s)		23.0			23.0			14.5			14.5	
Actuated g/C Ratio		0.51			0.51			0.32			0.32	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1485			1648			1011			894	
v/s Ratio Prot												
v/s Ratio Perm		0.08			c0.16			c0.18			0.04	
v/c Ratio		0.16			0.31			0.56			0.14	
Uniform Delay, d1		5.9			6.4			12.6			10.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.5			0.7			0.1	
Delay (s)		6.1			6.9			13.3			10.9	
Level of Service		A			A			B			B	
Approach Delay (s)		6.1			6.9			13.3			10.9	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	415	1502	0	0	0	0	0	384	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6291						4916	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6291						4916	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	451	1548	0	0	0	0	0	392	83
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	1911	0	0	0	0	0	472	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2171	
v/s Ratio Prot											c0.10	
v/s Ratio Perm					0.30							
v/c Ratio					0.70						0.22	
Uniform Delay, d1					13.8						10.3	
Progression Factor					0.48						1.00	
Incremental Delay, d2					1.3						0.2	
Delay (s)					7.9						10.6	
Level of Service					A						B	
Approach Delay (s)		0.0			7.9			0.0			10.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1684	78	326	814	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6341			6167				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6341			6167				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1736	85	351	885	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1812	0	0	1233	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3160			2117				
v/s Ratio Prot					c0.29							
v/s Ratio Perm								0.20				
v/c Ratio					0.57			0.58				
Uniform Delay, d1					10.6			16.2				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.8			1.2				
Delay (s)					11.3			17.3				
Level of Service					B			B				
Approach Delay (s)		0.0			11.3			17.3			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	66	0	0	1092	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	72	0	0	1103	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	288	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	288	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	672	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	72	276	276	276	276
Volume Left	72	0	0	0	0
Volume Right	0	0	0	0	0
cSH	672	1700	1700	1700	1700
Volume to Capacity	0.11	0.16	0.16	0.16	0.16
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.0	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.0	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	398	142	0	0	0	0	0	0	26	784	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6074									5074	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6074									5074	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	433	154	0	0	0	0	0	0	28	825	0
RTOR Reduction (vph)	0	48	0	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	539	0	0	0	0	0	0	0	0	847	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2328									2199	
v/s Ratio Prot		c0.09										
v/s Ratio Perm											0.17	
v/c Ratio		0.23									0.39	
Uniform Delay, d1		12.5									11.6	
Progression Factor		0.76									1.15	
Incremental Delay, d2		0.2									0.5	
Delay (s)		9.8									13.8	
Level of Service		A									B	
Approach Delay (s)		9.8			0.0			0.0			13.8	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	402	0	0	0	0	0	411	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6274						6263				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6274						6263				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	432	0	0	0	0	0	447	64	0	0	0
RTOR Reduction (vph)	0	110	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	452	0	0	0	0	0	494	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		9.2						43.8				
Effective Green, g (s)		9.2						43.8				
Actuated g/C Ratio		0.15						0.73				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		962						4572				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.07										
v/c Ratio		0.47						0.11				
Uniform Delay, d1		23.2						2.4				
Progression Factor		1.03						1.00				
Incremental Delay, d2		0.1						0.0				
Delay (s)		23.9						2.4				
Level of Service		C						A				
Approach Delay (s)		23.9			0.0			2.4			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	575	0	0	0	0	0	1145	291	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.97				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6328						4909				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6328						4909				
Peak-hour factor, PHF	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	625	0	0	0	0	0	1245	316	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	72	0	0	0	0
Lane Group Flow (vph)	0	762	0	0	0	0	0	1489	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2531						1964				
v/s Ratio Prot								c0.30				
v/s Ratio Perm		0.12										
v/c Ratio		0.30						0.76				
Uniform Delay, d1		9.2						11.6				
Progression Factor		0.79						0.74				
Incremental Delay, d2		0.3						2.0				
Delay (s)		7.6						10.7				
Level of Service		A						B				
Approach Delay (s)		7.6			0.0			10.7			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	553	283	0	0	0	0	0	0	153	622	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.95									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6050									5025	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6050									5025	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	601	308	0	0	0	0	0	0	166	635	0
RTOR Reduction (vph)	0	94	0	0	0	0	0	0	0	0	82	0
Lane Group Flow (vph)	0	815	0	0	0	0	0	0	0	0	719	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2420									2233	
v/s Ratio Prot		c0.13										
v/s Ratio Perm											0.14	
v/c Ratio		0.34									0.32	
Uniform Delay, d1		9.4									8.1	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.4									0.4	
Delay (s)		9.7									8.5	
Level of Service		A									A	
Approach Delay (s)		9.7			0.0			0.0			8.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	24	349	53	226	282	0	0	167	1779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1821			1863	1558
Flt Permitted				0.95	1.00	1.00		0.77			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1436			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	0	0	0	26	364	58	246	307	0	0	182	1873
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	0	94
Lane Group Flow (vph)	0	0	0	26	364	16	0	553	0	0	182	1779
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				12.2	12.2	12.2		21.8			21.8	21.8
Effective Green, g (s)				12.2	12.2	12.2		21.8			21.8	21.8
Actuated g/C Ratio				0.27	0.27	0.27		0.48			0.48	0.48
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				471	505	407		696			903	755
v/s Ratio Prot					c0.20						0.10	
v/s Ratio Perm				0.01		0.01		0.39				c1.14
v/c Ratio				0.06	0.72	0.04		0.79			0.20	2.36
Uniform Delay, d1				12.1	14.9	12.1		9.7			6.6	11.6
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	5.0	0.0		9.1			0.5	614.5
Delay (s)				12.2	19.9	12.1		18.8			7.1	626.1
Level of Service				B	B	B		B			A	F
Approach Delay (s)		0.0			18.4			18.8			571.3	
Approach LOS		A			B			B			F	

Intersection Summary			
HCM Average Control Delay	390.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	170.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	145	505	141	57	908
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.99	1.00
Satd. Flow (prot)			3497		3188	1441
Flt Permitted			0.99		0.99	1.00
Satd. Flow (perm)			3497		3188	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	158	526	153	62	987
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	684	0	709	493
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1148	519
v/s Ratio Prot						
v/s Ratio Perm			0.20		0.22	c0.34
v/c Ratio			0.54		0.87dr	0.95
Uniform Delay, d1			11.4		11.9	14.0
Progression Factor			0.81		1.00	1.00
Incremental Delay, d2			0.5		2.5	28.8
Delay (s)			9.7		14.3	42.9
Level of Service			A		B	D
Approach Delay (s)			9.7		26.0	
Approach LOS			A		C	

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	356	655	179	0	0	0	0	271	80	4	138	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4858						1800			1860	
Flt Permitted		0.99						1.00			0.99	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	375	712	195	0	0	0	0	295	87	4	150	0
RTOR Reduction (vph)	0	57	0	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	1226	0	0	0	0	0	358	0	0	154	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						620			551	
v/s Ratio Prot								c0.20				
v/s Ratio Perm		c0.66									0.10	
v/c Ratio		1.32						0.58			0.28	
Uniform Delay, d1		11.2						12.1			10.7	
Progression Factor		1.00						1.00			0.93	
Incremental Delay, d2		153.7						3.9			1.0	
Delay (s)		165.0						16.0			11.0	
Level of Service		F						B			B	
Approach Delay (s)		165.0			0.0			16.0			11.0	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	120.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	361	213	523	288	115	1322
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3351		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3351		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	392	232	568	313	125	1437
RTOR Reduction (vph)	0	171	76	0	0	0
Lane Group Flow (vph)	392	61	805	0	125	1437
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	23.5	23.5	40.6		13.9	58.5
Effective Green, g (s)	23.5	23.5	40.6		13.9	58.5
Actuated g/C Ratio	0.26	0.26	0.45		0.15	0.65
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	462	413	1512		273	2300
v/s Ratio Prot	c0.22		0.24		0.07	c0.41
v/s Ratio Perm		0.04				
v/c Ratio	0.85	0.15	0.53		0.46	0.62
Uniform Delay, d1	31.6	25.5	17.8		34.6	9.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	13.5	0.2	1.3		5.4	1.3
Delay (s)	45.1	25.7	19.2		40.1	10.6
Level of Service	D	C	B		D	B
Approach Delay (s)	37.9		19.2			12.9
Approach LOS	D		B			B

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	233	416	206	189	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3363		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3363		1770	1583
Peak-hour factor, PHF	0.94	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	372	243	452	224	205	216
RTOR Reduction (vph)	0	0	90	0	0	166
Lane Group Flow (vph)	372	243	586	0	205	50
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.2	31.5	13.3		11.8	11.8
Effective Green, g (s)	14.2	31.5	13.3		11.8	11.8
Actuated g/C Ratio	0.28	0.61	0.26		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	490	2173	872		407	364
v/s Ratio Prot	c0.21	0.07	c0.17		c0.12	
v/s Ratio Perm						0.03
v/c Ratio	0.76	0.11	0.67		0.50	0.14
Uniform Delay, d1	17.0	4.1	17.0		17.2	15.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.7	0.0	2.0		1.0	0.2
Delay (s)	23.6	4.1	19.1		18.2	15.9
Level of Service	C	A	B		B	B
Approach Delay (s)		15.9	19.1		17.0	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	51.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	215	282	1398	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4932			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4932			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	729	767	240	0	456	234	307	1520	0
RTOR Reduction (vph)	0	0	0	20	0	0	0	182	0	0	0
Lane Group Flow (vph)	0	0	0	1716	0	0	456	52	307	1520	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.35			0.13		0.17	c0.43	
v/s Ratio Perm								0.03			
v/c Ratio				1.16dl			0.78	0.20	0.47	0.75	
Uniform Delay, d1				34.8			42.4	38.2	25.6	17.1	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				24.4			10.0	1.7	2.4	2.6	
Delay (s)				59.2			52.4	39.9	28.1	19.8	
Level of Service				E			D	D	C	B	
Approach Delay (s)	0.0			59.2			48.2			21.2	
Approach LOS	A			E			D			C	

Intersection Summary			
HCM Average Control Delay	41.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	492	217	198	341	178	23	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3340				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3340				1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	284	535	236	215	363	193	25	375	51	500
RTOR Reduction (vph)	0	0	80	0	3	0	0	0	0	0
Lane Group Flow (vph)	256	705	229	0	578	0	0	0	426	500
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.6	30.6	30.6		34.1				28.8	66.4
Effective Green, g (s)	30.6	30.6	30.6		34.1				28.8	66.4
Actuated g/C Ratio	0.29	0.29	0.29		0.32				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	465	895	416		1074				481	2217
v/s Ratio Prot	0.16	c0.23	0.16		c0.17				c0.24	0.14
v/s Ratio Perm										
v/c Ratio	0.55	0.79	0.55		0.54				0.89	0.23
Uniform Delay, d1	31.9	34.7	31.9		29.5				37.0	8.6
Progression Factor	0.70	0.71	0.57		1.00				1.00	1.00
Incremental Delay, d2	0.8	2.7	0.9		1.9				17.5	0.2
Delay (s)	23.3	27.4	18.9		31.4				54.5	8.9
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.5			31.4					29.9
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2741	126	466	414	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4790				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4790				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2855	137	501	436	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	65	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2855	72	0	937	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2036				
v/s Ratio Prot					c0.56							
v/s Ratio Perm						0.05		0.20				
v/c Ratio					1.18	0.10		0.46				
Uniform Delay, d1					21.0	11.6		16.4				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					86.6	0.3		0.8				
Delay (s)					107.6	11.8		17.2				
Level of Service					F	B		B				
Approach Delay (s)		0.0			103.2			17.2			0.0	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	82.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1358	1734	0	0	0	0	0	1252	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4748						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4748						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1400	1885	0	0	0	0	0	1332	39
RTOR Reduction (vph)	0	0	0	2	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	796	2485	0	0	0	0	0	1368	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2730						1145	
v/s Ratio Prot											c0.39	
v/s Ratio Perm				0.52	0.52							
v/c Ratio				0.91	0.91						1.20	
Uniform Delay, d1				15.2	15.2						27.0	
Progression Factor				1.41	1.40						1.00	
Incremental Delay, d2				1.8	0.6						96.5	
Delay (s)				23.2	21.8						123.5	
Level of Service				C	C						F	
Approach Delay (s)		0.0			22.1			0.0			123.5	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	52.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	238	7	11	520	16	11	7	10	22	17	16
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	253	8	12	565	17	12	8	11	24	18	17

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	98	261	595	30	60
Volume Left (vph)	98	0	12	12	24
Volume Right (vph)	0	8	17	11	17
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.8	5.3	4.7	6.1	6.1
Degree Utilization, x	0.16	0.38	0.78	0.05	0.10
Capacity (veh/h)	602	659	751	529	531
Control Delay (s)	8.7	10.4	22.5	9.5	9.8
Approach Delay (s)	9.9		22.5	9.5	9.8
Approach LOS	A		C	A	A

Intersection Summary			
Delay	17.1		
HCM Level of Service	C		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      4.4       Worst Case Level Of Service: B[ 14.6]
********************************************************************************
Street Name:         Harrison Street         Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0  816     0     0    0   349     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0  816     0     0    0   349     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0  816     0     0    0   349     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:     0    0     0     0  887     0     0    0   379     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0  887     0     0    0   379     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   296  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   748  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   748  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.51  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   2.9  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  14.6 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     B     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx              14.6            xxxxxx
ApproachLOS:         *                *                 B                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	738	349	1319	794	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1738	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1738	3539	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	802	379	1434	863	107
RTOR Reduction (vph)	34	34	0	0	0
Lane Group Flow (vph)	551	562	1434	970	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	463	2153	356	
v/s Ratio Prot			c0.41	c0.61	
v/s Ratio Perm	c0.33	0.32			
v/c Ratio	1.23	1.21	0.67	2.72	
Uniform Delay, d1	22.0	22.0	7.7	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	122.0	115.0	1.6	784.0	
Delay (s)	144.0	137.0	9.4	807.3	
Level of Service	F	F	A	F	
Approach Delay (s)		140.4	331.3		
Approach LOS		F	F		

Intersection Summary			
HCM Average Control Delay	268.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	222	425	103	20	52	16	180	206	10	440	1240	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1522		3433	3488	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1522		3433	3488	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	236	452	110	21	57	17	196	224	11	478	1348	112
RTOR Reduction (vph)	0	0	7	0	0	0	0	187	0	0	7	0
Lane Group Flow (vph)	236	452	124	0	0	74	196	37	0	489	1453	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	18.9	26.1	26.1			7.7	14.9	14.9		14.8	27.2	
Effective Green, g (s)	18.9	26.1	26.1			7.7	14.9	14.9		14.8	27.2	
Actuated g/C Ratio	0.21	0.29	0.29			0.09	0.17	0.17		0.16	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	372	1026	459			151	308	252		565	1054	
v/s Ratio Prot	c0.13	0.13				0.04	c0.11			0.14	c0.42	
v/s Ratio Perm			0.08					0.02				
v/c Ratio	0.63	0.44	0.27			0.49	0.64	0.15		0.87	1.38	
Uniform Delay, d1	32.4	26.0	24.6			39.3	35.0	32.1		36.6	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.3	0.3			2.5	4.3	0.3		13.1	176.4	
Delay (s)	35.9	26.3	24.9			41.8	39.3	32.4		49.7	207.8	
Level of Service	D	C	C			D	D	C		D	F	
Approach Delay (s)		28.9					36.5				168.1	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	102.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	222	515	47	78
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3435		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3435		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	239	554	51	84
RTOR Reduction (vph)	0	12	0	0
Lane Group Flow (vph)	239	677	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	22.4		
Effective Green, g (s)	11.0	22.4		
Actuated g/C Ratio	0.12	0.25		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	855		
v/s Ratio Prot	c0.14	0.20		
v/s Ratio Perm				
v/c Ratio	1.11	0.79		
Uniform Delay, d1	39.5	31.6		
Progression Factor	1.00	1.00		
Incremental Delay, d2	92.7	7.4		
Delay (s)	132.2	39.0		
Level of Service	F	D		
Approach Delay (s)		63.0		
Approach LOS		E		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	252	73	48	438	269	175	681	33	202	631	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1747	3383			3519	1536	1767	3511		1768	3448	
Flt Permitted	0.43	1.00			0.88	1.00	0.27	1.00		0.28	1.00	
Satd. Flow (perm)	783	3383			3097	1536	508	3511		520	3448	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	274	79	52	456	292	190	740	36	220	686	103
RTOR Reduction (vph)	0	31	0	0	0	68	0	4	0	0	14	0
Lane Group Flow (vph)	99	322	0	0	508	224	190	772	0	220	775	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	332	1433			1312	651	227	1570		232	1541	
v/s Ratio Prot		0.10						0.22			0.22	
v/s Ratio Perm	0.13				c0.16	0.15	0.37			c0.42		
v/c Ratio	0.30	0.22			0.39	0.34	0.84	0.49		0.95	0.50	
Uniform Delay, d1	16.2	15.6			16.9	16.5	20.8	16.7		22.6	16.8	
Progression Factor	0.85	0.84			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.3			0.9	1.4	29.1	1.1		47.1	1.2	
Delay (s)	15.6	13.4			17.8	18.0	49.9	17.8		69.6	17.9	
Level of Service	B	B			B	B	D	B		E	B	
Approach Delay (s)		13.9			17.8			24.1			29.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM Average Control Delay	22.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	409	137	64	660	115	210	506	46	133	464	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1554	1769	1863	1552	1763	3484		1763	3258	
Flt Permitted	0.12	1.00	1.00	0.35	1.00	1.00	0.20	1.00		0.35	1.00	
Satd. Flow (perm)	226	1863	1554	648	1863	1552	368	3484		656	3258	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	445	149	70	717	125	228	550	50	145	504	380
RTOR Reduction (vph)	0	0	91	0	0	80	0	8	0	0	161	0
Lane Group Flow (vph)	228	445	58	70	717	45	228	592	0	145	723	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.40	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	298	725	605	329	622	519	143	1353		255	1265	
v/s Ratio Prot	c0.09	0.24		0.01	c0.38			0.17			0.22	
v/s Ratio Perm	0.30		0.04	0.07		0.03	c0.62			0.22		
v/c Ratio	0.77	0.61	0.10	0.21	1.15	0.09	1.59	0.44		0.57	0.57	
Uniform Delay, d1	17.6	20.8	16.5	16.6	28.3	19.4	26.0	19.2		20.4	20.4	
Progression Factor	1.00	1.00	1.00	1.56	1.41	2.62	0.75	0.66		1.00	1.00	
Incremental Delay, d2	10.1	3.9	0.3	0.1	85.0	0.3	295.2	0.1		1.7	0.4	
Delay (s)	27.7	24.7	16.8	26.0	125.0	51.2	314.8	12.8		22.1	20.8	
Level of Service	C	C	B	C	F	D	F	B		C	C	
Approach Delay (s)		24.1			107.3			95.9			21.0	
Approach LOS		C			F			F			C	

Intersection Summary			
HCM Average Control Delay	60.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	246	661	0	0	257	1069	21	876	75	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1609	3384			3539	2787		5013				
Flt Permitted	0.58	0.94			1.00	1.00		1.00				
Satd. Flow (perm)	983	3181			3539	2787		5013				
Peak-hour factor, PHF	0.93	0.92	0.25	0.25	0.92	0.97	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	265	718	0	0	279	1102	23	952	82	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	46	0	24	0	0	0	0
Lane Group Flow (vph)	238	745	0	0	279	1056	0	1033	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	393	1272			1416	1115		2005				
v/s Ratio Prot					0.08							
v/s Ratio Perm	0.24	0.23				c0.38		0.21				
v/c Ratio	0.61	0.59			0.20	0.95		0.52				
Uniform Delay, d1	9.5	9.4			7.8	11.6		9.1				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	6.8	2.0			0.3	17.0		0.9				
Delay (s)	16.3	11.4			8.1	28.5		10.0				
Level of Service	B	B			A	C		B				
Approach Delay (s)		12.6			24.4			10.0			0.0	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	492	38	12	243	0	0	0	0	412	307	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		3539	1552		3531					1605	3325	1558
Flt Permitted		1.00	1.00		0.93					0.95	0.98	1.00
Satd. Flow (perm)		3539	1552		3285					1605	3325	1558
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	518	41	13	264	0	0	0	0	448	334	223
RTOR Reduction (vph)	0	0	27	0	0	0	0	0	0	0	0	108
Lane Group Flow (vph)	0	518	14	0	277	0	0	0	0	255	527	115
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	543		1150					829	1718	805
v/s Ratio Prot		c0.15										
v/s Ratio Perm			0.01		0.08					c0.16	0.16	0.07
v/c Ratio		0.42	0.03		0.24					0.31	0.31	0.14
Uniform Delay, d1		14.8	12.8		13.8					8.3	8.3	7.6
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		1.0	0.1		0.5					1.0	0.5	0.4
Delay (s)		15.9	12.9		14.3					9.3	8.8	7.9
Level of Service		B	B		B					A	A	A
Approach Delay (s)		15.7			14.3			0.0			8.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	274	574	635	493	206	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.98		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3263		3421	1421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3263		3421	1421
Peak-hour factor, PHF	0.92	0.93	0.92	0.97	0.92	0.92
Adj. Flow (vph)	298	617	690	508	224	115
RTOR Reduction (vph)	0	0	125	0	6	90
Lane Group Flow (vph)	298	617	1073	0	230	13
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	18.9	62.2	39.3		9.8	9.8
Effective Green, g (s)	18.9	62.2	39.3		9.8	9.8
Actuated g/C Ratio	0.24	0.78	0.49		0.12	0.12
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	418	2752	1603		419	174
v/s Ratio Prot	c0.17	0.17	c0.33		c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.71	0.22	0.67		0.55	0.07
Uniform Delay, d1	28.1	2.4	15.4		33.0	31.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.7	0.2	2.2		0.8	0.1
Delay (s)	32.8	2.6	17.7		33.8	31.1
Level of Service	C	A	B		C	C
Approach Delay (s)		12.4	17.7		33.0	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	702	32	19	893	141	95	566	33	143	431	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1761	3340		1769	3506		1761	3406	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.37	1.00		0.40	1.00	
Satd. Flow (perm)	308	3427	1532	306	3340		680	3506		750	3406	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	29	763	35	21	971	153	103	615	36	155	454	115
RTOR Reduction (vph)	0	0	25	0	14	0	0	5	0	0	22	0
Lane Group Flow (vph)	29	763	10	21	1110	0	103	646	0	155	547	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		50.3	50.3		40.2	40.2	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		50.3	50.3		40.2	40.2	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.59	0.59		0.47	0.47	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	87	951		474	2075		355	1611	
v/s Ratio Prot		0.22			c0.33		0.01	c0.18			0.16	
v/s Ratio Perm	0.09		0.01	0.07			0.11			c0.21		
v/c Ratio	0.33	0.78	0.02	0.24	1.17		0.22	0.31		0.44	0.34	
Uniform Delay, d1	24.0	28.0	21.9	23.3	30.4		7.9	8.7		14.9	14.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.27	1.29	
Incremental Delay, d2	9.7	6.2	0.1	6.5	86.6		0.1	0.4		3.4	0.5	
Delay (s)	33.7	34.2	22.0	29.8	117.0		8.0	9.1		22.4	18.7	
Level of Service	C	C	C	C	F		A	A		C	B	
Approach Delay (s)		33.7			115.4			8.9			19.5	
Approach LOS		C			F			A			B	

Intersection Summary			
HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	480	42	105	356	35	342	679	173	58	506	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99			0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1764	3379			3351		1765	3539	1551	1752	3415	
Flt Permitted	0.31	1.00			0.62		0.37	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	572	3379			2091		686	3539	1551	640	3415	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	522	46	114	387	38	372	715	188	63	550	117
RTOR Reduction (vph)	0	11	0	0	9	0	0	0	68	0	16	0
Lane Group Flow (vph)	89	557	0	0	530	0	372	715	120	63	651	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	23.1	23.1			23.1		48.9	48.9	48.9	48.9	48.9	
Effective Green, g (s)	23.1	23.1			23.1		48.9	48.9	48.9	48.9	48.9	
Actuated g/C Ratio	0.29	0.29			0.29		0.61	0.61	0.61	0.61	0.61	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	165	976			604		419	2163	948	391	2087	
v/s Ratio Prot		0.16						0.20			0.19	
v/s Ratio Perm	0.16				c0.25		c0.54		0.08	0.10		
v/c Ratio	0.54	0.57			0.88		0.89	0.33	0.13	0.16	0.31	
Uniform Delay, d1	24.0	24.2			27.1		13.2	7.6	6.6	6.7	7.5	
Progression Factor	1.00	1.00			1.06		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	0.5			13.1		23.3	0.4	0.3	0.9	0.4	
Delay (s)	25.7	24.7			41.9		36.5	8.0	6.8	7.6	7.9	
Level of Service	C	C			D		D	A	A	A	A	
Approach Delay (s)		24.9			41.9			16.1			7.8	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	670	220	119	382	2	0	0	0	88	254	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.96		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3121		1770	3424						3380	
Flt Permitted		0.95		0.15	1.00						0.99	
Satd. Flow (perm)		2971		274	3424						3380	
Peak-hour factor, PHF	0.92	0.99	0.92	0.93	0.92	0.92	0.25	0.25	0.25	0.92	0.94	0.92
Adj. Flow (vph)	7	677	239	128	415	2	0	0	0	96	270	82
RTOR Reduction (vph)	0	38	0	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	885	0	128	417	0	0	0	0	0	424	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		31.6		43.0	43.0						29.0	
Effective Green, g (s)		31.6		43.0	43.0						29.0	
Actuated g/C Ratio		0.40		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1174		267	1840						1225	
v/s Ratio Prot				c0.04	0.12							
v/s Ratio Perm		c0.30		0.22							0.13	
v/c Ratio		0.75		0.48	0.23						0.35	
Uniform Delay, d1		20.8		12.1	9.7						18.6	
Progression Factor		1.66		1.00	1.00						1.00	
Incremental Delay, d2		4.4		0.5	0.3						0.8	
Delay (s)		39.0		12.6	10.0						19.4	
Level of Service		D		B	B						B	
Approach Delay (s)		39.0			10.6			0.0			19.4	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	142	637	132	373	846	42	11	1495	1129	2	645	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1483	3433	3539	1460		5083	1466		4987	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.94	
Satd. Flow (perm)	3433	3539	1483	3433	3539	1460		4738	1466		4665	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.93	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	154	692	143	381	910	46	12	1625	1227	2	672	67
RTOR Reduction (vph)	0	0	41	0	0	27	0	0	250	0	12	0
Lane Group Flow (vph)	154	692	102	381	910	19	0	1637	977	0	729	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	8.9	34.6	34.6	14.4	41.1	41.1		36.0	36.0		36.0	
Effective Green, g (s)	8.9	34.6	34.6	14.4	41.1	41.1		36.0	36.0		36.0	
Actuated g/C Ratio	0.09	0.35	0.35	0.14	0.41	0.41		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	306	1224	513	494	1455	600		1706	528		1679	
v/s Ratio Prot	0.04	0.20		c0.11	c0.26							
v/s Ratio Perm			0.07			0.01		0.35	c0.67		0.16	
v/c Ratio	0.50	0.57	0.20	0.77	0.63	0.03		0.96	1.85		0.43	
Uniform Delay, d1	43.4	26.6	23.0	41.2	23.3	17.6		31.3	32.0		24.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.5	1.9	0.9	6.7	2.0	0.1		14.1	389.7		0.8	
Delay (s)	43.9	28.5	23.8	47.9	25.4	17.7		45.4	421.7		25.1	
Level of Service	D	C	C	D	C	B		D	F		C	
Approach Delay (s)		30.2			31.5			206.6			25.1	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM Average Control Delay	115.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	126.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	756	159	103	1542	930	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.99		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.97		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	3358		1763	3725	6261	
Flt Permitted	0.96		0.16	1.00	1.00	
Satd. Flow (perm)	3358		294	3725	6261	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.92
Adj. Flow (vph)	822	173	112	1606	1011	183
RTOR Reduction (vph)	25	0	0	0	36	0
Lane Group Flow (vph)	970	0	112	1606	1158	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	29.3		37.2	30.5	30.5	
Effective Green, g (s)	29.3		37.2	30.5	30.5	
Actuated g/C Ratio	0.37		0.46	0.38	0.38	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1230		260	1420	2387	
v/s Ratio Prot	c0.29		c0.04	c0.43	0.18	
v/s Ratio Perm			0.16			
v/c Ratio	0.79		0.43	1.13	0.49	
Uniform Delay, d1	22.6		12.7	24.8	18.8	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	3.4		1.1	68.4	0.7	
Delay (s)	26.0		13.8	93.1	19.5	
Level of Service	C		B	F	B	
Approach Delay (s)	26.0			88.0	19.5	
Approach LOS	C			F	B	

Intersection Summary			
HCM Average Control Delay	51.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	544	10	28	256	11	335
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	579	11	30	278	12	364
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			590		941	602
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			590		941	602
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		96	26
cM capacity (veh/h)			986		279	492

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	590	309	376
Volume Left	0	30	12
Volume Right	11	0	364
cSH	1700	986	480
Volume to Capacity	0.35	0.03	0.78
Queue Length 95th (ft)	0	2	176
Control Delay (s)	0.0	1.2	34.6
Lane LOS		A	D
Approach Delay (s)	0.0	1.2	34.6
Approach LOS			D

Intersection Summary			
Average Delay	10.5		
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	333	41	66	203	30	221
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	362	45	72	221	33	240
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			407		775	411
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			407		775	411
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		90	62
cM capacity (veh/h)			1152		336	626

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	407	292	273
Volume Left	0	72	33
Volume Right	45	0	240
cSH	1700	1152	567
Volume to Capacity	0.24	0.06	0.48
Queue Length 95th (ft)	0	5	65
Control Delay (s)	0.0	2.5	17.1
Lane LOS		A	C
Approach Delay (s)	0.0	2.5	17.1
Approach LOS			C

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	398	32	34	151	114	207
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.92	0.92	0.94	0.92	0.92
Hourly flow rate (vph)	410	35	37	161	124	225
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.89		0.89	0.89
vC, conflicting volume			445		682	448
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			314		581	317
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		69	64
cM capacity (veh/h)			1109		403	633

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	445	198	62	62	112	112
Volume Left	0	37	62	62	0	0
Volume Right	35	0	0	0	112	112
cSH	1700	1109	403	403	633	633
Volume to Capacity	0.26	0.03	0.15	0.15	0.18	0.18
Queue Length 95th (ft)	0	3	13	13	16	16
Control Delay (s)	0.0	1.8	15.6	15.6	11.9	11.9
Lane LOS		A	C	C	B	B
Approach Delay (s)	0.0	1.8	13.2			
Approach LOS			B			

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	237	103	75	238	0	0	0	0	78	529	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1436		1805						4806	
Flt Permitted		1.00	1.00		0.79						0.99	
Satd. Flow (perm)		1863	1436		1442						4806	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	258	112	82	259	0	0	0	0	85	545	32
RTOR Reduction (vph)	0	0	19	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	258	93	0	341	0	0	0	0	0	658	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		25.0	25.0		25.0						47.0	
Effective Green, g (s)		25.0	25.0		25.0						47.0	
Actuated g/C Ratio		0.31	0.31		0.31						0.59	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		582	449		451						2824	
v/s Ratio Prot		0.14										
v/s Ratio Perm			0.07		c0.24						0.14	
v/c Ratio		0.44	0.21		0.76						0.23	
Uniform Delay, d1		21.9	20.2		24.8						7.9	
Progression Factor		1.00	1.00		1.00						1.24	
Incremental Delay, d2		0.5	0.2		7.1						0.2	
Delay (s)		22.5	20.5		31.8						10.0	
Level of Service		C	C		C						A	
Approach Delay (s)		21.9			31.8			0.0			10.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	121	1	0	134	108	21	380	200	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.81			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1844			1694			3509	1290			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1800			1694			3509	1290			
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	14	132	1	0	146	117	23	409	217	0	0	0
RTOR Reduction (vph)	0	0	0	0	44	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	147	0	0	219	0	0	432	50	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		26.7			26.7			10.3	10.3			
Effective Green, g (s)		26.7			26.7			10.3	10.3			
Actuated g/C Ratio		0.59			0.59			0.23	0.23			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1068			1005			803	295			
v/s Ratio Prot					c0.13							
v/s Ratio Perm		0.08						0.12	0.04			
v/c Ratio		0.14			0.22			0.54	0.17			
Uniform Delay, d1		4.1			4.3			15.3	13.9			
Progression Factor		0.40			1.00			1.00	1.00			
Incremental Delay, d2		0.3			0.5			0.3	0.1			
Delay (s)		1.9			4.8			15.6	14.0			
Level of Service		A			A			B	B			
Approach Delay (s)		1.9			4.8			15.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	50	22	78	0	82	0	571	45	44	478	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.95			0.93			0.99			1.00	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1748	1761			1655			3478			3516	
Flt Permitted	0.70	1.00			0.84			1.00			0.85	
Satd. Flow (perm)	1295	1761			1431			3478			3009	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.99	0.92
Adj. Flow (vph)	15	54	24	85	0	89	0	621	49	48	483	0
RTOR Reduction (vph)	0	14	0	0	51	0	0	13	0	0	0	0
Lane Group Flow (vph)	15	64	0	0	123	0	0	657	0	0	531	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	547	744			604			1314			1137	
v/s Ratio Prot		0.04						c0.19				
v/s Ratio Perm	0.01				c0.09						0.18	
v/c Ratio	0.03	0.09			0.20			0.50			0.47	
Uniform Delay, d1	7.6	7.8			8.2			10.7			10.6	
Progression Factor	1.00	1.00			1.03			1.00			1.00	
Incremental Delay, d2	0.1	0.2			0.7			1.4			1.4	
Delay (s)	7.7	8.0			9.2			12.1			12.0	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.0			9.2			12.1			12.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	169	30	12	218	227	26	657	31	41	180	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.93			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3420			3210			3502		1767	3370	
Flt Permitted		0.78			0.94			0.94		0.28	1.00	
Satd. Flow (perm)		2702			3029			3293		519	3370	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	32	184	33	13	237	247	28	714	34	42	196	70
RTOR Reduction (vph)	0	25	0	0	200	0	0	4	0	0	24	0
Lane Group Flow (vph)	0	224	0	0	297	0	0	772	0	42	242	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.4			11.4			32.4		39.6	39.6	
Effective Green, g (s)		11.4			11.4			32.4		39.6	39.6	
Actuated g/C Ratio		0.19			0.19			0.54		0.66	0.66	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		513			576			1778		399	2224	
v/s Ratio Prot										0.00	c0.07	
v/s Ratio Perm		0.08			c0.10			c0.23		0.06		
v/c Ratio		0.44			0.52			0.43		0.11	0.11	
Uniform Delay, d1		21.5			21.8			8.3		4.1	3.7	
Progression Factor		1.00			0.61			1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.6			0.8		0.1	0.1	
Delay (s)		22.1			13.9			9.1		4.3	3.8	
Level of Service		C			B			A		A	A	
Approach Delay (s)		22.1			13.9			9.1			3.9	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	162	95	61	294	124	109	804	117	45	568	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.97			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3228			3236			3410			4989	
Flt Permitted		0.90			0.87			0.72			0.80	
Satd. Flow (perm)		2914			2843			2474			4026	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	25	176	103	66	320	135	118	874	123	49	617	42
RTOR Reduction (vph)	0	65	0	0	46	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	239	0	0	475	0	0	1099	0	0	696	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1068			1042			1305			1208	
v/s Ratio Prot								c0.10				
v/s Ratio Perm		0.08			c0.17			c0.31			0.17	
v/c Ratio		0.22			0.46			0.84			0.58	
Uniform Delay, d1		13.1			14.4			13.5			17.8	
Progression Factor		2.11			1.00			1.00			1.00	
Incremental Delay, d2		0.5			1.4			6.7			2.0	
Delay (s)		28.1			15.9			20.2			19.8	
Level of Service		C			B			C			B	
Approach Delay (s)		28.1			15.9			20.2			19.8	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	346	0	0	453	129	80	417	298	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3513			3368	1319		4993	1458			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3097			3368	1319		4993	1458			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	41	376	0	0	492	137	87	453	320	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	36	0	0	212	0	0	0
Lane Group Flow (vph)	0	417	0	0	505	87	0	540	108	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		56.9			56.9	56.9		16.1	16.1			
Effective Green, g (s)		56.9			56.9	56.9		16.1	16.1			
Actuated g/C Ratio		0.71			0.71	0.71		0.20	0.20			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2203			2395	938		1005	293			
v/s Ratio Prot					c0.15							
v/s Ratio Perm		0.13				0.07		0.11	0.07			
v/c Ratio		0.19			0.21	0.09		0.54	0.37			
Uniform Delay, d1		3.9			3.9	3.6		28.6	27.6			
Progression Factor		1.00			0.71	0.27		1.00	1.00			
Incremental Delay, d2		0.2			0.2	0.2		0.6	0.8			
Delay (s)		4.0			3.0	1.2		29.2	28.3			
Level of Service		A			A	A		C	C			
Approach Delay (s)		4.0			2.6			28.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	450	192	157	462	0	0	0	0	82	531	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.97	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3378						4528	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1439	1610	3193						4528	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	489	209	171	502	0	0	0	0	89	577	129
RTOR Reduction (vph)	0	0	38	0	0	0	0	0	0	0	36	0
Lane Group Flow (vph)	0	489	171	154	519	0	0	0	0	0	759	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1699						1698	
v/s Ratio Prot		c0.14		c0.10	0.04							
v/s Ratio Perm			0.12		0.12						0.17	
v/c Ratio		0.39	0.34	0.77	0.31						0.45	
Uniform Delay, d1		19.6	19.2	33.9	10.7						18.8	
Progression Factor		1.10	1.13	1.00	1.00						1.42	
Incremental Delay, d2		0.9	1.8	14.4	0.0						0.1	
Delay (s)		22.5	23.4	48.3	10.8						26.7	
Level of Service		C	C	D	B						C	
Approach Delay (s)		22.8			19.4			0.0			26.7	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	14	416	103	97	31	829	190	272	51	0	160	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	0.48	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.97				1.00	0.94	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	841	4900				3516	3186	1441	1583		1583	1554
Flt Permitted	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	841	4900				3516	3186	1441	1583		1583	1554
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	15	452	112	105	34	901	207	296	55	0	168	115
RTOR Reduction (vph)	0	68	0	0	0	0	0	0	32	0	0	87
Lane Group Flow (vph)	15	496	0	0	0	1040	346	157	23	0	168	28
Confl. Peds. (#/hr)	22								74			
Confl. Bikes (#/hr)						7			8			7
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	0.8	12.8				16.0	17.2	29.2	29.2		8.0	17.2
Effective Green, g (s)	0.8	12.8				16.0	17.2	29.2	29.2		8.0	17.2
Actuated g/C Ratio	0.01	0.18				0.23	0.25	0.42	0.42		0.11	0.25
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	10	896				804	783	601	660		181	382
v/s Ratio Prot	0.02	c0.10				c0.30	c0.11	0.11	0.01			
v/s Ratio Perm											c0.11	0.02
v/c Ratio	1.50	0.55				1.29	0.44	0.26	0.03		0.93	0.07
Uniform Delay, d1	34.6	26.0				27.0	22.3	13.3	12.1		30.7	20.3
Progression Factor	1.00	1.00				1.00	1.41	1.63	2.66		1.00	1.00
Incremental Delay, d2	478.8	2.5				141.3	0.1	1.0	0.1		45.6	0.0
Delay (s)	513.4	28.5				168.3	31.7	22.9	32.2		76.3	20.3
Level of Service	F	C				F	C	C	C		E	C
Approach Delay (s)		41.0				168.3	29.3			53.6		
Approach LOS		D				F	C			D		

Intersection Summary			
HCM Average Control Delay	93.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1099	71	830	332	153	845
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5038		3433	5085	3174	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5038		3433	5085	3174	1441
Peak-hour factor, PHF	0.95	0.92	0.99	0.92	0.92	0.93
Adj. Flow (vph)	1157	77	838	361	166	909
RTOR Reduction (vph)	10	0	0	0	319	318
Lane Group Flow (vph)	1224	0	838	361	303	136
Confl. Bikes (#/hr)				16		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	18.0		19.0	41.0	21.0	21.0
Effective Green, g (s)	18.0		19.0	41.0	21.0	21.0
Actuated g/C Ratio	0.26		0.27	0.59	0.30	0.30
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1295		932	2978	952	432
v/s Ratio Prot	c0.24		c0.24	0.07	c0.10	
v/s Ratio Perm						0.09
v/c Ratio	0.94		0.90	0.12	0.32	0.32
Uniform Delay, d1	25.5		24.6	6.5	19.0	18.9
Progression Factor	1.05		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0		13.3	0.1	0.9	1.9
Delay (s)	28.7		37.9	6.5	19.8	20.8
Level of Service	C		D	A	B	C
Approach Delay (s)	28.7			28.5	20.3	
Approach LOS	C			C	C	

Intersection Summary			
HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	150	168	0	0	0	0	0	1270	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6292	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6292	
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	0	0	163	183	0	0	0	0	0	1309	160
RTOR Reduction (vph)	0	0	0	3	0	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	0	0	160	183	0	0	0	0	0	1450	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				23.6	23.6						42.4	
Effective Green, g (s)				23.6	23.6						42.4	
Actuated g/C Ratio				0.31	0.31						0.57	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				556	1114						3557	
v/s Ratio Prot					0.05						c0.23	
v/s Ratio Perm				c0.09								
v/c Ratio				0.29	0.16						0.41	
Uniform Delay, d1				19.4	18.6						9.2	
Progression Factor				1.00	1.00						0.73	
Incremental Delay, d2				1.3	0.3						0.1	
Delay (s)				20.7	18.9						6.8	
Level of Service				C	B						A	
Approach Delay (s)		0.0			19.7			0.0			6.8	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	397	1220	78	346	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5027		3404	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5027		3404	
Peak-hour factor, PHF	0.92	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	217	427	1312	85	376	45
RTOR Reduction (vph)	2	0	9	0	0	0
Lane Group Flow (vph)	215	427	1388	0	421	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	15.9	15.9	26.0		21.1	
Effective Green, g (s)	15.9	15.9	26.0		21.1	
Actuated g/C Ratio	0.21	0.21	0.35		0.28	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	375	1078	1743		958	
v/s Ratio Prot		0.08	c0.28		c0.12	
v/s Ratio Perm	c0.12					
v/c Ratio	0.57	0.40	0.80		0.44	
Uniform Delay, d1	26.5	25.4	22.1		22.1	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	6.2	1.1	2.6		0.3	
Delay (s)	32.7	26.5	24.7		22.4	
Level of Service	C	C	C		C	
Approach Delay (s)		28.6	24.7		22.4	
Approach LOS		C	C		C	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	274	878	1024	528	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3046	1417	1403	5828				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3046	1417	1403	5828				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	298	954	1113	568	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	62	62	337	271	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	713	415	219	854	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					42.6	42.6	22.4	22.4				
Effective Green, g (s)					42.6	42.6	22.4	22.4				
Actuated g/C Ratio					0.57	0.57	0.30	0.30				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1730	805	419	1741				
v/s Ratio Prot					0.23							
v/s Ratio Perm						c0.29	c0.16	0.15				
v/c Ratio					0.41	0.52	0.52	0.49				
Uniform Delay, d1					9.1	9.9	21.9	21.6				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					0.7	2.4	1.2	0.2				
Delay (s)					9.9	12.3	23.0	21.8				
Level of Service					A	B	C	C				
Approach Delay (s)		0.0			10.8			22.2			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	251	72	0	0	0	0	0	0	561	908	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3407								1522	4729	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3407								1522	4729	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	273	78	0	0	0	0	0	0	610	987	60
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	231	42	0
Lane Group Flow (vph)	0	325	0	0	0	0	0	0	0	172	1212	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1590								649	2018	
v/s Ratio Prot		c0.10										
v/s Ratio Perm										0.11	0.26	
v/c Ratio		0.20								0.26	0.60	
Uniform Delay, d1		11.8								13.9	16.6	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.3								1.0	1.3	
Delay (s)		12.1								14.9	17.9	
Level of Service		B								B	B	
Approach Delay (s)		12.1			0.0			0.0			17.2	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	918	0	0	425	261	205	637	42	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3524			3539	1461		3472	1520			
Flt Permitted		0.89			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3130			3539	1461		3472	1520			
Peak-hour factor, PHF	0.92	0.92	0.25	0.99	0.96	0.96	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	68	998	0	0	443	272	223	692	46	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	117	0	0	4	0	0	0
Lane Group Flow (vph)	0	1066	0	0	443	155	0	915	42	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		939			1062	438		1852	811			
v/s Ratio Prot					0.13							
v/s Ratio Perm		c0.34				0.11		0.26	0.03			
v/c Ratio		1.14			0.42	0.35		0.49	0.05			
Uniform Delay, d1		21.0			16.8	16.4		8.9	6.7			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		74.1			1.2	2.2		0.9	0.1			
Delay (s)		95.1			18.0	18.7		9.8	6.8			
Level of Service		F			B	B		A	A			
Approach Delay (s)		95.1			18.3			9.7			0.0	
Approach LOS		F			B			A			A	

Intersection Summary			
HCM Average Control Delay	45.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	644	73	26	560	0	0	0	0	344	683	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	1.00	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3464			3531					1734	3521	
Flt Permitted		1.00			0.91					0.95	1.00	
Satd. Flow (perm)		3464			3232					1734	3521	
Peak-hour factor, PHF	0.25	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.94	0.96	0.92
Adj. Flow (vph)	0	700	79	28	609	0	0	0	0	366	711	21
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	760	0	0	637	0	0	0	0	366	727	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1463			1365					732	1487	
v/s Ratio Prot		c0.22									0.21	
v/s Ratio Perm					0.20					c0.21		
v/c Ratio		0.52			0.47					0.50	0.49	
Uniform Delay, d1		9.6			9.4					9.5	9.5	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.3			1.1					2.4	1.2	
Delay (s)		10.9			10.5					12.0	10.6	
Level of Service		B			B					B	B	
Approach Delay (s)		10.9			10.5			0.0			11.1	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	73	430	8	19	401	44	69	449	25	114	196	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3484			3457			3475			3369	
Flt Permitted		0.84			0.93			0.86			0.65	
Satd. Flow (perm)		2949			3221			3001			2223	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92
Adj. Flow (vph)	79	467	9	21	436	48	75	488	27	124	202	54
RTOR Reduction (vph)	0	2	0	0	15	0	0	9	0	0	33	0
Lane Group Flow (vph)	0	553	0	0	490	0	0	581	0	0	347	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		22.8			22.8			14.7			14.7	
Effective Green, g (s)		22.8			22.8			14.7			14.7	
Actuated g/C Ratio		0.51			0.51			0.33			0.33	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1494			1632			980			726	
v/s Ratio Prot												
v/s Ratio Perm		c0.19			0.15			c0.19			0.16	
v/c Ratio		0.37			0.30			0.59			0.48	
Uniform Delay, d1		6.7			6.5			12.7			12.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.5			1.0			0.5	
Delay (s)		7.4			6.9			13.6			12.6	
Level of Service		A			A			B			B	
Approach Delay (s)		7.4			6.9			13.6			12.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	249	941	0	0	0	0	0	780	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6270						5030	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6270						5030	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	271	970	0	0	0	0	0	848	50
RTOR Reduction (vph)	0	0	0	0	40	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	0	1201	0	0	0	0	0	887	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2717						2222	
v/s Ratio Prot											c0.18	
v/s Ratio Perm					0.19							
v/c Ratio					0.44						0.40	
Uniform Delay, d1					11.9						11.4	
Progression Factor					0.46						1.00	
Incremental Delay, d2					0.5						0.5	
Delay (s)					5.9						11.9	
Level of Service					A						B	
Approach Delay (s)		0.0			5.9			0.0			11.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1015	60	178	989	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6330			6239				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6330			6239				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1068	65	193	1030	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	28	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1129	0	0	1195	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3154			2142				
v/s Ratio Prot					c0.18							
v/s Ratio Perm								0.19				
v/c Ratio					0.36			0.56				
Uniform Delay, d1					9.2			16.0				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.3			1.1				
Delay (s)					9.5			17.1				
Level of Service					A			B				
Approach Delay (s)		0.0			9.5			17.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	68	0	0	1084	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	74	0	0	1178	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	301	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	301	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	100	100			
cM capacity (veh/h)	663	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	74	295	295	295	295
Volume Left	74	0	0	0	0
Volume Right	0	0	0	0	0
cSH	663	1700	1700	1700	1700
Volume to Capacity	0.11	0.17	0.17	0.17	0.17
Queue Length 95th (ft)	9	0	0	0	0
Control Delay (s)	11.1	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.1	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	910	194	0	0	0	0	0	0	51	956	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.97									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6193									5068	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6193									5068	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	948	211	0	0	0	0	0	0	55	1028	0
RTOR Reduction (vph)	0	25	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1134	0	0	0	0	0	0	0	0	1073	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2374									2196	
v/s Ratio Prot		c0.18										
v/s Ratio Perm											0.21	
v/c Ratio		0.48									0.49	
Uniform Delay, d1		14.0									12.2	
Progression Factor		0.83									0.56	
Incremental Delay, d2		0.7									0.7	
Delay (s)		12.2									7.6	
Level of Service		B									A	
Approach Delay (s)		12.2			0.0			0.0			7.6	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	724	0	0	0	0	0	335	134	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6384						6045				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6384						6045				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	34	787	0	0	0	0	0	364	138	0	0	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	808	0	0	0	0	0	482	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		13.4						39.6				
Effective Green, g (s)		13.4						39.6				
Actuated g/C Ratio		0.22						0.66				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1426						3990				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.13										
v/c Ratio		0.57						0.12				
Uniform Delay, d1		20.7						3.8				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.3						0.1				
Delay (s)		21.0						3.8				
Level of Service		C						A				
Approach Delay (s)		21.0			0.0			3.8			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	1117	0	0	0	0	0	947	394	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6347						4832				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6347						4832				
Peak-hour factor, PHF	0.92	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	193	1140	0	0	0	0	0	1007	410	0	0	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	1313	0	0	0	0	0	1406	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2539						1933				
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.21										
v/c Ratio		0.52						0.73				
Uniform Delay, d1		10.2						11.4				
Progression Factor		0.98						1.56				
Incremental Delay, d2		0.6						1.9				
Delay (s)		10.6						19.7				
Level of Service		B						B				
Approach Delay (s)		10.6			0.0			19.7			0.0	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	976	289	0	0	0	0	0	0	472	1514	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6152									5014	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6152									5014	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.95	0.25
Adj. Flow (vph)	0	986	314	0	0	0	0	0	0	513	1594	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	1296	0	0	0	0	0	0	0	0	2086	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2461									2228	
v/s Ratio Prot		c0.21										
v/s Ratio Perm											0.42	
v/c Ratio		0.53									0.94	
Uniform Delay, d1		10.3									11.9	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.8									9.0	
Delay (s)		11.1									20.9	
Level of Service		B									C	
Approach Delay (s)		11.1			0.0			0.0			20.9	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	7	369	56	351	352	0	0	216	1648
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1817			1863	1559
Flt Permitted				0.95	1.00	1.00		0.72			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1350			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	8	401	61	382	383	0	0	235	1682
RTOR Reduction (vph)	0	0	0	0	0	46	0	0	0	0	0	41
Lane Group Flow (vph)	0	0	0	8	401	15	0	765	0	0	235	1641
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.4	14.4	14.4		34.6			34.6	34.6
Effective Green, g (s)				14.4	14.4	14.4		34.6			34.6	34.6
Actuated g/C Ratio				0.24	0.24	0.24		0.58			0.58	0.58
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				414	447	353		779			1074	899
v/s Ratio Prot					c0.22						0.13	
v/s Ratio Perm				0.00		0.01		0.57				c1.05
v/c Ratio				0.02	0.90	0.04		0.98			0.22	1.83
Uniform Delay, d1				17.4	22.1	17.5		12.4			6.2	12.7
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	20.2	0.0		28.2			0.5	375.8
Delay (s)				17.4	42.2	17.6		40.6			6.6	388.5
Level of Service				B	D	B		D			A	F
Approach Delay (s)		0.0			38.6			40.6			341.6	
Approach LOS		A			D			D			F	

Intersection Summary			
HCM Average Control Delay	223.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	173.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	184	627	66	56	735
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.89	0.85
Flt Protected			0.99		0.99	1.00
Satd. Flow (prot)			3500		3169	1441
Flt Permitted			0.99		0.99	1.00
Satd. Flow (perm)			3500		3169	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94
Adj. Flow (vph)	0	200	682	72	61	782
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	882	0	524	391
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1268		1141	519
v/s Ratio Prot						
v/s Ratio Perm			0.25		0.17	c0.27
v/c Ratio			0.70		0.46	0.75
Uniform Delay, d1			12.2		11.0	12.6
Progression Factor			0.75		1.00	1.00
Incremental Delay, d2			0.3		1.3	9.7
Delay (s)			9.5		12.4	22.4
Level of Service			A		B	C
Approach Delay (s)			9.5		16.7	
Approach LOS			A		B	

Intersection Summary			
HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	291	617	83	0	0	0	0	534	74	1	69	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.98			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4925						1832			1862	
Flt Permitted		0.99						1.00			0.84	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.92	0.93	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.25
Adj. Flow (vph)	316	663	90	0	0	0	0	580	80	1	75	0
RTOR Reduction (vph)	0	24	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	1045	0	0	0	0	0	649	0	0	76	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						631			448	
v/s Ratio Prot								c0.35				
v/s Ratio Perm		c1.05									0.06	
v/c Ratio		2.09						1.03			0.17	
Uniform Delay, d1		11.2						14.8			10.3	
Progression Factor		1.00						1.00			0.08	
Incremental Delay, d2		497.3						43.3			0.8	
Delay (s)		508.6						58.0			1.5	
Level of Service		F						E			A	
Approach Delay (s)		508.6			0.0			58.0			1.5	
Approach LOS		F			A			E			A	

Intersection Summary			
HCM Average Control Delay	322.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.66		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1237	903	149	870
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3312		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3312		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	209	185	1316	982	162	946
RTOR Reduction (vph)	0	152	139	0	0	0
Lane Group Flow (vph)	209	33	2159	0	162	946
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0	39.9		22.1	66.0
Effective Green, g (s)	16.0	16.0	39.9		22.1	66.0
Actuated g/C Ratio	0.18	0.18	0.44		0.25	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	315	281	1468		435	2595
v/s Ratio Prot	c0.12		c0.65		0.09	c0.27
v/s Ratio Perm		0.02				
v/c Ratio	0.66	0.12	1.47		0.37	0.36
Uniform Delay, d1	34.5	31.1	25.0		28.2	4.4
Progression Factor	1.00	1.00	1.00		0.66	0.45
Incremental Delay, d2	5.2	0.2	215.7		1.8	0.3
Delay (s)	39.7	31.3	240.8		20.6	2.3
Level of Service	D	C	F		C	A
Approach Delay (s)	35.7		240.8			4.9
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	150.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	254	299	247	109	532	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3377		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3377		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	325	268	118	578	486
RTOR Reduction (vph)	0	0	82	0	0	296
Lane Group Flow (vph)	276	325	304	0	578	190
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.6	27.2	10.6		22.6	22.6
Effective Green, g (s)	12.6	27.2	10.6		22.6	22.6
Actuated g/C Ratio	0.22	0.47	0.18		0.39	0.39
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	386	1665	619		692	619
v/s Ratio Prot	c0.16	0.09	c0.09		c0.33	
v/s Ratio Perm						0.12
v/c Ratio	0.72	0.20	0.49		0.84	0.31
Uniform Delay, d1	20.9	8.9	21.2		15.9	12.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.2	0.1	0.6		8.6	0.3
Delay (s)	27.1	9.0	21.8		24.5	12.5
Level of Service	C	A	C		C	B
Approach Delay (s)		17.3	21.8		19.0	
Approach LOS		B	C		B	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	741	490	1085	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4962			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4962			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	329	1480	154	0	614	805	533	1179	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	52	0	0	0
Lane Group Flow (vph)	0	0	0	1952	0	0	614	753	533	1179	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	308	580	2005	
v/s Ratio Prot				c0.39			0.17		c0.30	0.33	
v/s Ratio Perm								c0.48			
v/c Ratio				1.18			0.89	2.45	0.92	0.59	
Uniform Delay, d1				30.0			35.3	36.2	29.1	12.7	
Progression Factor				1.00			1.48	1.55	1.00	1.00	
Incremental Delay, d2				87.6			1.9	651.7	19.6	0.4	
Delay (s)				117.6			54.0	707.9	48.7	13.1	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			117.6			424.9			24.2	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	171.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1236	609	169	346	550	143	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3143	1441		3185				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3143	1441		3185				1770	3539
Peak-hour factor, PHF	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	1315	662	184	376	598	155	358	26	264
RTOR Reduction (vph)	0	0	15	0	14	0	0	0	0	0
Lane Group Flow (vph)	405	1539	652	0	1115	0	0	0	384	264
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	978	448		1309				236	2084
v/s Ratio Prot	0.25	c0.49	0.45		c0.35				c0.22	0.07
v/s Ratio Perm										
v/c Ratio	0.81	1.57	1.46		1.11dr				1.63	0.13
Uniform Delay, d1	28.5	31.0	31.0		24.0				39.0	8.2
Progression Factor	0.65	0.67	0.65		1.00				1.00	1.00
Incremental Delay, d2	1.3	258.6	205.9		7.1				300.8	0.1
Delay (s)	20.0	279.3	226.1		31.1				339.8	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		225.5			31.1					204.7
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	172.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1677	234	329	1088	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4863				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4863				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1747	254	336	1157	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	8	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1747	247	0	1487	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1783				
v/s Ratio Prot					c0.34							
v/s Ratio Perm						0.16		0.31				
v/c Ratio					0.69	0.31		0.83				
Uniform Delay, d1					11.4	8.9		17.3				
Progression Factor					1.00	1.00		1.19				
Incremental Delay, d2					1.5	1.0		2.4				
Delay (s)					13.0	9.9		23.0				
Level of Service					B	A		C				
Approach Delay (s)		0.0			12.6			23.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	673	1371	0	0	0	0	0	722	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4775						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4775						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	732	1413	0	0	0	0	0	785	71
RTOR Reduction (vph)	0	0	0	37	30	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	483	1595	0	0	0	0	0	845	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2308						1340	
v/s Ratio Prot											c0.24	
v/s Ratio Perm				0.32	0.33							
v/c Ratio				0.66	0.69						0.63	
Uniform Delay, d1				11.7	12.0						15.0	
Progression Factor				1.43	1.38						1.00	
Incremental Delay, d2				3.3	1.2						2.3	
Delay (s)				20.0	17.8						17.3	
Level of Service				C	B						B	
Approach Delay (s)		0.0			18.4			0.0			17.3	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	567	11	18	249	20	16	24	30	68	50	45
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	250	603	12	20	271	22	17	26	33	74	54	49

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	250	615	312	76	177
Volume Left (vph)	250	0	20	17	74
Volume Right (vph)	0	12	22	33	49
Hadj (s)	0.53	0.02	0.00	-0.18	-0.05
Departure Headway (s)	6.4	5.9	5.9	6.9	6.7
Degree Utilization, x	0.44	1.00	0.52	0.15	0.33
Capacity (veh/h)	553	615	597	487	517
Control Delay (s)	13.2	59.3	15.1	11.1	12.9
Approach Delay (s)	46.0		15.1	11.1	12.9
Approach LOS	E		C	B	B

Intersection Summary			
Delay	33.3		
HCM Level of Service	D		
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):     21.6       Worst Case Level Of Service: F[ 68.7]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     0 1253     0     0    0   581     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0     0 1253     0     0    0   581     0    0     0
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0    0     0     0 1253     0     0    0   581     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:      0    0     0     0 1362     0     0    0   625     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     0 1362     0     0    0   625     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   454  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   610  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   610  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  1.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  16.2  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  68.7 xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     F     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             68.7             xxxxxx
ApproachLOS:          *                *                F                  *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	553	195	1186	498	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1730	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1730	3539	1583	
Peak-hour factor, PHF	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	570	212	1289	541	36
RTOR Reduction (vph)	49	49	0	0	0
Lane Group Flow (vph)	339	345	1289	577	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	14.4	14.4	38.1	15.1	
Effective Green, g (s)	14.4	14.4	38.1	15.1	
Actuated g/C Ratio	0.24	0.24	0.64	0.25	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	403	415	2247	398	
v/s Ratio Prot			c0.36	c0.36	
v/s Ratio Perm	c0.20	0.20			
v/c Ratio	0.84	0.83	0.57	1.45	
Uniform Delay, d1	21.7	21.7	6.3	22.4	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.1	12.8	1.1	216.0	
Delay (s)	35.9	34.4	7.4	238.5	
Level of Service	D	C	A	F	
Approach Delay (s)		35.1	78.8		
Approach LOS		D	E		

Intersection Summary			
HCM Average Control Delay	65.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	81	141	132	36	84	31	200	177	16	487	620	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.95			1.00	1.00	0.92		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1497			1770	1863	1462		3433	3497	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1497			1770	1863	1462		3433	3497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	153	143	39	91	34	217	186	17	529	674	51
RTOR Reduction (vph)	0	0	12	0	0	0	0	149	0	0	6	0
Lane Group Flow (vph)	88	153	170	0	0	125	217	37	0	546	719	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	8.6	16.5	16.5			10.0	17.9	17.9		18.1	34.6	
Effective Green, g (s)	8.6	16.5	16.5			10.0	17.9	17.9		18.1	34.6	
Actuated g/C Ratio	0.10	0.18	0.18			0.11	0.20	0.20		0.20	0.38	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	169	649	274			197	371	291		690	1344	
v/s Ratio Prot	0.05	0.04				0.07	c0.12			c0.16	0.21	
v/s Ratio Perm			c0.11					0.03				
v/c Ratio	0.52	0.24	0.62			0.63	0.58	0.13		0.79	0.54	
Uniform Delay, d1	38.7	31.4	33.9			38.3	32.7	29.6		34.2	21.5	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.2	4.1			6.5	2.3	0.2		6.2	1.5	
Delay (s)	41.6	31.6	38.0			44.8	35.0	29.8		40.3	23.0	
Level of Service	D	C	D			D	D	C		D	C	
Approach Delay (s)		36.4					35.5				30.4	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	97.0	HCM Level of Service	F
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	163	1145	155	108
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3440		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3440		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	1245	168	117
RTOR Reduction (vph)	0	6	0	0
Lane Group Flow (vph)	177	1524	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	12.9	29.4		
Effective Green, g (s)	12.9	29.4		
Actuated g/C Ratio	0.14	0.33		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	254	1124		
v/s Ratio Prot	0.10	c0.44		
v/s Ratio Perm				
v/c Ratio	0.70	1.36		
Uniform Delay, d1	36.7	30.3		
Progression Factor	1.00	1.00		
Incremental Delay, d2	8.1	166.0		
Delay (s)	44.7	196.3		
Level of Service	D	F		
Approach Delay (s)		180.6		
Approach LOS		F		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	184	89	38	321	332	56	527	42	109	590	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1748	3319			3516	1543	1761	3484		1766	3493	
Flt Permitted	0.52	1.00			0.89	1.00	0.32	1.00		0.38	1.00	
Satd. Flow (perm)	953	3319			3140	1543	596	3484		709	3493	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.95	0.92	0.92	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	198	97	41	338	361	61	543	46	118	641	53
RTOR Reduction (vph)	0	56	0	0	0	119	0	7	0	0	7	0
Lane Group Flow (vph)	71	239	0	0	379	242	61	582	0	118	687	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	404	1406			1330	654	266	1558		317	1562	
v/s Ratio Prot		0.07						0.17			c0.20	
v/s Ratio Perm	0.07				0.12	c0.16	0.10			0.17		
v/c Ratio	0.18	0.17			0.28	0.37	0.23	0.37		0.37	0.44	
Uniform Delay, d1	15.3	15.2			16.1	16.8	14.5	15.6		15.6	16.2	
Progression Factor	1.29	1.28			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.2			0.5	1.6	2.0	0.7		3.3	0.9	
Delay (s)	20.5	19.7			16.6	18.4	16.5	16.3		18.9	17.1	
Level of Service	C	B			B	B	B	B		B	B	
Approach Delay (s)		19.8			17.5			16.3			17.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	406	153	50	280	122	94	415	26	53	377	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1561	1765	1863	1546	1762	3498		1765	3363	
Flt Permitted	0.42	1.00	1.00	0.51	1.00	1.00	0.26	1.00		0.35	1.00	
Satd. Flow (perm)	788	1863	1561	942	1863	1546	476	3498		647	3363	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	428	441	166	54	304	133	98	451	28	58	410	167
RTOR Reduction (vph)	0	0	71	0	0	76	0	7	0	0	65	0
Lane Group Flow (vph)	428	441	95	54	304	57	98	472	0	58	512	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	56.8	48.6	48.6	40.3	36.6	36.6	19.2	19.2		19.2	19.2	
Effective Green, g (s)	56.8	48.6	48.6	40.3	36.6	36.6	19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.67	0.57	0.57	0.47	0.43	0.43	0.23	0.23		0.23	0.23	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	708	1065	893	482	802	666	108	790		146	760	
v/s Ratio Prot	c0.11	0.24		0.00	0.16			0.13			0.15	
v/s Ratio Perm	c0.29		0.06	0.05		0.04	c0.21			0.09		
v/c Ratio	0.60	0.41	0.11	0.11	0.38	0.09	0.91	0.60		0.40	0.67	
Uniform Delay, d1	7.3	10.2	8.3	12.1	16.5	14.3	32.0	29.4		28.0	30.0	
Progression Factor	1.00	1.00	1.00	0.65	0.65	0.27	0.92	0.90		1.00	1.00	
Incremental Delay, d2	1.0	1.2	0.2	0.0	1.3	0.2	54.4	0.8		0.6	1.9	
Delay (s)	8.3	11.4	8.5	7.9	12.1	4.1	83.9	27.3		28.6	31.9	
Level of Service	A	B	A	A	B	A	F	C		C	C	
Approach Delay (s)		9.7			9.5			36.9			31.6	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	177	943	0	0	171	328	5	298	29	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1608	3387			3539	2787		5006				
Flt Permitted	0.63	0.95			1.00	1.00		1.00				
Satd. Flow (perm)	1074	3217			3539	2787		5006				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	192	1025	0	0	186	357	5	324	32	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	214	0	19	0	0	0	0
Lane Group Flow (vph)	173	1044	0	0	186	143	0	342	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	430	1287			1416	1115		2002				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.16	c0.32				0.05		0.07				
v/c Ratio	0.40	0.81			0.13	0.13		0.17				
Uniform Delay, d1	8.6	10.7			7.6	7.6		7.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.8	5.6			0.2	0.2		0.2				
Delay (s)	11.4	16.3			7.8	7.8		7.9				
Level of Service	B	B			A	A		A				
Approach Delay (s)		15.6			7.8			7.9			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	321	31	12	181	0	0	0	0	786	1141	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1558		3527					1610	3369	1583
Flt Permitted		1.00	1.00		0.93					0.95	0.99	1.00
Satd. Flow (perm)		3539	1558		3290					1610	3369	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	0	349	34	13	197	0	0	0	0	854	1227	440
RTOR Reduction (vph)	0	0	22	0	0	0	0	0	0	0	0	213
Lane Group Flow (vph)	0	349	12	0	210	0	0	0	0	675	1406	227
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	545		1152					832	1741	818
v/s Ratio Prot		c0.10										
v/s Ratio Perm			0.01		0.06					c0.42	0.42	0.14
v/c Ratio		0.28	0.02		0.18					0.81	0.81	0.28
Uniform Delay, d1		14.1	12.8		13.5					12.1	12.0	8.2
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		0.6	0.1		0.3					8.5	4.1	0.8
Delay (s)		14.6	12.8		13.9					20.5	16.2	9.0
Level of Service		B	B		B					C	B	A
Approach Delay (s)		14.5			13.9			0.0			16.1	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	225	654	769	141	883	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3440		3431	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3440		3431	1414
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	711	836	153	960	247
RTOR Reduction (vph)	0	0	18	0	3	151
Lane Group Flow (vph)	245	711	971	0	982	71
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	46.3	28.6		25.7	25.7
Effective Green, g (s)	13.7	46.3	28.6		25.7	25.7
Actuated g/C Ratio	0.17	0.58	0.36		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	303	2048	1230		1102	454
v/s Ratio Prot	c0.14	0.20	c0.28		c0.29	
v/s Ratio Perm						0.05
v/c Ratio	0.81	0.35	0.79		0.89	0.16
Uniform Delay, d1	31.9	8.9	23.0		25.8	19.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	13.8	0.5	5.2		9.1	0.1
Delay (s)	45.7	9.3	28.2		34.9	19.5
Level of Service	D	A	C		C	B
Approach Delay (s)		18.7	28.2		32.1	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	26.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	892	410	79	482	74	232	296	35	99	409	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1767	3427	1553	1768	3350		1769	3473		1757	3430	
Flt Permitted	0.27	1.00	1.00	0.16	1.00		0.36	1.00		0.54	1.00	
Satd. Flow (perm)	500	3427	1553	297	3350		669	3473		1003	3430	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	929	446	86	524	80	252	312	38	108	445	97
RTOR Reduction (vph)	0	0	314	0	13	0	0	6	0	0	21	0
Lane Group Flow (vph)	136	929	132	86	591	0	252	344	0	108	521	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	25.1	25.1	25.1	25.1	25.1		49.4	49.4		34.9	34.9	
Effective Green, g (s)	25.1	25.1	25.1	25.1	25.1		49.4	49.4		34.9	34.9	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.58	0.58		0.41	0.41	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	148	1012	459	88	989		518	2018		412	1408	
v/s Ratio Prot		0.27			0.18		c0.06	0.10			0.15	
v/s Ratio Perm	0.27		0.08	c0.29			c0.23			0.11		
v/c Ratio	0.92	0.92	0.29	0.98	0.60		0.49	0.17		0.26	0.37	
Uniform Delay, d1	29.0	29.0	23.1	29.7	25.6		9.2	8.3		16.5	17.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.11	1.15	
Incremental Delay, d2	55.0	14.3	1.6	89.9	2.7		0.3	0.2		1.5	0.7	
Delay (s)	83.9	43.3	24.6	119.5	28.3		9.5	8.5		19.9	20.8	
Level of Service	F	D	C	F	C		A	A		B	C	
Approach Delay (s)		41.4			39.7			8.9			20.6	
Approach LOS		D			D			A			C	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	751	72	108	556	83	116	479	104	69	415	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			0.99		1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99			0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1755	3368			3324		1764	3539	1527	1762	3430	
Flt Permitted	0.23	1.00			0.61		0.40	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	424	3368			2040		741	3539	1527	772	3430	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	816	78	117	604	90	126	521	113	75	451	98
RTOR Reduction (vph)	0	9	0	0	12	0	0	0	45	0	22	0
Lane Group Flow (vph)	109	885	0	0	799	0	126	521	68	75	527	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	34.1	34.1			34.1		37.9	37.9	37.9	37.9	37.9	
Effective Green, g (s)	34.1	34.1			34.1		37.9	37.9	37.9	37.9	37.9	
Actuated g/C Ratio	0.43	0.43			0.43		0.47	0.47	0.47	0.47	0.47	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	181	1436			870		351	1677	723	366	1625	
v/s Ratio Prot		0.26						0.15			0.15	
v/s Ratio Perm	0.26				c0.39		c0.17		0.04	0.10		
v/c Ratio	0.60	0.62			0.92		0.36	0.31	0.09	0.20	0.32	
Uniform Delay, d1	17.7	17.9			21.6		13.3	13.0	11.6	12.3	13.1	
Progression Factor	1.00	1.00			1.31		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.8	0.6			14.0		2.8	0.5	0.3	1.3	0.5	
Delay (s)	21.5	18.4			42.4		16.2	13.5	11.8	13.5	13.6	
Level of Service	C	B			D		B	B	B	B	B	
Approach Delay (s)		18.8			42.4			13.7			13.6	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	444	359	137	505	0	0	0	0	12	188	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.93		1.00	1.00						0.99	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		3113		1770	3427						3419	
Flt Permitted		1.00		0.16	1.00						1.00	
Satd. Flow (perm)		3113		295	3427						3419	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	477	390	149	549	0	0	0	0	13	204	24
RTOR Reduction (vph)	0	177	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	690	0	149	549	0	0	0	0	0	231	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		30.2		43.0	43.0						29.0	
Effective Green, g (s)		30.2		43.0	43.0						29.0	
Actuated g/C Ratio		0.38		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1175		302	1842						1239	
v/s Ratio Prot		c0.22		c0.05	0.16							
v/s Ratio Perm				0.22							0.07	
v/c Ratio		0.59		0.49	0.30						0.19	
Uniform Delay, d1		19.9		11.9	10.2						17.4	
Progression Factor		2.34		1.00	1.00						1.00	
Incremental Delay, d2		1.9		0.5	0.4						0.3	
Delay (s)		48.5		12.4	10.6						17.8	
Level of Service		D		B	B						B	
Approach Delay (s)		48.5			11.0			0.0			17.8	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	70.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	257	100	618	834	137	265	1023	392	48	1183	294
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	3539	1479	3433	3539	1484		5034	1419		4880	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.68	1.00		0.74	
Satd. Flow (perm)	3433	3539	1479	3433	3539	1484		3460	1419		3595	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	126	279	109	672	907	149	288	1112	426	52	1272	320
RTOR Reduction (vph)	0	0	4	0	0	74	0	0	273	0	41	0
Lane Group Flow (vph)	126	279	105	672	907	75	0	1400	153	0	1603	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	8.1	33.0	33.0	16.0	41.9	41.9		36.0	36.0		36.0	
Effective Green, g (s)	8.1	33.0	33.0	16.0	41.9	41.9		36.0	36.0		36.0	
Actuated g/C Ratio	0.08	0.33	0.33	0.16	0.42	0.42		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	278	1168	488	549	1483	622		1246	511		1294	
v/s Ratio Prot	0.04	0.08		c0.20	c0.26							
v/s Ratio Perm			0.07			0.05		0.40	0.11		c0.45	
v/c Ratio	0.45	0.24	0.22	1.22	0.61	0.12		3.84dl	0.30		1.24	
Uniform Delay, d1	43.8	24.4	24.2	42.0	22.7	17.8		32.0	23.0		32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.5	1.0	116.3	1.9	0.4		66.6	1.5		114.3	
Delay (s)	44.3	24.8	25.2	158.3	24.6	18.2		98.6	24.5		146.3	
Level of Service	D	C	C	F	C	B		F	C		F	
Approach Delay (s)		29.7			76.0			81.3			146.3	
Approach LOS		C			E			F			F	

Intersection Summary			
HCM Average Control Delay	93.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	110.3%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	68	43	114	1089	1252	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.97		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.94		1.00	1.00	0.97	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3202		1768	3725	6191	
Flt Permitted	0.97		0.10	1.00	1.00	
Satd. Flow (perm)	3202		188	3725	6191	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.93	0.92
Adj. Flow (vph)	74	47	124	1134	1346	391
RTOR Reduction (vph)	43	0	0	0	30	0
Lane Group Flow (vph)	78	0	124	1134	1707	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	6.3		60.2	53.8	53.8	
Effective Green, g (s)	6.3		60.2	53.8	53.8	
Actuated g/C Ratio	0.08		0.75	0.67	0.67	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	252		268	2505	4163	
v/s Ratio Prot	c0.02		c0.04	0.30	0.28	
v/s Ratio Perm			c0.31			
v/c Ratio	0.31		0.46	0.45	0.41	
Uniform Delay, d1	34.8		3.1	6.2	5.9	
Progression Factor	1.00		1.48	1.01	1.00	
Incremental Delay, d2	0.7		1.0	0.5	0.3	
Delay (s)	35.5		5.6	6.7	6.2	
Level of Service	D		A	A	A	
Approach Delay (s)	35.5			6.6	6.2	
Approach LOS	D			A	A	

Intersection Summary			
HCM Average Control Delay	7.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	120	30	89	390	1	1
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	130	33	97	424	1	1
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			165		773	156
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			165		773	156
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		100	100
cM capacity (veh/h)			1411		340	883

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	163	521	2
Volume Left	0	97	1
Volume Right	33	0	1
cSH	1700	1411	491
Volume to Capacity	0.10	0.07	0.00
Queue Length 95th (ft)	0	6	0
Control Delay (s)	0.0	2.0	12.4
Lane LOS		A	B
Approach Delay (s)	0.0	2.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	148	105	150	241	2	2
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	161	114	163	262	2	2
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			277		832	244
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			277		832	244
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		99	100
cM capacity (veh/h)			1284		290	778

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	275	425	4
Volume Left	0	163	2
Volume Right	114	0	2
cSH	1700	1284	422
Volume to Capacity	0.16	0.13	0.01
Queue Length 95th (ft)	0	11	1
Control Delay (s)	0.0	3.9	13.6
Lane LOS		A	B
Approach Delay (s)	0.0	3.9	13.6
Approach LOS			B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	111	8	40	473	25	16
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	1.00	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	121	8	43	514	27	17
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked						
vC, conflicting volume			131		744	143
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			131		744	143
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		93	98
cM capacity (veh/h)			1452		365	891

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	129	558	14	14	9	9
Volume Left	0	43	14	14	0	0
Volume Right	8	0	0	0	9	9
cSH	1700	1452	365	365	891	891
Volume to Capacity	0.08	0.03	0.04	0.04	0.01	0.01
Queue Length 95th (ft)	0	2	3	3	1	1
Control Delay (s)	0.0	0.9	15.2	15.2	9.1	9.1
Lane LOS		A	C	C	A	A
Approach Delay (s)	0.0	0.9	12.8			
Approach LOS			B			

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	47.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	227	67	59	61	0	0	0	0	184	477	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.95						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.99	
Satd. Flow (prot)		1863	1341		1724						4795	
Flt Permitted		1.00	1.00		0.56						0.99	
Satd. Flow (perm)		1863	1341		992						4795	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	247	73	64	66	0	0	0	0	200	518	39
RTOR Reduction (vph)	0	0	42	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	247	31	0	130	0	0	0	0	0	754	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		16.7	16.7		16.7						55.3	
Effective Green, g (s)		16.7	16.7		16.7						55.3	
Actuated g/C Ratio		0.21	0.21		0.21						0.69	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		389	280		207						3315	
v/s Ratio Prot		c0.13										
v/s Ratio Perm			0.02		0.13						0.16	
v/c Ratio		0.63	0.11		0.63						0.23	
Uniform Delay, d1		28.9	25.6		28.8						4.5	
Progression Factor		1.00	1.00		1.00						0.86	
Incremental Delay, d2		3.4	0.2		5.8						0.1	
Delay (s)		32.2	25.8		34.7						4.0	
Level of Service		C	C		C						A	
Approach Delay (s)		30.8			34.7			0.0			4.0	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	198	4	0	45	39	12	242	96	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			1.00	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1848			1647			3514	1377			
Flt Permitted		0.99			1.00			1.00	1.00			
Satd. Flow (perm)		1840			1647			3514	1377			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	215	4	0	49	42	13	263	104	0	0	0
RTOR Reduction (vph)	0	1	0	0	15	0	0	0	86	0	0	0
Lane Group Flow (vph)	0	227	0	0	76	0	0	276	18	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		29.1			29.1			7.9	7.9			
Effective Green, g (s)		29.1			29.1			7.9	7.9			
Actuated g/C Ratio		0.65			0.65			0.18	0.18			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1190			1065			617	242			
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.12						0.08	0.01			
v/c Ratio		0.19			0.07			0.45	0.08			
Uniform Delay, d1		3.2			2.9			16.6	15.5			
Progression Factor		0.81			1.00			1.00	1.00			
Incremental Delay, d2		0.3			0.1			0.2	0.0			
Delay (s)		3.0			3.1			16.8	15.5			
Level of Service		A			A			B	B			
Approach Delay (s)		3.0			3.1			16.4			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	136	21	28	0	41	0	381	46	50	422	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			1.00	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1751	1819			1648			3453			3509	
Flt Permitted	0.71	1.00			0.88			1.00			0.87	
Satd. Flow (perm)	1306	1819			1480			3453			3052	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	148	23	30	0	45	0	414	50	54	459	0
RTOR Reduction (vph)	0	13	0	0	26	0	0	21	0	0	0	0
Lane Group Flow (vph)	14	158	0	0	49	0	0	443	0	0	513	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	551	768			625			1304			1153	
v/s Ratio Prot		c0.09						0.13				
v/s Ratio Perm	0.01				0.03						c0.17	
v/c Ratio	0.03	0.21			0.08			0.34			0.44	
Uniform Delay, d1	7.6	8.2			7.8			10.0			10.5	
Progression Factor	1.00	1.00			1.28			1.00			1.00	
Incremental Delay, d2	0.1	0.6			0.2			0.7			1.2	
Delay (s)	7.7	8.8			10.2			10.7			11.7	
Level of Service	A	A			B			B			B	
Approach Delay (s)		8.7			10.2			10.7			11.7	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	92	24	15	234	119	40	547	28	188	194	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.97			0.95			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3402			3325			3498		1769	3381	
Flt Permitted		0.85			0.94			0.92		0.32	1.00	
Satd. Flow (perm)		2921			3128			3216		589	3381	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	100	26	16	249	129	43	558	30	204	211	76
RTOR Reduction (vph)	0	21	0	0	106	0	0	5	0	0	25	0
Lane Group Flow (vph)	0	129	0	0	288	0	0	626	0	204	262	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.9			10.9			27.3		40.1	40.1	
Effective Green, g (s)		10.9			10.9			27.3		40.1	40.1	
Actuated g/C Ratio		0.18			0.18			0.46		0.67	0.67	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		531			568			1463		557	2260	
v/s Ratio Prot										c0.05	0.08	
v/s Ratio Perm		0.04			c0.09			c0.19		0.19		
v/c Ratio		0.24			0.51			0.43		0.37	0.12	
Uniform Delay, d1		21.0			22.1			11.1		4.4	3.6	
Progression Factor		1.00			1.02			1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.7			0.9		0.4	0.1	
Delay (s)		21.3			23.1			12.0		4.8	3.7	
Level of Service		C			C			B		A	A	
Approach Delay (s)		21.3			23.1			12.0			4.1	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	176	71	56	177	128	69	552	79	72	477	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.96			0.95			0.98			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		3317			3151			3413			4982	
Flt Permitted		0.94			0.87			0.84			0.78	
Satd. Flow (perm)		3118			2752			2888			3896	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	191	77	61	192	139	75	594	86	78	518	33
RTOR Reduction (vph)	0	49	0	0	88	0	0	17	0	0	10	0
Lane Group Flow (vph)	0	230	0	0	304	0	0	738	0	0	619	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1143			1009			1457			1169	
v/s Ratio Prot								c0.06				
v/s Ratio Perm		0.07			c0.11			c0.19			0.16	
v/c Ratio		0.20			0.30			0.51			0.53	
Uniform Delay, d1		13.0			13.5			10.6			17.5	
Progression Factor		0.85			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.8			1.3			1.7	
Delay (s)		11.4			14.3			11.9			19.2	
Level of Service		B			B			B			B	
Approach Delay (s)		11.4			14.3			11.9			19.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	330	0	0	301	102	39	227	113	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3513			3366	1337		5008	1458			
Flt Permitted		0.91			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3198			3366	1337		5008	1458			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	359	0	0	327	111	42	247	123	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	22	0	0	107	0	0	0
Lane Group Flow (vph)	0	394	0	0	337	79	0	289	16	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		62.8			62.8	62.8		10.2	10.2			
Effective Green, g (s)		62.8			62.8	62.8		10.2	10.2			
Actuated g/C Ratio		0.78			0.78	0.78		0.13	0.13			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2510			2642	1050		639	186			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.12				0.06		0.06	0.01			
v/c Ratio		0.16			0.13	0.07		0.45	0.08			
Uniform Delay, d1		2.1			2.1	2.0		32.3	30.8			
Progression Factor		1.00			0.28	0.14		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.5	0.2			
Delay (s)		2.2			0.7	0.4		32.8	31.0			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.2			0.6			32.3			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	270	179	188	298	0	0	0	0	80	406	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.94	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1422	1610	3354						4451	
Flt Permitted		1.00	1.00	0.95	0.93						0.99	
Satd. Flow (perm)		3539	1422	1610	3134						4451	
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	293	188	204	324	0	0	0	0	87	441	116
RTOR Reduction (vph)	0	0	91	0	0	0	0	0	0	0	43	0
Lane Group Flow (vph)	0	293	97	171	357	0	0	0	0	0	601	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1650						1725	
v/s Ratio Prot		c0.08		c0.11	0.04							
v/s Ratio Perm			0.07		0.07						0.13	
v/c Ratio		0.32	0.26	0.53	0.22						0.35	
Uniform Delay, d1		23.7	23.4	28.6	10.7						17.3	
Progression Factor		1.05	1.25	1.17	1.93						1.16	
Incremental Delay, d2		0.9	1.7	0.7	0.0						0.0	
Delay (s)		25.7	31.0	34.3	20.6						20.2	
Level of Service		C	C	C	C						C	
Approach Delay (s)		27.8			25.0			0.0			20.2	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations										
Volume (vph)	175	204	102	62	451	516	555	116	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0	4.0	4.0		
Lane Util. Factor	0.94				0.95	0.91	0.91	1.00		
Frpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Frt	0.92				1.00	0.96	0.85	0.85		
Flt Protected	0.98				0.99	1.00	1.00	1.00		
Satd. Flow (prot)	4720				3492	3245	1441	1583		
Flt Permitted	0.98				0.99	1.00	1.00	1.00		
Satd. Flow (perm)	4720				3492	3245	1441	1583		
Peak-hour factor, PHF	0.92	0.92	0.94	0.94	0.96	0.92	0.96	0.96	0.92	0.92
Adj. Flow (vph)	190	222	109	66	470	561	578	121	0	0
RTOR Reduction (vph)	169	0	0	0	0	0	0	48	0	0
Lane Group Flow (vph)	243	0	0	0	645	786	353	73	0	0
Confl. Peds. (#/hr)								102		
Confl. Bikes (#/hr)					6			10		
Turn Type			Split	Split			custom	custom		
Protected Phases	1		8	8	8	2	6	6		
Permitted Phases	1						6			
Actuated Green, G (s)	19.0				24.0	25.0	48.0	48.0		
Effective Green, g (s)	19.0				24.0	25.0	48.0	48.0		
Actuated g/C Ratio	0.24				0.30	0.31	0.60	0.60		
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0		
Vehicle Extension (s)	2.0				2.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	1121				1048	1014	865	950		
v/s Ratio Prot	0.05				c0.18	c0.24	c0.24	0.05		
v/s Ratio Perm										
v/c Ratio	0.22				0.62	0.78	0.41	0.08		
Uniform Delay, d1	24.5				24.0	24.9	8.5	6.7		
Progression Factor	2.62				1.00	0.59	0.65	0.27		
Incremental Delay, d2	0.4				0.8	3.2	1.3	0.1		
Delay (s)	64.6				24.8	18.0	6.8	2.0		
Level of Service	E				C	B	A	A		
Approach Delay (s)	64.6				24.8	13.4			0.0	
Approach LOS	E				C	B			A	

Intersection Summary			
HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	40	350	550	0	0	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	380	598	0	0	41
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		431	98			
pX, platoon unblocked						
vC, conflicting volume	598				812	299
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	598				812	299
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				100	94
cM capacity (veh/h)	975				303	697

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	43	127	127	127	299	299	41
Volume Left	43	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	41
cSH	975	1700	1700	1700	1700	1700	697
Volume to Capacity	0.04	0.07	0.07	0.07	0.18	0.18	0.06
Queue Length 95th (ft)	3	0	0	0	0	0	5
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	0.0	10.5
Lane LOS	A						B
Approach Delay (s)	0.9				0.0		10.5
Approach LOS							B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	25.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	570	56	532	995	192	1129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5017		3433	5085	3173	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5017		3433	5085	3173	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.97
Adj. Flow (vph)	620	61	554	1082	209	1164
RTOR Reduction (vph)	15	0	0	0	347	347
Lane Group Flow (vph)	666	0	554	1082	444	235
Confl. Bikes (#/hr)				2		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	33.0		16.4	54.4	17.6	17.6
Effective Green, g (s)	33.0		16.4	54.4	17.6	17.6
Actuated g/C Ratio	0.41		0.20	0.68	0.22	0.22
Clearance Time (s)	5.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2070		704	3458	698	317
v/s Ratio Prot	0.13		c0.16	c0.21	0.14	
v/s Ratio Perm						c0.16
v/c Ratio	0.32		0.79	0.31	0.64	0.74
Uniform Delay, d1	15.9		30.1	5.2	28.3	29.1
Progression Factor	0.59		0.83	1.29	1.00	1.00
Incremental Delay, d2	0.4		8.3	0.2	1.9	9.0
Delay (s)	9.8		33.5	6.9	30.2	38.1
Level of Service	A		C	A	C	D
Approach Delay (s)	9.8			15.9	33.5	
Approach LOS	A			B	C	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	110	0	0	0	0	0	3648	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6403	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	0	0	88	120	0	0	0	0	0	3800	15
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	120	0	0	0	0	0	3815	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4849	
v/s Ratio Prot					0.03						c0.60	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.28						0.79	
Uniform Delay, d1				30.4	29.9						5.5	
Progression Factor				1.00	1.00						0.97	
Incremental Delay, d2				5.5	1.6						0.9	
Delay (s)				35.9	31.5						6.2	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.3			0.0			6.2	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1172	646	84	594	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4970		3376	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4970		3376	
Peak-hour factor, PHF	0.92	0.96	0.95	0.92	0.94	0.92
Adj. Flow (vph)	238	1221	680	91	632	142
RTOR Reduction (vph)	30	0	25	0	0	0
Lane Group Flow (vph)	208	1221	746	0	774	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	32.1	32.1	17.4		13.5	
Effective Green, g (s)	32.1	32.1	17.4		13.5	
Actuated g/C Ratio	0.43	0.43	0.23		0.18	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	758	2176	1153		608	
v/s Ratio Prot		c0.24	c0.15		c0.23	
v/s Ratio Perm	0.12					
v/c Ratio	0.27	0.56	0.65		1.27	
Uniform Delay, d1	13.9	16.1	26.0		30.8	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.9	1.1	1.3		135.4	
Delay (s)	14.8	17.2	27.3		166.1	
Level of Service	B	B	C		F	
Approach Delay (s)		16.8	27.3		166.1	
Approach LOS		B	C		F	

Intersection Summary			
HCM Average Control Delay	58.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	180	281	357	358	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3150	1423	1425	5925				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3150	1423	1425	5925				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	191	305	388	389	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	56	59	154	154	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	284	98	40	429	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.5	37.5	12.5	12.5				
Effective Green, g (s)					37.5	37.5	12.5	12.5				
Actuated g/C Ratio					0.62	0.62	0.21	0.21				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1969	889	297	1234				
v/s Ratio Prot					c0.09							
v/s Ratio Perm						0.07	0.03	0.07				
v/c Ratio					0.14	0.11	0.14	0.35				
Uniform Delay, d1					4.6	4.5	19.4	20.3				
Progression Factor					3.81	6.84	1.00	1.00				
Incremental Delay, d2					0.1	0.1	0.2	0.2				
Delay (s)					17.8	31.1	19.6	20.4				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			22.0			20.2			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	198	44	0	0	0	0	0	0	1216	1366	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3427								1522	4723	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3427								1522	4723	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	213	48	0	0	0	0	0	0	1322	1485	41
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	345	63	0
Lane Group Flow (vph)	0	257	0	0	0	0	0	0	0	356	2084	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1771								634	1968	
v/s Ratio Prot		c0.08										
v/s Ratio Perm										0.23	0.44	
v/c Ratio		0.15								0.56	1.06	
Uniform Delay, d1		15.2								26.7	35.0	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.2								3.6	38.0	
Delay (s)		15.3								30.2	73.0	
Level of Service		B								C	E	
Approach Delay (s)		15.3			0.0			0.0			62.5	
Approach LOS		B			A			A			E	

Intersection Summary			
HCM Average Control Delay	58.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	353	0	0	740	649	157	683	31	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3539	1548		3491	1531			
Flt Permitted		0.71			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2520			3539	1548		3491	1531			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	384	0	0	804	676	171	711	34	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	117	0	0	16	0	0	0
Lane Group Flow (vph)	0	434	0	0	804	559	0	882	18	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		756			1062	464		1862	817			
v/s Ratio Prot					0.23							
v/s Ratio Perm		0.17				c0.36		0.25	0.01			
v/c Ratio		0.57			0.76	1.20		0.47	0.02			
Uniform Delay, d1		17.8			19.0	21.0		8.7	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		3.2			5.0	111.2		0.9	0.1			
Delay (s)		20.9			24.1	132.2		9.6	6.7			
Level of Service		C			C	F		A	A			
Approach Delay (s)		20.9			73.4			9.5			0.0	
Approach LOS		C			E			A			A	

Intersection Summary			
HCM Average Control Delay	44.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	315	135	156	930	0	0	0	0	212	417	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.95			1.00					1.00	0.99	
Flt Protected		1.00			0.99					0.95	1.00	
Satd. Flow (prot)		3335			3507					1746	3505	
Flt Permitted		1.00			0.80					0.95	1.00	
Satd. Flow (perm)		3335			2819					1746	3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	342	147	170	969	0	0	0	0	230	434	25
RTOR Reduction (vph)	0	85	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	404	0	0	1139	0	0	0	0	230	450	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1408			1190					737	1480	
v/s Ratio Prot		0.12									0.13	
v/s Ratio Perm					c0.40					c0.13		
v/c Ratio		0.29			0.96					0.31	0.30	
Uniform Delay, d1		8.5			12.6					8.7	8.6	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.5			17.6					1.1	0.5	
Delay (s)		9.1			30.2					9.8	9.1	
Level of Service		A			C					A	A	
Approach Delay (s)		9.1			30.2			0.0			9.3	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	191	14	9	460	114	76	478	31	34	85	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3462			3387			3466			3344	
Flt Permitted		0.81			0.95			0.89			0.80	
Satd. Flow (perm)		2846			3222			3109			2721	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	208	15	10	500	124	83	520	34	37	92	35
RTOR Reduction (vph)	0	8	0	0	42	0	0	10	0	0	23	0
Lane Group Flow (vph)	0	270	0	0	592	0	0	627	0	0	141	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		22.2			22.2			15.3			15.3	
Effective Green, g (s)		22.2			22.2			15.3			15.3	
Actuated g/C Ratio		0.49			0.49			0.34			0.34	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1404			1590			1057			925	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.18			c0.20			0.05	
v/c Ratio		0.19			0.37			0.59			0.15	
Uniform Delay, d1		6.4			7.1			12.3			10.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.9			0.1	
Delay (s)		6.7			7.7			13.2			10.4	
Level of Service		A			A			B			B	
Approach Delay (s)		6.7			7.7			13.2			10.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	478	1728	0	0	0	0	0	591	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.98	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6291						4933	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6291						4933	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	520	1781	0	0	0	0	0	603	113
RTOR Reduction (vph)	0	0	0	0	87	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	2214	0	0	0	0	0	714	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2179	
v/s Ratio Prot											c0.14	
v/s Ratio Perm					0.35							
v/c Ratio					0.81						0.33	
Uniform Delay, d1					14.9						10.9	
Progression Factor					0.48						1.00	
Incremental Delay, d2					2.1						0.4	
Delay (s)					9.1						11.3	
Level of Service					A						B	
Approach Delay (s)		0.0			9.1			0.0			11.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1936	89	372	904	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6342			6163				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6342			6163				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1996	97	400	983	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2087	0	0	1382	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3160			2116				
v/s Ratio Prot					c0.33							
v/s Ratio Perm								0.22				
v/c Ratio					0.66			0.65				
Uniform Delay, d1					11.3			16.7				
Progression Factor					1.00			1.00				
Incremental Delay, d2					1.1			1.6				
Delay (s)					12.4			18.3				
Level of Service					B			B				
Approach Delay (s)		0.0			12.4			18.3			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	76	0	0	1222	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	83	0	0	1234	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	321	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	321	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	100			
cM capacity (veh/h)	641	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	83	309	309	309	309
Volume Left	83	0	0	0	0
Volume Right	0	0	0	0	0
cSH	641	1700	1700	1700	1700
Volume to Capacity	0.13	0.18	0.18	0.18	0.18
Queue Length 95th (ft)	11	0	0	0	0
Control Delay (s)	11.4	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.4	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	457	174	0	0	0	0	0	0	64	949	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6057									5063	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6057									5063	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	497	189	0	0	0	0	0	0	70	999	0
RTOR Reduction (vph)	0	27	0	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	659	0	0	0	0	0	0	0	0	1056	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2322									2194	
v/s Ratio Prot		c0.11										
v/s Ratio Perm											0.21	
v/c Ratio		0.28									0.48	
Uniform Delay, d1		12.8									12.2	
Progression Factor		0.78									0.96	
Incremental Delay, d2		0.3									0.6	
Delay (s)		10.3									12.4	
Level of Service		B									B	
Approach Delay (s)		10.3			0.0			0.0			12.4	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	463	0	0	0	0	0	377	68	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6304						6231				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6304						6231				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	498	0	0	0	0	0	410	74	0	0	0
RTOR Reduction (vph)	0	90	0	0	0	0	0	21	0	0	0	0
Lane Group Flow (vph)	0	516	0	0	0	0	0	463	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		10.0						43.0				
Effective Green, g (s)		10.0						43.0				
Actuated g/C Ratio		0.17						0.72				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1051						4466				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.08										
v/c Ratio		0.49						0.10				
Uniform Delay, d1		22.7						2.6				
Progression Factor		1.03						1.00				
Incremental Delay, d2		0.1						0.0				
Delay (s)		23.5						2.6				
Level of Service		C						A				
Approach Delay (s)		23.5			0.0			2.6			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	739	0	0	0	0	0	1269	334	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.97				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6335						4904				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6335						4904				
Peak-hour factor, PHF	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	803	0	0	0	0	0	1379	363	0	0	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	39	0	0	0	0
Lane Group Flow (vph)	0	966	0	0	0	0	0	1703	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2534						1962				
v/s Ratio Prot								c0.35				
v/s Ratio Perm		0.15										
v/c Ratio		0.38						0.87				
Uniform Delay, d1		9.6						12.4				
Progression Factor		0.85						0.77				
Incremental Delay, d2		0.3						3.6				
Delay (s)		8.4						13.2				
Level of Service		A						B				
Approach Delay (s)		8.4			0.0			13.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	647	564	0	0	0	0	0	0	270	1578	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.93									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		5917									5041	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		5917									5041	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	703	613	0	0	0	0	0	0	293	1610	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	57	0
Lane Group Flow (vph)	0	1312	0	0	0	0	0	0	0	0	1846	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2367									2240	
v/s Ratio Prot		c0.22										
v/s Ratio Perm											0.37	
v/c Ratio		0.95dr									0.82	
Uniform Delay, d1		10.4									11.0	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.9									3.6	
Delay (s)		11.3									14.6	
Level of Service		B									B	
Approach Delay (s)		11.3			0.0			0.0			14.6	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	27	400	61	260	325	0	0	192	2043
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1821			1863	1558
Flt Permitted				0.95	1.00	1.00		0.76			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1413			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	0	0	0	29	417	66	283	353	0	0	209	2151
RTOR Reduction (vph)	0	0	0	0	0	47	0	0	0	0	0	76
Lane Group Flow (vph)	0	0	0	29	417	19	0	636	0	0	209	2075
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				12.8	12.8	12.8		21.2			21.2	21.2
Effective Green, g (s)				12.8	12.8	12.8		21.2			21.2	21.2
Actuated g/C Ratio				0.28	0.28	0.28		0.47			0.47	0.47
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				494	530	428		666			878	734
v/s Ratio Prot					c0.22						0.11	
v/s Ratio Perm				0.02		0.01		0.45				c1.33
v/c Ratio				0.06	0.79	0.04		0.95			0.24	2.83
Uniform Delay, d1				11.7	14.8	11.7		11.4			7.1	11.9
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	7.6	0.0		25.4			0.6	826.1
Delay (s)				11.8	22.4	11.7		36.9			7.7	838.0
Level of Service				B	C	B		D			A	F
Approach Delay (s)		0.0			20.4			36.9			764.5	
Approach LOS		A			C			D			F	

Intersection Summary			
HCM Average Control Delay	524.0	HCM Level of Service	F
HCM Volume to Capacity ratio	2.06		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	193.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	166	580	162	65	997
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3497		3191	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3497		3191	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	180	604	176	71	1084
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	784	0	789	542
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1149	519
v/s Ratio Prot						
v/s Ratio Perm			0.22		0.25	c0.38
v/c Ratio			0.62		0.95dr	1.04
Uniform Delay, d1			11.8		12.2	14.4
Progression Factor			0.85		1.00	1.00
Incremental Delay, d2			0.2		3.4	51.6
Delay (s)			10.2		15.6	66.0
Level of Service			B		B	E
Approach Delay (s)			10.2		36.1	
Approach LOS			B		D	

Intersection Summary			
HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	410	746	206	0	0	0	0	311	92	4	158	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4857						1800			1861	
Flt Permitted		0.99						1.00			0.99	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	432	811	224	0	0	0	0	338	100	4	172	0
RTOR Reduction (vph)	0	58	0	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	1410	0	0	0	0	0	414	0	0	176	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						620			551	
v/s Ratio Prot								c0.23				
v/s Ratio Perm		c0.76									0.11	
v/c Ratio		1.52						0.67			0.32	
Uniform Delay, d1		11.2						12.6			10.9	
Progression Factor		1.00						1.00			0.91	
Incremental Delay, d2		241.2						5.6			1.1	
Delay (s)		252.5						18.2			10.9	
Level of Service		F						B			B	
Approach Delay (s)		252.5			0.0			18.2			10.9	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	182.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	418	267	629	307	154	1364
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3365		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3365		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	454	290	684	334	167	1483
RTOR Reduction (vph)	0	209	62	0	0	0
Lane Group Flow (vph)	454	81	956	0	167	1483
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	25.1	25.1	38.9		14.0	56.9
Effective Green, g (s)	25.1	25.1	38.9		14.0	56.9
Actuated g/C Ratio	0.28	0.28	0.43		0.16	0.63
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	494	441	1454		275	2237
v/s Ratio Prot	c0.26		0.28		0.09	c0.42
v/s Ratio Perm		0.05				
v/c Ratio	0.92	0.18	0.66		0.61	0.66
Uniform Delay, d1	31.5	24.7	20.3		35.4	10.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	22.1	0.2	2.3		9.6	1.6
Delay (s)	53.5	24.9	22.6		45.0	12.0
Level of Service	D	C	C		D	B
Approach Delay (s)	42.3		22.6			15.4
Approach LOS	D		C			B

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	427	437	466	220	221	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3369		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3369		1770	1583
Peak-hour factor, PHF	0.94	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	454	455	507	239	240	238
RTOR Reduction (vph)	0	0	82	0	0	181
Lane Group Flow (vph)	454	455	664	0	240	57
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.1	32.4	14.3		12.7	12.7
Effective Green, g (s)	14.1	32.4	14.3		12.7	12.7
Actuated g/C Ratio	0.27	0.61	0.27		0.24	0.24
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	470	2159	907		423	379
v/s Ratio Prot	c0.26	0.13	c0.20		c0.14	
v/s Ratio Perm						0.04
v/c Ratio	0.97	0.21	0.73		0.57	0.15
Uniform Delay, d1	19.3	4.6	17.7		17.8	15.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	32.6	0.0	3.1		1.7	0.2
Delay (s)	51.8	4.7	20.7		19.5	16.1
Level of Service	D	A	C		B	B
Approach Delay (s)		28.2	20.7		17.8	
Approach LOS		C	C		B	

Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	722	760	349	0	490	274	374	1367	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4904			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4904			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	785	826	379	0	527	298	407	1486	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	129	0	0	0
Lane Group Flow (vph)	0	0	0	1968	0	0	527	169	407	1486	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1689			584	261	651	2020	
v/s Ratio Prot				c0.40			c0.15		0.23	c0.42	
v/s Ratio Perm								0.11			
v/c Ratio				1.24dl			0.90	0.65	0.63	0.74	
Uniform Delay, d1				34.8			43.4	41.4	27.5	16.8	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				81.3			19.7	11.9	4.5	2.4	
Delay (s)				116.1			63.1	53.2	32.0	19.3	
Level of Service				F			E	D	C	B	
Approach Delay (s)	0.0			116.1			59.5			22.0	
Approach LOS	A			F			E			C	

Intersection Summary			
HCM Average Control Delay	68.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	291	589	239	228	398	323	24	739	50	516
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.93				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3111	1441		3289				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3111	1441		3289				1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	316	640	260	248	423	351	26	803	54	561
RTOR Reduction (vph)	0	0	76	0	2	0	0	0	0	0
Lane Group Flow (vph)	284	820	284	0	798	0	0	0	857	561
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	32.0	32.0	32.0		29.0				32.5	65.0
Effective Green, g (s)	32.0	32.0	32.0		29.0				32.5	65.0
Actuated g/C Ratio	0.30	0.30	0.30		0.27				0.31	0.61
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	486	939	435		900				543	2170
v/s Ratio Prot	0.18	c0.26	0.20		c0.24				c0.48	0.16
v/s Ratio Perm										
v/c Ratio	0.58	0.87	0.65		0.89				1.58	0.26
Uniform Delay, d1	31.4	35.1	32.2		36.9				36.8	9.4
Progression Factor	0.77	0.78	0.70		1.00				1.00	1.00
Incremental Delay, d2	0.6	3.3	1.2		12.5				269.0	0.3
Delay (s)	24.8	30.8	23.7		49.5				305.7	9.7
Level of Service	C	C	C		D				F	A
Approach Delay (s)		27.9			49.5					188.6
Approach LOS		C			D					F

Intersection Summary			
HCM Average Control Delay	94.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	3040	149	551	481	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4789				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4789				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	3167	162	592	506	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	69	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	3167	93	0	1098	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2035				
v/s Ratio Prot					c0.62							
v/s Ratio Perm						0.06		0.23				
v/c Ratio					1.31	0.12		0.89dl				
Uniform Delay, d1					21.0	11.7		17.2				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					143.2	0.3		1.0				
Delay (s)					164.2	12.0		18.2				
Level of Service					F	B		B				
Approach Delay (s)		0.0			156.8			18.2			0.0	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	122.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	127.7%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1406	2049	0	0	0	0	0	1431	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4759						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4759						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1449	2227	0	0	0	0	0	1522	46
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	898	2778	0	0	0	0	0	1565	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2736						1145	
v/s Ratio Prot											c0.44	
v/s Ratio Perm				c0.59	0.58							
v/c Ratio				1.03	1.02						1.37	
Uniform Delay, d1				17.0	17.0						27.0	
Progression Factor				1.36	1.34						1.00	
Incremental Delay, d2				16.7	9.6						170.8	
Delay (s)				39.8	32.5						197.8	
Level of Service				D	C						F	
Approach Delay (s)		0.0			34.3			0.0			197.8	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	83.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	138.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	107	273	9	13	565	19	13	9	12	26	20	19
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	290	10	14	614	21	14	10	13	28	22	21

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	116	300	649	37	71
Volume Left (vph)	116	0	14	14	28
Volume Right (vph)	0	10	21	13	21
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	6.0	5.5	4.9	6.5	6.4
Degree Utilization, x	0.19	0.46	0.88	0.07	0.13
Capacity (veh/h)	576	641	731	515	521
Control Delay (s)	9.2	11.8	32.6	9.9	10.3
Approach Delay (s)	11.1		32.6	9.9	10.3
Approach LOS	B		D	A	B

Intersection Summary			
Delay	22.9		
HCM Level of Service	C		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      6.3       Worst Case Level Of Service: C[ 20.6]
********************************************************************************
Street Name:         Harrison Street         Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign        Yield Sign
Rights:           Include          Include           Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     0  987     0     0    0   433     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0     0  987     0     0    0   433     0    0     0
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0    0     0     0  987     0     0    0   433     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:      0    0     0     0 1073     0     0    0   471     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     0 1073     0     0    0   471     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   358  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   691  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   691  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.68  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   5.4  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  20.6 xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     C     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             20.6            xxxxxx
ApproachLOS:        *                *                 C                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	934	442	1574	644	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1738	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1738	3539	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1015	480	1711	700	135
RTOR Reduction (vph)	18	18	0	0	0
Lane Group Flow (vph)	723	736	1711	835	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	463	2153	356	
v/s Ratio Prot			c0.48	c0.53	
v/s Ratio Perm	c0.43	0.42			
v/c Ratio	1.61	1.59	0.79	2.35	
Uniform Delay, d1	22.0	22.0	8.9	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	286.8	275.8	3.1	614.2	
Delay (s)	308.8	297.8	12.0	637.4	
Level of Service	F	F	B	F	
Approach Delay (s)		303.3	217.1		
Approach LOS		F	F		

Intersection Summary			
HCM Average Control Delay	249.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	242	485	154	23	60	19	206	235	11	399	1069	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1525		3433	3473	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1525		3433	3473	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	257	516	164	24	65	21	224	255	12	434	1162	130
RTOR Reduction (vph)	0	0	6	0	0	0	0	209	0	0	10	0
Lane Group Flow (vph)	257	516	182	0	0	86	224	46	0	446	1282	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	17.6	25.8	25.8			8.0	16.2	16.2		14.5	27.2	
Effective Green, g (s)	17.6	25.8	25.8			8.0	16.2	16.2		14.5	27.2	
Actuated g/C Ratio	0.20	0.29	0.29			0.09	0.18	0.18		0.16	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	346	1015	454			157	335	275		553	1050	
v/s Ratio Prot	c0.15	0.15				0.05	c0.12			0.13	c0.37	
v/s Ratio Perm			0.12					0.03				
v/c Ratio	0.74	0.51	0.40			0.55	0.67	0.17		0.81	1.22	
Uniform Delay, d1	34.1	26.8	25.9			39.3	34.4	31.2		36.4	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	0.4	0.6			3.9	5.0	0.3		8.4	108.2	
Delay (s)	42.4	27.2	26.5			43.1	39.4	31.5		44.8	139.6	
Level of Service	D	C	C			D	D	C		D	F	
Approach Delay (s)		31.1					36.4				115.3	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	78.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	258	584	54	91
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3434		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3434		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	277	628	58	98
RTOR Reduction (vph)	0	13	0	0
Lane Group Flow (vph)	277	771	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	22.7		
Effective Green, g (s)	11.0	22.7		
Actuated g/C Ratio	0.12	0.25		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	866		
v/s Ratio Prot	c0.16	0.22		
v/s Ratio Perm				
v/c Ratio	1.28	0.89		
Uniform Delay, d1	39.5	32.5		
Progression Factor	1.00	1.00		
Incremental Delay, d2	157.6	13.3		
Delay (s)	197.1	45.8		
Level of Service	F	D		
Approach Delay (s)		85.3		
Approach LOS		F		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	104	283	80	54	389	307	164	745	39	234	714	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	3386			3515	1536	1768	3509		1768	3446	
Flt Permitted	0.46	1.00			0.85	1.00	0.22	1.00		0.24	1.00	
Satd. Flow (perm)	837	3386			3000	1536	417	3509		454	3446	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	308	87	59	405	334	178	810	42	254	776	120
RTOR Reduction (vph)	0	31	0	0	0	55	0	4	0	0	14	0
Lane Group Flow (vph)	113	364	0	0	464	279	178	848	0	254	882	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	354	1434			1271	651	186	1569		203	1541	
v/s Ratio Prot		0.11						0.24			0.26	
v/s Ratio Perm	0.13				0.15	c0.18	0.43			c0.56		
v/c Ratio	0.32	0.25			0.37	0.43	0.96	0.54		1.25	0.57	
Uniform Delay, d1	16.3	15.8			16.7	17.3	22.7	17.1		23.5	17.5	
Progression Factor	0.92	0.91			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.3			0.8	2.1	55.6	1.3		147.0	1.5	
Delay (s)	16.8	14.7			17.5	19.3	78.3	18.5		170.5	19.0	
Level of Service	B	B			B	B	E	B		F	B	
Approach Delay (s)		15.2			18.3			28.8			52.5	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	32.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	459	155	73	604	130	203	555	54	154	532	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1554	1769	1863	1552	1765	3480		1764	3257	
Flt Permitted	0.12	1.00	1.00	0.28	1.00	1.00	0.14	1.00		0.32	1.00	
Satd. Flow (perm)	230	1863	1554	527	1863	1552	261	3480		586	3257	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	499	168	79	657	141	221	603	59	167	578	440
RTOR Reduction (vph)	0	0	103	0	0	87	0	9	0	0	162	0
Lane Group Flow (vph)	260	499	65	79	657	54	221	653	0	167	856	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.39	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	308	721	601	290	612	509	101	1351		228	1264	
v/s Ratio Prot	c0.11	0.27		0.02	c0.35			0.19			0.26	
v/s Ratio Perm	0.32		0.04	0.09		0.03	c0.85			0.29		
v/c Ratio	0.84	0.69	0.11	0.27	1.07	0.11	2.19	0.48		0.73	0.68	
Uniform Delay, d1	19.8	21.8	16.7	17.2	28.6	19.9	26.0	19.6		22.2	21.6	
Progression Factor	1.00	1.00	1.00	1.49	1.35	2.32	0.74	0.65		1.00	1.00	
Incremental Delay, d2	17.9	5.4	0.4	0.2	56.2	0.4	562.7	0.1		10.0	1.1	
Delay (s)	37.8	27.2	17.0	25.7	94.8	46.5	582.1	12.8		32.2	22.7	
Level of Service	D	C	B	C	F	D	F	B		C	C	
Approach Delay (s)		28.3			80.8			155.3			24.1	
Approach LOS		C			F			F			C	

Intersection Summary			
HCM Average Control Delay	67.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.55		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	745	0	0	293	1032	25	940	87	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1609	3383			3539	2787		5008				
Flt Permitted	0.56	0.93			1.00	1.00		1.00				
Satd. Flow (perm)	947	3158			3539	2787		5008				
Peak-hour factor, PHF	0.93	0.92	0.25	0.25	0.92	0.97	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	301	810	0	0	318	1064	27	1022	95	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	35	0	26	0	0	0	0
Lane Group Flow (vph)	265	846	0	0	318	1029	0	1118	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	379	1263			1416	1115		2003				
v/s Ratio Prot					0.09							
v/s Ratio Perm	0.28	0.27				c0.37		0.22				
v/c Ratio	0.70	0.67			0.22	0.92		0.56				
Uniform Delay, d1	10.0	9.8			7.9	11.4		9.3				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	10.3	2.8			0.4	13.8		1.1				
Delay (s)	20.3	12.7			8.3	25.2		10.4				
Level of Service	C	B			A	C		B				
Approach Delay (s)		14.5			21.3			10.4			0.0	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	562	44	13	278	0	0	0	0	469	333	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		3539	1552		3531					1605	3322	1558
Flt Permitted		1.00	1.00		0.93					0.95	0.98	1.00
Satd. Flow (perm)		3539	1552		3276					1605	3322	1558
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	592	48	14	302	0	0	0	0	510	362	258
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	0	0	0	125
Lane Group Flow (vph)	0	592	17	0	316	0	0	0	0	286	586	133
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	543		1147					829	1716	805
v/s Ratio Prot		c0.17										
v/s Ratio Perm			0.01		0.10					c0.18	0.18	0.09
v/c Ratio		0.48	0.03		0.28					0.34	0.34	0.17
Uniform Delay, d1		15.2	12.8		14.0					8.5	8.5	7.7
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		1.3	0.1		0.6					1.1	0.5	0.4
Delay (s)		16.5	12.9		14.6					9.7	9.1	8.1
Level of Service		B	B		B					A	A	A
Approach Delay (s)		16.3			14.6			0.0			9.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	313	649	706	490	218	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.96	1.00
Satd. Flow (prot)	1770	3539	3280		3412	1421
Flt Permitted	0.95	1.00	1.00		0.96	1.00
Satd. Flow (perm)	1770	3539	3280		3412	1421
Peak-hour factor, PHF	0.92	0.93	0.92	0.97	0.92	0.92
Adj. Flow (vph)	340	698	767	505	237	134
RTOR Reduction (vph)	0	0	115	0	10	100
Lane Group Flow (vph)	340	698	1157	0	246	15
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	22.8	61.8	35.0		10.2	10.2
Effective Green, g (s)	22.8	61.8	35.0		10.2	10.2
Actuated g/C Ratio	0.29	0.77	0.44		0.13	0.13
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	504	2734	1435		435	181
v/s Ratio Prot	c0.19	0.20	c0.35		c0.07	
v/s Ratio Perm						0.01
v/c Ratio	0.67	0.26	0.81		0.57	0.08
Uniform Delay, d1	25.3	2.6	19.6		32.8	30.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.8	0.2	4.9		1.0	0.1
Delay (s)	28.1	2.8	24.5		33.8	30.8
Level of Service	C	A	C		C	C
Approach Delay (s)		11.1	24.5		32.9	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	775	36	21	927	132	110	616	39	158	497	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1762	3348		1769	3504		1762	3405	
Flt Permitted	0.16	1.00	1.00	0.16	1.00		0.32	1.00		0.38	1.00	
Satd. Flow (perm)	303	3427	1532	302	3348		589	3504		706	3405	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	34	842	39	23	1008	143	120	670	42	172	523	134
RTOR Reduction (vph)	0	0	28	0	13	0	0	5	0	0	23	0
Lane Group Flow (vph)	34	842	11	23	1138	0	120	707	0	172	634	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.6	24.6	24.6	24.6	24.6		49.9	49.9		39.4	39.4	
Effective Green, g (s)	24.6	24.6	24.6	24.6	24.6		49.9	49.9		39.4	39.4	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29		0.59	0.59		0.46	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	992	443	87	969		429	2057		327	1578	
v/s Ratio Prot		0.25			c0.34		0.02	c0.20			0.19	
v/s Ratio Perm	0.11		0.01	0.08			0.14			c0.24		
v/c Ratio	0.39	0.85	0.03	0.26	1.17		0.28	0.34		0.53	0.40	
Uniform Delay, d1	24.2	28.4	21.6	23.2	30.2		8.4	9.1		16.2	15.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.25	1.27	
Incremental Delay, d2	12.3	9.0	0.1	7.3	89.5		0.1	0.5		5.0	0.6	
Delay (s)	36.5	37.4	21.7	30.5	119.7		8.5	9.5		25.2	19.7	
Level of Service	D	D	C	C	F		A	A		C	B	
Approach Delay (s)		36.7			118.0			9.4			20.8	
Approach LOS		D			F			A			C	

Intersection Summary			
HCM Average Control Delay	52.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	522	41	120	392	39	287	721	200	59	579	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99			0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1765	3384			3350		1766	3539	1550	1753	3413	
Flt Permitted	0.29	1.00			0.61		0.31	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	547	3384			2059		585	3539	1550	586	3413	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	567	45	130	426	42	312	759	217	64	629	136
RTOR Reduction (vph)	0	9	0	0	8	0	0	0	82	0	18	0
Lane Group Flow (vph)	100	603	0	0	590	0	312	759	135	64	747	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	26.4	26.4			26.4		45.6	45.6	45.6	45.6	45.6	
Effective Green, g (s)	26.4	26.4			26.4		45.6	45.6	45.6	45.6	45.6	
Actuated g/C Ratio	0.33	0.33			0.33		0.57	0.57	0.57	0.57	0.57	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	181	1117			679		333	2017	884	334	1945	
v/s Ratio Prot		0.18						0.21			0.22	
v/s Ratio Perm	0.18				c0.29		c0.53		0.09	0.11		
v/c Ratio	0.55	0.54			0.87		0.94	0.38	0.15	0.19	0.38	
Uniform Delay, d1	22.0	21.9			25.2		15.9	9.4	8.1	8.3	9.5	
Progression Factor	1.00	1.00			1.14		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	0.3			10.9		35.6	0.5	0.4	1.3	0.6	
Delay (s)	24.0	22.1			39.5		51.5	10.0	8.5	9.6	10.0	
Level of Service	C	C			D		D	A	A	A	B	
Approach Delay (s)		22.4			39.5			19.8			10.0	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	763	218	134	427	3	0	0	0	99	306	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						1.00	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.97		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3150		1770	3423						3384	
Flt Permitted		0.95		0.11	1.00						0.99	
Satd. Flow (perm)		2996		211	3423						3384	
Peak-hour factor, PHF	0.92	0.99	0.92	0.93	0.92	0.92	0.25	0.25	0.25	0.92	0.94	0.92
Adj. Flow (vph)	8	771	237	144	464	3	0	0	0	108	326	96
RTOR Reduction (vph)	0	32	0	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	984	0	144	467	0	0	0	0	0	506	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		30.3		43.0	43.0						29.0	
Effective Green, g (s)		30.3		43.0	43.0						29.0	
Actuated g/C Ratio		0.38		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1135		263	1840						1227	
v/s Ratio Prot				c0.05	0.14							
v/s Ratio Perm		c0.33		0.24							0.15	
v/c Ratio		0.87		0.55	0.25						0.41	
Uniform Delay, d1		23.0		13.4	9.9						19.1	
Progression Factor		1.58		1.00	1.00						1.00	
Incremental Delay, d2		8.8		1.3	0.3						1.0	
Delay (s)		45.0		14.6	10.2						20.1	
Level of Service		D		B	B						C	
Approach Delay (s)		45.0			11.3			0.0			20.1	
Approach LOS		D			B			A			C	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	383	723	163	373	969	52	13	1215	1286	3	703	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1483	3433	3539	1458		5082	1466		4823	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.92	1.00		0.94	
Satd. Flow (perm)	3433	3539	1483	3433	3539	1458		4692	1466		4514	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.93	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	416	786	177	381	1042	57	14	1321	1398	3	732	237
RTOR Reduction (vph)	0	0	34	0	0	8	0	0	243	0	58	0
Lane Group Flow (vph)	416	786	143	381	1042	49	0	1335	1155	0	914	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	14.9	34.6	34.6	14.4	35.1	35.1		36.0	36.0		36.0	
Effective Green, g (s)	14.9	34.6	34.6	14.4	35.1	35.1		36.0	36.0		36.0	
Actuated g/C Ratio	0.15	0.35	0.35	0.14	0.35	0.35		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	512	1224	513	494	1242	512		1689	528		1625	
v/s Ratio Prot	c0.12	0.22		0.11	c0.29							
v/s Ratio Perm			0.10			0.03		0.28	c0.79		0.20	
v/c Ratio	0.81	0.64	0.28	0.77	0.84	0.09		0.79	2.19		0.56	
Uniform Delay, d1	41.2	27.5	23.7	41.2	29.9	21.8		28.6	32.0		25.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	9.1	2.6	1.4	6.7	6.9	0.4		3.9	541.0		1.4	
Delay (s)	50.3	30.1	25.0	47.9	36.7	22.2		32.5	573.0		27.1	
Level of Service	D	C	C	D	D	C		C	F		C	
Approach Delay (s)		35.5			39.1			309.0			27.1	
Approach LOS		D			D			F			C	

Intersection Summary			
HCM Average Control Delay	148.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	136.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	360	96	117	1762	1069	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.99		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	3340		1763	3725	6323	
Flt Permitted	0.96		0.17	1.00	1.00	
Satd. Flow (perm)	3340		313	3725	6323	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.92
Adj. Flow (vph)	391	104	127	1835	1162	112
RTOR Reduction (vph)	43	0	0	0	13	0
Lane Group Flow (vph)	452	0	127	1835	1261	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	16.4		50.1	43.4	43.4	
Effective Green, g (s)	16.4		50.1	43.4	43.4	
Actuated g/C Ratio	0.20		0.63	0.54	0.54	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	685		317	2021	3430	
v/s Ratio Prot	c0.14		c0.03	c0.49	0.20	
v/s Ratio Perm			0.22			
v/c Ratio	0.66		0.40	0.91	0.37	
Uniform Delay, d1	29.2		6.3	16.5	10.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	2.3		0.8	7.4	0.3	
Delay (s)	31.5		7.1	23.9	10.8	
Level of Service	C		A	C	B	
Approach Delay (s)	31.5			22.9	10.8	
Approach LOS	C			C	B	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	369	11	22	221	12	57
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	393	12	24	240	13	62
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			405		705	417
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			405		705	417
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	90
cM capacity (veh/h)			1154		389	627

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	405	264	75
Volume Left	0	24	13
Volume Right	12	0	62
cSH	1700	1154	566
Volume to Capacity	0.24	0.02	0.13
Queue Length 95th (ft)	0	2	11
Control Delay (s)	0.0	0.9	12.3
Lane LOS		A	B
Approach Delay (s)	0.0	0.9	12.3
Approach LOS			B

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	317	9	9	224	30	63
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	345	10	10	243	33	68
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			354		640	376
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			354		640	376
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		92	90
cM capacity (veh/h)			1204		427	655

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	354	253	101
Volume Left	0	10	33
Volume Right	10	0	68
cSH	1700	1204	558
Volume to Capacity	0.21	0.01	0.18
Queue Length 95th (ft)	0	1	16
Control Delay (s)	0.0	0.4	12.9
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	12.9
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	449	3	16	185	47	86
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.92	0.92	0.94	0.92	0.92
Hourly flow rate (vph)	463	3	17	197	51	93
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			466		716	485
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			329		612	350
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		87	84
cM capacity (veh/h)			1086		390	602

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	466	214	26	26	47	47
Volume Left	0	17	26	26	0	0
Volume Right	3	0	0	0	47	47
cSH	1700	1086	390	390	602	602
Volume to Capacity	0.27	0.02	0.07	0.07	0.08	0.08
Queue Length 95th (ft)	0	1	5	5	6	6
Control Delay (s)	0.0	0.8	14.9	14.9	11.5	11.5
Lane LOS		A	B	B	B	B
Approach Delay (s)	0.0	0.8	12.7			
Approach LOS			B			

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	250	126	92	209	0	0	0	0	62	640	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.98	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						1.00	
Satd. Flow (prot)		1863	1437		1792						4860	
Flt Permitted		1.00	1.00		0.70						1.00	
Satd. Flow (perm)		1863	1437		1270						4860	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	272	137	100	227	0	0	0	0	67	660	38
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	272	127	0	327	0	0	0	0	0	761	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		25.2	25.2		25.2						46.8	
Effective Green, g (s)		25.2	25.2		25.2						46.8	
Actuated g/C Ratio		0.32	0.32		0.32						0.58	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		587	453		400						2843	
v/s Ratio Prot		0.15										
v/s Ratio Perm			0.09		c0.26						0.16	
v/c Ratio		0.46	0.28		0.82						0.27	
Uniform Delay, d1		22.0	20.6		25.3						8.2	
Progression Factor		1.00	1.00		1.00						1.19	
Incremental Delay, d2		0.6	0.3		12.2						0.2	
Delay (s)		22.6	20.9		37.5						9.9	
Level of Service		C	C		D						A	
Approach Delay (s)		22.0			37.5			0.0			9.9	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	122	1	0	116	83	25	420	223	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.82			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		0.99			1.00			1.00	1.00			
Satd. Flow (prot)		1842			1705			3507	1296			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1796			1705			3507	1296			
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	16	133	1	0	126	90	27	452	242	0	0	0
RTOR Reduction (vph)	0	0	0	0	38	0	0	0	183	0	0	0
Lane Group Flow (vph)	0	150	0	0	178	0	0	479	59	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		26.0			26.0			11.0	11.0			
Effective Green, g (s)		26.0			26.0			11.0	11.0			
Actuated g/C Ratio		0.58			0.58			0.24	0.24			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1038			985			857	317			
v/s Ratio Prot					c0.10							
v/s Ratio Perm		0.08						0.14	0.05			
v/c Ratio		0.14			0.18			0.56	0.19			
Uniform Delay, d1		4.4			4.5			14.9	13.5			
Progression Factor		0.41			1.00			1.00	1.00			
Incremental Delay, d2		0.3			0.4			0.5	0.1			
Delay (s)		2.0			4.9			15.3	13.6			
Level of Service		A			A			B	B			
Approach Delay (s)		2.0			4.9			14.7			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	57	27	78	0	78	0	674	56	40	586	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.95			0.93			0.99			1.00	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1748	1757			1658			3475			3523	
Flt Permitted	0.71	1.00			0.84			1.00			0.86	
Satd. Flow (perm)	1301	1757			1420			3475			3046	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.99	0.92
Adj. Flow (vph)	20	62	29	85	0	85	0	733	61	43	592	0
RTOR Reduction (vph)	0	17	0	0	35	0	0	14	0	0	0	0
Lane Group Flow (vph)	20	74	0	0	135	0	0	780	0	0	635	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	549	742			600			1313			1151	
v/s Ratio Prot		0.04						c0.22				
v/s Ratio Perm	0.02				c0.09						0.21	
v/c Ratio	0.04	0.10			0.22			0.59			0.55	
Uniform Delay, d1	7.6	7.8			8.3			11.2			11.0	
Progression Factor	1.00	1.00			1.06			1.00			1.00	
Incremental Delay, d2	0.1	0.3			0.9			2.0			1.9	
Delay (s)	7.8	8.1			9.7			13.2			12.9	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.0			9.7			13.2			12.9	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	202	37	14	240	237	32	807	33	49	221	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.93			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3420			3219			3506		1769	3371	
Flt Permitted		0.76			0.94			0.93		0.20	1.00	
Satd. Flow (perm)		2632			3029			3278		377	3371	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	38	220	40	15	261	258	35	877	36	51	240	85
RTOR Reduction (vph)	0	25	0	0	192	0	0	3	0	0	30	0
Lane Group Flow (vph)	0	273	0	0	342	0	0	945	0	51	295	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.3			12.3			30.2		38.7	38.7	
Effective Green, g (s)		12.3			12.3			30.2		38.7	38.7	
Actuated g/C Ratio		0.20			0.20			0.50		0.64	0.64	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		540			621			1650		336	2174	
v/s Ratio Prot										0.01	c0.09	
v/s Ratio Perm		0.10			c0.11			c0.29		0.09		
v/c Ratio		0.50			0.55			0.57		0.15	0.14	
Uniform Delay, d1		21.1			21.4			10.4		5.1	4.1	
Progression Factor		1.00			0.72			1.00		1.00	1.00	
Incremental Delay, d2		0.7			0.8			1.4		0.2	0.1	
Delay (s)		21.9			16.2			11.8		5.3	4.3	
Level of Service		C			B			B		A	A	
Approach Delay (s)		21.9			16.2			11.8			4.4	
Approach LOS		C			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	176	110	70	274	119	127	930	131	51	642	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.97			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3215			3230			3415			4989	
Flt Permitted		0.90			0.85			0.66			0.78	
Satd. Flow (perm)		2898			2763			2260			3904	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	28	191	120	76	298	129	138	1011	138	55	698	49
RTOR Reduction (vph)	0	76	0	0	33	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	263	0	0	470	0	0	1272	0	0	790	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1063			1013			1227			1171	
v/s Ratio Prot								c0.12				
v/s Ratio Perm		0.09			c0.17			c0.38			0.20	
v/c Ratio		0.25			0.46			1.04			0.67	
Uniform Delay, d1		13.2			14.5			15.5			18.4	
Progression Factor		2.20			1.00			1.00			1.00	
Incremental Delay, d2		0.5			1.5			35.6			3.1	
Delay (s)		29.7			16.0			51.1			21.6	
Level of Service		C			B			D			C	
Approach Delay (s)		29.7			16.0			51.1			21.6	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	406	0	0	478	119	80	481	315	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3512			3371	1319		5004	1459			
Flt Permitted		0.86			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3047			3371	1319		5004	1459			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	50	441	0	0	520	127	87	523	339	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	36	0	0	167	0	0	0
Lane Group Flow (vph)	0	491	0	0	532	78	0	610	172	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		54.7			54.7	54.7		18.3	18.3			
Effective Green, g (s)		54.7			54.7	54.7		18.3	18.3			
Actuated g/C Ratio		0.68			0.68	0.68		0.23	0.23			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2083			2305	902		1145	334			
v/s Ratio Prot					0.16							
v/s Ratio Perm		c0.16				0.06		0.12	0.12			
v/c Ratio		0.24			0.23	0.09		0.53	0.51			
Uniform Delay, d1		4.8			4.7	4.3		27.1	27.0			
Progression Factor		1.00			0.66	0.33		1.00	1.00			
Incremental Delay, d2		0.3			0.2	0.2		0.5	1.3			
Delay (s)		5.0			3.3	1.5		27.6	28.3			
Level of Service		A			A	A		C	C			
Approach Delay (s)		5.0			3.0			27.8			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	502	218	174	449	0	0	0	0	100	642	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.97	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3377						4522	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1439	1610	3178						4522	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	546	237	189	488	0	0	0	0	109	698	159
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	0	0	37	0
Lane Group Flow (vph)	0	546	206	170	507	0	0	0	0	0	929	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1693						1696	
v/s Ratio Prot		c0.15		c0.11	0.04							
v/s Ratio Perm			0.14		0.12						0.21	
v/c Ratio		0.44	0.41	0.85	0.30						0.55	
Uniform Delay, d1		20.0	19.7	34.2	10.7						19.7	
Progression Factor		1.07	1.08	1.00	1.00						1.36	
Incremental Delay, d2		1.1	2.4	25.6	0.0						0.2	
Delay (s)		22.5	23.7	59.8	10.7						27.0	
Level of Service		C	C	E	B						C	
Approach Delay (s)		22.9			23.1			0.0			27.0	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER
Lane Configurations										
Volume (vph)	478	127	270	75	1017	231	370	114	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0				4.0	4.0	4.0	4.0		
Lane Util. Factor	0.94				0.95	0.91	0.91	1.00		
Frpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Flpb, ped/bikes	1.00				1.00	1.00	1.00	1.00		
Frt	0.97				1.00	0.93	0.85	0.85		
Flt Protected	0.96				0.99	1.00	1.00	1.00		
Satd. Flow (prot)	4894				3495	3167	1441	1583		
Flt Permitted	0.96				0.99	1.00	1.00	1.00		
Satd. Flow (perm)	4894				3495	3167	1441	1583		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	520	138	293	82	1105	251	402	124	0	0
RTOR Reduction (vph)	68	0	0	0	0	0	0	64	0	0
Lane Group Flow (vph)	590	0	0	0	1480	448	205	60	0	0
Confl. Peds. (#/hr)								74		
Confl. Bikes (#/hr)					7			8		
Turn Type			Split	Split			custom	custom		
Protected Phases	1		8	8	8	2	6	6		
Permitted Phases	1						6			
Actuated Green, G (s)	16.0				28.0	14.0	34.0	34.0		
Effective Green, g (s)	16.0				28.0	14.0	34.0	34.0		
Actuated g/C Ratio	0.23				0.40	0.20	0.49	0.49		
Clearance Time (s)	4.0				4.0	4.0	4.0	4.0		
Vehicle Extension (s)	2.0				2.0	2.0	2.0	2.0		
Lane Grp Cap (vph)	1119				1398	633	700	769		
v/s Ratio Prot	c0.12				c0.42	c0.14	0.14	0.04		
v/s Ratio Perm										
v/c Ratio	0.53				1.06	0.71	0.29	0.08		
Uniform Delay, d1	23.7				21.0	26.1	10.8	9.6		
Progression Factor	1.00				1.00	0.83	0.97	0.82		
Incremental Delay, d2	1.8				41.3	2.9	1.0	0.2		
Delay (s)	25.5				62.3	24.6	11.5	8.1		
Level of Service	C				E	C	B	A		
Approach Delay (s)	25.5				62.3	18.5			0.0	
Approach LOS	C				E	B			A	

Intersection Summary			
HCM Average Control Delay	42.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	0	605	351	0	0	99
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	658	382	0	0	108
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		420	110			
pX, platoon unblocked					0.96	
vC, conflicting volume	382				601	191
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	382				448	191
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	87
cM capacity (veh/h)	1174				519	819

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	SB 1
Volume Total	0	219	219	219	191	191	108
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	108
cSH	1700	1700	1700	1700	1700	1700	819
Volume to Capacity	0.00	0.13	0.13	0.13	0.11	0.11	0.13
Queue Length 95th (ft)	0	0	0	0	0	0	11
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.1
Lane LOS							B
Approach Delay (s)	0.0				0.0		10.1
Approach LOS							B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1246	170	870	512	188	981
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	4991		3433	5085	3178	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	4991		3433	5085	3178	1441
Peak-hour factor, PHF	0.95	0.92	0.99	0.92	0.92	0.93
Adj. Flow (vph)	1312	185	879	557	204	1055
RTOR Reduction (vph)	26	0	0	0	370	369
Lane Group Flow (vph)	1471	0	879	557	362	158
Confl. Bikes (#/hr)				16		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	18.0		19.0	41.0	21.0	21.0
Effective Green, g (s)	18.0		19.0	41.0	21.0	21.0
Actuated g/C Ratio	0.26		0.27	0.59	0.30	0.30
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1283		932	2978	953	432
v/s Ratio Prot	c0.29		c0.26	0.11	c0.11	
v/s Ratio Perm						0.11
v/c Ratio	1.15		0.94	0.19	0.38	0.37
Uniform Delay, d1	26.0		25.0	6.7	19.4	19.3
Progression Factor	0.81		1.00	1.00	1.00	1.00
Incremental Delay, d2	70.2		18.6	0.1	1.2	2.4
Delay (s)	91.3		43.5	6.9	20.5	21.7
Level of Service	F		D	A	C	C
Approach Delay (s)	91.3			29.3	21.0	
Approach LOS	F			C	C	

Intersection Summary			
HCM Average Control Delay	49.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	146	151	0	0	0	0	0	1554	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6292	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6292	
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	0	0	159	164	0	0	0	0	0	1602	196
RTOR Reduction (vph)	0	0	0	1	0	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	158	164	0	0	0	0	0	1782	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				18.1	18.1						47.9	
Effective Green, g (s)				18.1	18.1						47.9	
Actuated g/C Ratio				0.24	0.24						0.64	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				426	854						4018	
v/s Ratio Prot					0.05						c0.28	
v/s Ratio Perm				c0.09								
v/c Ratio				0.37	0.19						0.44	
Uniform Delay, d1				23.7	22.6						6.8	
Progression Factor				1.00	1.00						0.79	
Incremental Delay, d2				2.5	0.5						0.1	
Delay (s)				26.2	23.1						5.5	
Level of Service				C	C						A	
Approach Delay (s)		0.0			24.6			0.0			5.5	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	396	1492	93	424	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5029		3405	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5029		3405	
Peak-hour factor, PHF	0.92	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	217	426	1604	101	461	54
RTOR Reduction (vph)	1	0	9	0	0	0
Lane Group Flow (vph)	216	426	1696	0	515	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	15.3	15.3	24.5		23.2	
Effective Green, g (s)	15.3	15.3	24.5		23.2	
Actuated g/C Ratio	0.20	0.20	0.33		0.31	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	361	1037	1643		1053	
v/s Ratio Prot		0.08	c0.34		c0.15	
v/s Ratio Perm	c0.12					
v/c Ratio	0.60	0.41	1.03		0.49	
Uniform Delay, d1	27.1	25.9	25.2		21.1	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	7.2	1.2	30.9		0.4	
Delay (s)	34.2	27.1	56.1		21.4	
Level of Service	C	C	E		C	
Approach Delay (s)		29.5	56.1		21.4	
Approach LOS		C	E		C	

Intersection Summary			
HCM Average Control Delay	43.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	299	1000	1172	605	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3041	1417	1403	5828				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3041	1417	1403	5828				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	325	1087	1274	651	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	51	51	295	253	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	818	492	342	1035	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					39.5	39.5	25.5	25.5				
Effective Green, g (s)					39.5	39.5	25.5	25.5				
Actuated g/C Ratio					0.53	0.53	0.34	0.34				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1602	746	477	1982				
v/s Ratio Prot					0.27							
v/s Ratio Perm						c0.35	c0.24	0.18				
v/c Ratio					0.51	0.66	0.72	0.52				
Uniform Delay, d1					11.5	12.9	21.6	19.9				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					1.2	4.5	5.1	0.2				
Delay (s)					12.7	17.4	26.7	20.1				
Level of Service					B	B	C	C				
Approach Delay (s)		0.0			14.5			22.3			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	283	82	0	0	0	0	0	0	642	1040	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3406								1522	4730	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3406								1522	4730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	308	89	0	0	0	0	0	0	698	1130	68
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	260	42	0
Lane Group Flow (vph)	0	381	0	0	0	0	0	0	0	201	1393	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1589								649	2018	
v/s Ratio Prot		c0.11										
v/s Ratio Perm										0.13	0.29	
v/c Ratio		0.24								0.31	0.69	
Uniform Delay, d1		12.0								14.2	17.5	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.4								1.2	2.0	
Delay (s)		12.4								15.4	19.4	
Level of Service		B								B	B	
Approach Delay (s)		12.4			0.0			0.0			18.5	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	1070	0	0	495	304	239	737	49	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3524			3539	1461		3472	1520			
Flt Permitted		0.84			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2959			3539	1461		3472	1520			
Peak-hour factor, PHF	0.92	0.92	0.25	0.99	0.96	0.96	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	80	1163	0	0	516	317	260	801	53	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	88	0	0	2	0	0	0
Lane Group Flow (vph)	0	1243	0	0	516	229	0	1061	51	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		888			1062	438		1852	811			
v/s Ratio Prot					0.15							
v/s Ratio Perm		c0.42				0.16		0.31	0.03			
v/c Ratio		1.40			0.49	0.52		0.57	0.06			
Uniform Delay, d1		21.0			17.2	17.4		9.4	6.8			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		186.7			1.6	4.4		1.3	0.1			
Delay (s)		207.7			18.8	21.8		10.7	6.9			
Level of Service		F			B	C		B	A			
Approach Delay (s)		207.7			20.0			10.5			0.0	
Approach LOS		F			B			B			A	

Intersection Summary			
HCM Average Control Delay	89.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	751	85	47	653	0	0	0	0	684	699	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3464			3526					1734	3507	
Flt Permitted		1.00			0.87					0.95	1.00	
Satd. Flow (perm)		3464			3062					1734	3507	
Peak-hour factor, PHF	0.25	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.94	0.96	0.92
Adj. Flow (vph)	0	816	92	51	710	0	0	0	0	728	728	38
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	889	0	0	761	0	0	0	0	728	758	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1463			1293					732	1481	
v/s Ratio Prot		c0.26									0.22	
v/s Ratio Perm					0.25					c0.42		
v/c Ratio		0.61			0.59					0.99	0.51	
Uniform Delay, d1		10.1			10.0					12.9	9.6	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.9			2.0					32.0	1.3	
Delay (s)		12.0			12.0					44.9	10.8	
Level of Service		B			B					D	B	
Approach Delay (s)		12.0			12.0			0.0			27.4	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	501	10	22	467	52	81	519	29	133	208	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3486			3456			3474			3362	
Flt Permitted		0.82			0.92			0.85			0.60	
Satd. Flow (perm)		2869			3200			2956			2056	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92
Adj. Flow (vph)	92	545	11	24	508	57	88	564	32	145	214	64
RTOR Reduction (vph)	0	3	0	0	17	0	0	8	0	0	35	0
Lane Group Flow (vph)	0	645	0	0	572	0	0	676	0	0	388	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		21.6			21.6			15.9			15.9	
Effective Green, g (s)		21.6			21.6			15.9			15.9	
Actuated g/C Ratio		0.48			0.48			0.35			0.35	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1377			1536			1044			726	
v/s Ratio Prot												
v/s Ratio Perm		c0.22			0.18			c0.23			0.19	
v/c Ratio		0.47			0.37			0.65			0.53	
Uniform Delay, d1		7.9			7.4			12.2			11.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.1			0.7			1.4			0.8	
Delay (s)		9.0			8.1			13.6			12.4	
Level of Service		A			A			B			B	
Approach Delay (s)		9.0			8.1			13.6			12.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	290	1096	0	0	0	0	0	812	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6270						5021	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6270						5021	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	315	1130	0	0	0	0	0	883	62
RTOR Reduction (vph)	0	0	0	0	36	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	0	0	0	1409	0	0	0	0	0	932	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2717						2218	
v/s Ratio Prot											c0.19	
v/s Ratio Perm					0.22							
v/c Ratio					0.52						0.42	
Uniform Delay, d1					12.4						11.5	
Progression Factor					0.64						1.00	
Incremental Delay, d2					0.6						0.6	
Delay (s)					8.6						12.1	
Level of Service					A						B	
Approach Delay (s)		0.0			8.6			0.0			12.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1183	70	436	1147	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.97				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6330			6106				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6330			6106				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1245	76	474	1195	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	16	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1319	0	0	1653	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3154			2096				
v/s Ratio Prot					c0.21							
v/s Ratio Perm								0.27				
v/c Ratio					0.42			0.79				
Uniform Delay, d1					9.5			17.7				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.4			3.1				
Delay (s)					9.9			20.8				
Level of Service					A			C				
Approach Delay (s)		0.0			9.9			20.8			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	80	0	0	1257	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	87	0	0	1366	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	348	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	100	100			
cM capacity (veh/h)	620	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	87	342	342	342	342
Volume Left	87	0	0	0	0
Volume Right	0	0	0	0	0
cSH	620	1700	1700	1700	1700
Volume to Capacity	0.14	0.20	0.20	0.20	0.20
Queue Length 95th (ft)	12	0	0	0	0
Control Delay (s)	11.7	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.7	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1295	226	0	0	0	0	0	0	60	1017	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6225									5066	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6225									5066	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	1349	246	0	0	0	0	0	0	65	1094	0
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1575	0	0	0	0	0	0	0	0	1155	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2386									2195	
v/s Ratio Prot		c0.25										
v/s Ratio Perm											0.23	
v/c Ratio		0.66									0.53	
Uniform Delay, d1		15.3									12.5	
Progression Factor		0.84									0.58	
Incremental Delay, d2		1.4									0.8	
Delay (s)		14.3									8.1	
Level of Service		B									A	
Approach Delay (s)		14.3			0.0			0.0			8.1	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	844	0	0	0	0	0	371	156	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6389						6031				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6389						6031				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	30	917	0	0	0	0	0	403	161	0	0	0
RTOR Reduction (vph)	0	9	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	938	0	0	0	0	0	550	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		15.4						37.6				
Effective Green, g (s)		15.4						37.6				
Actuated g/C Ratio		0.26						0.63				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1640						3779				
v/s Ratio Prot								c0.09				
v/s Ratio Perm		0.15										
v/c Ratio		0.57						0.15				
Uniform Delay, d1		19.4						4.6				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.3						0.1				
Delay (s)		19.7						4.7				
Level of Service		B						A				
Approach Delay (s)		19.7			0.0			4.7			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	208	1498	0	0	0	0	0	1095	1185	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.92				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6353						4636				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6353						4636				
Peak-hour factor, PHF	0.92	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	226	1529	0	0	0	0	0	1165	1234	0	0	0
RTOR Reduction (vph)	0	11	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1744	0	0	0	0	0	2396	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2541						1854				
v/s Ratio Prot								c0.52				
v/s Ratio Perm		0.27										
v/c Ratio		0.69						1.93dr				
Uniform Delay, d1		11.2						13.5				
Progression Factor		0.75						1.34				
Incremental Delay, d2		0.6						135.1				
Delay (s)		9.0						153.3				
Level of Service		A						F				
Approach Delay (s)		9.0			0.0			153.3			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM Average Control Delay	92.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1576	481	0	0	0	0	0	0	505	1713	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6146									5017	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6146									5017	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.95	0.25
Adj. Flow (vph)	0	1592	523	0	0	0	0	0	0	549	1803	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	2113	0	0	0	0	0	0	0	0	2350	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2458									2230	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.47	
v/c Ratio		0.86									1.05	
Uniform Delay, d1		12.3									12.5	
Progression Factor		1.00									1.00	
Incremental Delay, d2		4.2									35.1	
Delay (s)		16.5									47.6	
Level of Service		B									D	
Approach Delay (s)		16.5			0.0			0.0			47.6	
Approach LOS		B			A			A			D	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	8	430	66	409	410	0	0	251	1897
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1817			1863	1559
Flt Permitted				0.95	1.00	1.00		0.71			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1316			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	9	467	72	445	446	0	0	273	1936
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	0	28
Lane Group Flow (vph)	0	0	0	9	467	17	0	891	0	0	273	1908
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.5	14.5	14.5		34.5			34.5	34.5
Effective Green, g (s)				14.5	14.5	14.5		34.5			34.5	34.5
Actuated g/C Ratio				0.24	0.24	0.24		0.57			0.57	0.57
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				417	450	355		757			1071	896
v/s Ratio Prot					c0.25						0.15	
v/s Ratio Perm				0.01		0.01		0.68				c1.22
v/c Ratio				0.02	1.04	0.05		1.18			0.25	2.13
Uniform Delay, d1				17.3	22.8	17.5		12.8			6.3	12.8
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	52.5	0.1		93.2			0.6	512.0
Delay (s)				17.4	75.3	17.5		105.9			6.9	524.7
Level of Service				B	E	B		F			A	F
Approach Delay (s)		0.0			66.8			105.9			460.7	
Approach LOS		A			E			F			F	

Intersection Summary			
HCM Average Control Delay	314.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	198.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	215	731	77	66	848
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.89	0.85
Flt Protected			0.99		0.99	1.00
Satd. Flow (prot)			3499		3170	1441
Flt Permitted			0.99		0.99	1.00
Satd. Flow (perm)			3499		3170	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94
Adj. Flow (vph)	0	234	795	84	72	902
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1029	0	607	451
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1141	519
v/s Ratio Prot						
v/s Ratio Perm			0.29		0.19	c0.31
v/c Ratio			0.81		0.53	0.87
Uniform Delay, d1			13.0		11.4	13.4
Progression Factor			0.76		1.00	1.00
Incremental Delay, d2			0.5		1.8	17.7
Delay (s)			10.3		13.2	31.1
Level of Service			B		B	C
Approach Delay (s)			10.3		20.8	
Approach LOS			B		C	

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	339	664	96	0	0	0	0	622	86	1	81	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.98			1.00	
Flt Protected		0.98						1.00			1.00	
Satd. Flow (prot)		4917						1832			1862	
Flt Permitted		0.98						1.00			0.72	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.92	0.93	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.25
Adj. Flow (vph)	368	714	104	0	0	0	0	676	93	1	88	0
RTOR Reduction (vph)	0	25	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	1161	0	0	0	0	0	758	0	0	89	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						631			448	
v/s Ratio Prot								c0.41				
v/s Ratio Perm		c1.16									0.07	
v/c Ratio		2.32						1.20			0.20	
Uniform Delay, d1		11.2						14.8			10.4	
Progression Factor		1.00						1.00			0.08	
Incremental Delay, d2		601.2						105.1			0.9	
Delay (s)		612.4						119.9			1.7	
Level of Service		F						F			A	
Approach Delay (s)		612.4			0.0			119.9			1.7	
Approach LOS		F			A			F			A	

Intersection Summary			
HCM Average Control Delay	400.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.86		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	207	182	1326	958	213	1119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3314		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3314		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	225	198	1411	1041	232	1216
RTOR Reduction (vph)	0	161	143	0	0	0
Lane Group Flow (vph)	225	37	2309	0	232	1216
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	16.8	16.8	37.7		23.5	65.2
Effective Green, g (s)	16.8	16.8	37.7		23.5	65.2
Actuated g/C Ratio	0.19	0.19	0.42		0.26	0.72
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	330	295	1388		462	2564
v/s Ratio Prot	c0.13		c0.70		0.13	c0.34
v/s Ratio Perm		0.02				
v/c Ratio	0.68	0.13	1.66		0.50	0.47
Uniform Delay, d1	34.1	30.5	26.2		28.3	5.2
Progression Factor	1.00	1.00	1.00		0.72	0.84
Incremental Delay, d2	5.7	0.2	301.8		1.6	0.3
Delay (s)	39.8	30.7	328.0		21.9	4.6
Level of Service	D	C	F		C	A
Approach Delay (s)	35.5		328.0			7.4
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	192.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	273	487	265	151	646	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3347		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3347		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	529	288	164	702	520
RTOR Reduction (vph)	0	0	131	0	0	310
Lane Group Flow (vph)	297	529	321	0	702	210
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	13.0	27.7	10.7		24.1	24.1
Effective Green, g (s)	13.0	27.7	10.7		24.1	24.1
Actuated g/C Ratio	0.22	0.46	0.18		0.40	0.40
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	385	1639	599		713	638
v/s Ratio Prot	c0.17	0.15	c0.10		c0.40	
v/s Ratio Perm						0.13
v/c Ratio	0.77	0.32	0.54		0.98	0.33
Uniform Delay, d1	22.0	10.1	22.3		17.7	12.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.2	0.1	0.9		29.6	0.3
Delay (s)	31.2	10.2	23.2		47.3	12.6
Level of Service	C	B	C		D	B
Approach Delay (s)		17.8	23.2		32.5	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	26.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	340	2180	346	0	615	792	738	1118	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4940			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4940			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	354	2370	376	0	661	861	802	1215	0
RTOR Reduction (vph)	0	0	0	21	0	0	0	16	0	0	0
Lane Group Flow (vph)	0	0	0	3079	0	0	661	845	802	1215	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1647			688	308	580	2005	
v/s Ratio Prot				c0.62			0.19		c0.45	0.34	
v/s Ratio Perm								c0.53			
v/c Ratio				1.87			0.96	2.74	1.38	0.61	
Uniform Delay, d1				30.0			35.9	36.2	30.3	12.9	
Progression Factor				1.00			1.51	1.52	1.00	1.00	
Incremental Delay, d2				393.7			4.6	785.2	182.8	0.5	
Delay (s)				423.7			58.7	840.3	213.1	13.4	
Level of Service				F			E	F	F	B	
Approach Delay (s)	0.0			423.7			500.8			92.8	
Approach LOS	A			F			F			F	

Intersection Summary			
HCM Average Control Delay	340.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	123.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	489	2094	881	183	372	1030	76	575	26	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.99	0.85		0.89				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3175	1441		3142				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3175	1441		3142				1770	3539
Peak-hour factor, PHF	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	532	2228	958	199	404	1120	83	625	28	334
RTOR Reduction (vph)	0	0	10	0	4	0	0	0	0	0
Lane Group Flow (vph)	479	2406	1022	0	1603	0	0	0	653	334
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	988	448		1292				236	2084
v/s Ratio Prot	0.30	c0.76	0.71		c0.51				c0.37	0.09
v/s Ratio Perm										
v/c Ratio	0.96	2.44	2.28		1.81dr				2.77	0.16
Uniform Delay, d1	30.4	31.0	31.0		26.5				39.0	8.4
Progression Factor	0.62	0.63	0.61		1.00				1.00	1.00
Incremental Delay, d2	5.5	646.1	577.6		115.0				806.9	0.2
Delay (s)	24.2	665.5	596.6		141.5				845.9	8.6
Level of Service	C	F	F		F				F	A
Approach Delay (s)		568.9			141.5					562.5
Approach LOS		F			F					F

Intersection Summary			
HCM Average Control Delay	462.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	149.3%	ICU Level of Service	H
Analysis Period (min)	15		

dr	Defacto Right Lane. Recode with 1 though lane as a right lane.
c	Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2086	296	416	1281	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4860				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4860				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2173	322	424	1363	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	3	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2173	319	0	1786	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1782				
v/s Ratio Prot					c0.43							
v/s Ratio Perm						0.20		0.37				
v/c Ratio					0.85	0.40		1.00				
Uniform Delay, d1					13.1	9.4		19.0				
Progression Factor					1.00	1.00		1.10				
Incremental Delay, d2					3.9	1.5		6.9				
Delay (s)					17.0	10.9		27.7				
Level of Service					B	B		C				
Approach Delay (s)		0.0			16.2			27.7			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	817	1734	0	0	0	0	0	905	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4778						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4778						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	888	1788	0	0	0	0	0	984	90
RTOR Reduction (vph)	0	0	0	18	18	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	630	2010	0	0	0	0	0	1070	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2309						1340	
v/s Ratio Prot											c0.31	
v/s Ratio Perm				0.41	0.42							
v/c Ratio				0.86	0.87						0.80	
Uniform Delay, d1				13.7	13.8						16.4	
Progression Factor				1.29	1.29						1.00	
Incremental Delay, d2				6.5	2.5						5.0	
Delay (s)				24.2	20.3						21.5	
Level of Service				C	C						C	
Approach Delay (s)		0.0			21.3			0.0			21.5	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	291	623	14	22	306	26	21	31	38	86	64	57
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	663	15	24	333	28	23	34	41	93	70	62

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	316	678	385	98	225
Volume Left (vph)	316	0	24	23	93
Volume Right (vph)	0	15	28	41	62
Hadj (s)	0.53	0.02	0.00	-0.17	-0.05
Departure Headway (s)	6.9	6.4	6.3	7.3	6.9
Degree Utilization, x	0.60	1.20	0.67	0.20	0.43
Capacity (veh/h)	515	571	555	437	491
Control Delay (s)	18.7	126.1	21.0	12.1	15.1
Approach Delay (s)	91.9		21.0	12.1	15.1
Approach LOS	F		C	B	C

Intersection Summary			
Delay	61.2		
HCM Level of Service	F		
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

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                    Level Of Service Computation Report
          2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):     36.0       Worst Case Level Of Service: F[123.7]
********************************************************************************
Street Name:         Harrison Street         Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1463     0     0    0   607     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1463     0     0    0   607     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1463     0     0    0   607     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1590     0     0    0   653     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1590     0     0    0   653     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   530  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   553  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   553  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  1.18  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  23.1  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 123.7 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     F     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             123.7           xxxxxx
ApproachLOS:         *                *                 F                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	553	195	1193	549	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1730	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1730	3539	1583	
Peak-hour factor, PHF	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	570	212	1297	597	36
RTOR Reduction (vph)	48	48	0	0	0
Lane Group Flow (vph)	340	346	1297	633	0
Confl. Peds. (#/hr)					2
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	14.4	14.4	38.1	15.1	
Effective Green, g (s)	14.4	14.4	38.1	15.1	
Actuated g/C Ratio	0.24	0.24	0.64	0.25	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	403	415	2247	398	
v/s Ratio Prot			c0.37	c0.40	
v/s Ratio Perm	c0.20	0.20			
v/c Ratio	0.84	0.83	0.58	1.59	
Uniform Delay, d1	21.7	21.7	6.3	22.4	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.3	12.9	1.1	277.4	
Delay (s)	36.0	34.6	7.4	299.8	
Level of Service	D	C	A	F	
Approach Delay (s)		35.3	103.3		
Approach LOS		D	F		

Intersection Summary			
HCM Average Control Delay	83.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	83	141	151	36	84	31	200	177	16	505	676	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	0.95			1.00	1.00	0.92		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1497			1770	1863	1450		3433	3501	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1497			1770	1863	1450		3433	3501	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	153	164	39	91	34	217	186	17	549	735	51
RTOR Reduction (vph)	0	0	11	0	0	0	0	153	0	0	5	0
Lane Group Flow (vph)	90	153	192	0	0	125	217	33	0	566	781	0
Confl. Peds. (#/hr)	21		21					27		9		8
Confl. Bikes (#/hr)			8					24				1
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	10.6	16.6	16.6			10.0	16.0	16.0		18.6	34.5	
Effective Green, g (s)	10.6	16.6	16.6			10.0	16.0	16.0		18.6	34.5	
Actuated g/C Ratio	0.12	0.18	0.18			0.11	0.18	0.18		0.21	0.38	
Clearance Time (s)	4.0	4.0	4.0			4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	208	653	276			197	331	258		709	1342	
v/s Ratio Prot	0.05	0.04				0.07	c0.12			c0.16	0.22	
v/s Ratio Perm			c0.13					0.02				
v/c Ratio	0.43	0.23	0.70			0.63	0.66	0.13		0.80	0.58	
Uniform Delay, d1	36.9	31.3	34.3			38.3	34.4	31.1		33.9	22.0	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.2	7.5			6.5	4.6	0.2		6.3	1.8	
Delay (s)	38.3	31.5	41.8			44.8	39.1	31.4		40.2	23.9	
Level of Service	D	C	D			D	D	C		D	C	
Approach Delay (s)		37.6					37.7				30.7	
Approach LOS		D					D				C	

Intersection Summary			
HCM Average Control Delay	149.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	163	1382	155	108
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.98		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3455		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3455		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92
Adj. Flow (vph)	177	1502	168	117
RTOR Reduction (vph)	0	5	0	0
Lane Group Flow (vph)	177	1782	0	0
Confl. Peds. (#/hr)	18			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	12.9	28.8		
Effective Green, g (s)	12.9	28.8		
Actuated g/C Ratio	0.14	0.32		
Clearance Time (s)	4.0	4.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	254	1106		
v/s Ratio Prot	0.10	c0.52		
v/s Ratio Perm				
v/c Ratio	0.70	1.61		
Uniform Delay, d1	36.7	30.6		
Progression Factor	1.00	1.00		
Incremental Delay, d2	8.1	279.1		
Delay (s)	44.7	309.7		
Level of Service	D	F		
Approach Delay (s)		285.8		
Approach LOS		F		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	203	110	38	335	332	62	532	42	109	663	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1748	3302			3517	1543	1762	3484		1766	3498	
Flt Permitted	0.51	1.00			0.88	1.00	0.28	1.00		0.38	1.00	
Satd. Flow (perm)	932	3302			3127	1543	520	3484		703	3498	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.95	0.92	0.92	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	218	120	41	353	361	67	548	46	118	721	53
RTOR Reduction (vph)	0	69	0	0	0	117	0	7	0	0	6	0
Lane Group Flow (vph)	71	269	0	0	394	244	67	587	0	118	768	0
Confl. Peds. (#/hr)	25		25	18		13	19		13	6		6
Confl. Bikes (#/hr)		16	16	59		5		5	59			6
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	395	1398			1324	654	232	1558		314	1564	
v/s Ratio Prot		0.08						0.17			c0.22	
v/s Ratio Perm	0.08				0.13	c0.16	0.13			0.17		
v/c Ratio	0.18	0.19			0.30	0.37	0.29	0.38		0.38	0.49	
Uniform Delay, d1	15.3	15.4			16.2	16.8	14.9	15.6		15.6	16.6	
Progression Factor	1.44	1.46			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.3			0.6	1.6	3.1	0.7		3.4	1.1	
Delay (s)	22.9	22.8			16.7	18.4	18.0	16.3		19.0	17.8	
Level of Service	C	C			B	B	B	B		B	B	
Approach Delay (s)		22.8			17.5			16.5			17.9	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	101.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	444	164	50	299	122	100	419	26	55	406	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1561	1766	1863	1546	1762	3499		1765	3372	
Flt Permitted	0.39	1.00	1.00	0.49	1.00	1.00	0.25	1.00		0.36	1.00	
Satd. Flow (perm)	724	1863	1561	907	1863	1546	462	3499		666	3372	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	428	483	178	54	325	133	104	455	28	60	441	167
RTOR Reduction (vph)	0	0	79	0	0	79	0	7	0	0	58	0
Lane Group Flow (vph)	428	483	99	54	325	54	104	476	0	60	550	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	55.4	47.2	47.2	38.2	34.5	34.5	20.6	20.6		20.6	20.6	
Effective Green, g (s)	55.4	47.2	47.2	38.2	34.5	34.5	20.6	20.6		20.6	20.6	
Actuated g/C Ratio	0.65	0.56	0.56	0.45	0.41	0.41	0.24	0.24		0.24	0.24	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	674	1035	867	445	756	627	112	848		161	817	
v/s Ratio Prot	c0.12	0.26		0.01	0.17			0.14			0.16	
v/s Ratio Perm	c0.29		0.06	0.05		0.03	c0.22			0.09		
v/c Ratio	0.64	0.47	0.11	0.12	0.43	0.09	0.93	0.56		0.37	0.67	
Uniform Delay, d1	8.3	11.3	9.0	13.3	18.2	15.5	31.5	28.2		26.8	29.2	
Progression Factor	1.00	1.00	1.00	0.65	0.64	0.24	0.94	0.91		1.00	1.00	
Incremental Delay, d2	1.4	1.5	0.3	0.0	1.7	0.3	58.8	0.5		0.5	1.7	
Delay (s)	9.7	12.9	9.2	8.7	13.4	4.0	88.2	26.1		27.3	30.9	
Level of Service	A	B	A	A	B	A	F	C		C	C	
Approach Delay (s)		11.0			10.4			37.1			30.6	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	177	992	0	0	171	354	5	308	29	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1608	3387			3539	2787		5008				
Flt Permitted	0.63	0.95			1.00	1.00		1.00				
Satd. Flow (perm)	1074	3218			3539	2787		5008				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	192	1078	0	0	186	385	5	335	32	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	231	0	17	0	0	0	0
Lane Group Flow (vph)	173	1097	0	0	186	154	0	355	0	0	0	0
Confl. Peds. (#/hr)	2		2				6		6	4		4
Confl. Bikes (#/hr)									4			3
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	430	1287			1416	1115		2003				
v/s Ratio Prot					0.05							
v/s Ratio Perm	0.16	c0.34				0.06		0.07				
v/c Ratio	0.40	0.85			0.13	0.14		0.18				
Uniform Delay, d1	8.6	10.9			7.6	7.6		7.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.8	7.3			0.2	0.3		0.2				
Delay (s)	11.4	18.2			7.8	7.9		7.9				
Level of Service	B	B			A	A		A				
Approach Delay (s)		17.3			7.9			7.9			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	321	31	12	181	0	0	0	0	835	1243	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.99	1.00
Satd. Flow (prot)		3539	1558		3527					1610	3370	1583
Flt Permitted		1.00	1.00		0.93					0.95	0.99	1.00
Satd. Flow (perm)		3539	1558		3290					1610	3370	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	0	349	34	13	197	0	0	0	0	908	1337	440
RTOR Reduction (vph)	0	0	21	0	0	0	0	0	0	0	0	213
Lane Group Flow (vph)	0	349	13	0	210	0	0	0	0	726	1519	227
Confl. Peds. (#/hr)	2		2	10		10	6		6			
Confl. Bikes (#/hr)			3			4			1			
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	545		1152					832	1741	818
v/s Ratio Prot		c0.10										
v/s Ratio Perm			0.01		0.06					c0.45	0.45	0.14
v/c Ratio		0.28	0.02		0.18					0.87	0.87	0.28
Uniform Delay, d1		14.1	12.8		13.5					12.8	12.8	8.2
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		0.6	0.1		0.3					12.2	6.4	0.8
Delay (s)		14.6	12.9		13.9					25.0	19.1	9.0
Level of Service		B	B		B					C	B	A
Approach Delay (s)		14.5			13.9			0.0			19.1	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	225	688	772	151	975	227
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.99		1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3435		3432	1414
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3435		3432	1414
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	748	839	164	1060	247
RTOR Reduction (vph)	0	0	20	0	2	148
Lane Group Flow (vph)	245	748	983	0	1083	74
Confl. Peds. (#/hr)	14			11	6	6
Confl. Bikes (#/hr)				10		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	13.7	45.4	27.7		26.6	26.6
Effective Green, g (s)	13.7	45.4	27.7		26.6	26.6
Actuated g/C Ratio	0.17	0.57	0.35		0.33	0.33
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	303	2008	1189		1141	470
v/s Ratio Prot	c0.14	0.21	c0.29		c0.32	
v/s Ratio Perm						0.05
v/c Ratio	0.81	0.37	0.83		0.95	0.16
Uniform Delay, d1	31.9	9.5	24.0		26.0	18.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	13.8	0.5	6.7		15.6	0.1
Delay (s)	45.7	10.0	30.6		41.7	18.9
Level of Service	D	B	C		D	B
Approach Delay (s)		18.8	30.6		37.8	
Approach LOS		B	C		D	

Intersection Summary			
HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	1019	410	79	494	78	232	302	35	132	423	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1767	3427	1553	1770	3347		1769	3474		1757	3433	
Flt Permitted	0.26	1.00	1.00	0.16	1.00		0.35	1.00		0.54	1.00	
Satd. Flow (perm)	476	3427	1553	297	3347		653	3474		997	3433	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	1061	446	86	537	85	252	318	38	143	460	97
RTOR Reduction (vph)	0	0	314	0	14	0	0	3	0	0	20	0
Lane Group Flow (vph)	136	1061	132	86	608	0	252	353	0	143	537	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	25.1	25.1	25.1	25.1	25.1		49.4	49.4		34.9	34.9	
Effective Green, g (s)	25.1	25.1	25.1	25.1	25.1		49.4	49.4		34.9	34.9	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.58	0.58		0.41	0.41	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	141	1012	459	88	988		511	2019		409	1410	
v/s Ratio Prot		c0.31			0.18		c0.06	0.10			0.16	
v/s Ratio Perm	0.29		0.08	0.29			c0.23			0.14		
v/c Ratio	0.96	1.05	0.29	0.98	0.62		0.49	0.17		0.35	0.38	
Uniform Delay, d1	29.5	30.0	23.1	29.7	25.8		9.3	8.3		17.2	17.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.11	1.13	
Incremental Delay, d2	66.9	41.8	1.6	89.9	2.9		0.3	0.2		2.2	0.8	
Delay (s)	96.4	71.8	24.6	119.5	28.7		9.5	8.5		21.4	20.5	
Level of Service	F	E	C	F	C		A	A		C	C	
Approach Delay (s)		61.0			39.7			8.9			20.7	
Approach LOS		E			D			A			C	

Intersection Summary			
HCM Average Control Delay	40.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	877	100	108	559	83	129	499	111	105	452	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			0.99		1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98			0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1755	3358			3326		1764	3539	1526	1763	3437	
Flt Permitted	0.24	1.00			0.57		0.37	1.00	1.00	0.40	1.00	
Satd. Flow (perm)	435	3358			1909		688	3539	1526	739	3437	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	953	109	117	608	90	140	542	121	114	491	98
RTOR Reduction (vph)	0	11	0	0	12	0	0	0	31	0	20	0
Lane Group Flow (vph)	114	1051	0	0	803	0	140	542	90	114	569	0
Confl. Peds. (#/hr)	34		34	37		37	8		8	10		10
Confl. Bikes (#/hr)			11			8			35			7
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	35.4	35.4			35.4		36.6	36.6	36.6	36.6	36.6	
Effective Green, g (s)	35.4	35.4			35.4		36.6	36.6	36.6	36.6	36.6	
Actuated g/C Ratio	0.44	0.44			0.44		0.46	0.46	0.46	0.46	0.46	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	192	1486			845		315	1619	698	338	1572	
v/s Ratio Prot		0.31						0.15			0.17	
v/s Ratio Perm	0.26				c0.42		c0.20		0.06	0.15		
v/c Ratio	0.59	0.71			1.03dl		0.44	0.33	0.13	0.34	0.36	
Uniform Delay, d1	16.9	18.1			21.5		14.8	13.9	12.5	13.9	14.1	
Progression Factor	1.00	1.00			1.35		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	1.3			19.6		4.5	0.6	0.4	2.7	0.6	
Delay (s)	20.1	19.4			48.6		19.3	14.5	12.9	16.6	14.8	
Level of Service	C	B			D		B	B	B	B	B	
Approach Delay (s)		19.4			48.6			15.1			15.1	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM Average Control Delay	24.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	472	500	137	507	0	0	0	0	14	189	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.97		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						0.99	
Frt		0.92		1.00	1.00						0.98	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		3067		1770	3427						3413	
Flt Permitted		1.00		0.11	1.00						1.00	
Satd. Flow (perm)		3067		212	3427						3413	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	508	543	149	551	0	0	0	0	15	205	25
RTOR Reduction (vph)	0	175	0	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	876	0	149	551	0	0	0	0	0	234	0
Confl. Peds. (#/hr)	26		26	28		28	21		21	101		101
Confl. Bikes (#/hr)			4			4			3			6
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		30.2		43.0	43.0						29.0	
Effective Green, g (s)		30.2		43.0	43.0						29.0	
Actuated g/C Ratio		0.38		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1158		266	1842						1237	
v/s Ratio Prot		c0.29		c0.05	0.16							
v/s Ratio Perm				0.25							0.07	
v/c Ratio		0.76		0.56	0.30						0.19	
Uniform Delay, d1		21.7		13.8	10.2						17.5	
Progression Factor		2.05		1.00	1.00						1.00	
Incremental Delay, d2		3.8		1.6	0.4						0.3	
Delay (s)		48.2		15.4	10.6						17.8	
Level of Service		D		B	B						B	
Approach Delay (s)		48.2			11.6			0.0			17.8	
Approach LOS		D			B			A			B	

Intersection Summary			
HCM Average Control Delay	31.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	259	101	846	834	137	265	1094	394	48	1387	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.94		1.00	0.90		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	3433	3539	1479	3433	3539	1484		5036	1419		4897	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.73	
Satd. Flow (perm)	3433	3539	1479	3433	3539	1484		3500	1419		3564	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92
Adj. Flow (vph)	128	282	110	920	907	149	288	1189	428	52	1491	337
RTOR Reduction (vph)	0	0	1	0	0	72	0	0	274	0	35	0
Lane Group Flow (vph)	128	282	109	920	907	77	0	1477	154	0	1845	0
Confl. Peds. (#/hr)	38		38	34		34	60		60	28		28
Confl. Bikes (#/hr)			12			18			39			9
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	8.1	33.0	33.0	16.0	41.9	41.9		36.0	36.0		36.0	
Effective Green, g (s)	8.1	33.0	33.0	16.0	41.9	41.9		36.0	36.0		36.0	
Actuated g/C Ratio	0.08	0.33	0.33	0.16	0.42	0.42		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	278	1168	488	549	1483	622		1260	511		1283	
v/s Ratio Prot	0.04	0.08		c0.27	c0.26							
v/s Ratio Perm			0.07			0.05		0.42	0.11		c0.52	
v/c Ratio	0.46	0.24	0.22	1.68	0.61	0.12		3.84dl	0.30		1.44	
Uniform Delay, d1	43.9	24.4	24.2	42.0	22.7	17.8		32.0	23.0		32.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.5	1.1	312.0	1.9	0.4		86.2	1.5		201.8	
Delay (s)	44.3	24.9	25.3	354.0	24.6	18.2		118.2	24.5		233.8	
Level of Service	D	C	C	F	C	B		F	C		F	
Approach Delay (s)		29.7			177.5			97.2			233.8	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM Average Control Delay	157.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	130	54	128	1100	1303	743
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.96		1.00	1.00	0.95	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	3270		1769	3725	6056	
Flt Permitted	0.97		0.08	1.00	1.00	
Satd. Flow (perm)	3270		150	3725	6056	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.93	0.92
Adj. Flow (vph)	141	59	139	1146	1401	808
RTOR Reduction (vph)	52	0	0	0	70	0
Lane Group Flow (vph)	148	0	139	1146	2139	0
Confl. Peds. (#/hr)	36	36	109			
Confl. Bikes (#/hr)		14				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	8.9		57.6	49.6	49.6	
Effective Green, g (s)	8.9		57.6	49.6	49.6	
Actuated g/C Ratio	0.11		0.72	0.62	0.62	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	364		270	2310	3755	
v/s Ratio Prot	c0.05		c0.05	0.31	c0.35	
v/s Ratio Perm			0.32			
v/c Ratio	0.41		0.51	0.50	0.57	
Uniform Delay, d1	33.1		6.5	8.3	8.9	
Progression Factor	1.00		1.07	1.33	1.00	
Incremental Delay, d2	0.7		1.3	0.6	0.6	
Delay (s)	33.8		8.3	11.7	9.6	
Level of Service	C		A	B	A	
Approach Delay (s)	33.8			11.3	9.6	
Approach LOS	C			B	A	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	175	30	115	759	1	19
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	33	125	825	1	21
Pedestrians	7			7	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			225		1291	216
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			225		1291	216
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			91		99	97
cM capacity (veh/h)			1342		162	818

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	223	950	22
Volume Left	0	125	1
Volume Right	33	0	21
cSH	1700	1342	681
Volume to Capacity	0.13	0.09	0.03
Queue Length 95th (ft)	0	8	2
Control Delay (s)	0.0	2.3	10.5
Lane LOS		A	B
Approach Delay (s)	0.0	2.3	10.5
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	170	258	424	337	2	34
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	185	280	461	366	2	37
Pedestrians	24			24	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			467		1639	351
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			467		1639	351
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			58		97	95
cM capacity (veh/h)			1092		62	677

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	465	827	39
Volume Left	0	461	2
Volume Right	280	0	37
cSH	1700	1092	438
Volume to Capacity	0.27	0.42	0.09
Queue Length 95th (ft)	0	53	7
Control Delay (s)	0.0	8.5	14.0
Lane LOS		A	B
Approach Delay (s)	0.0	8.5	14.0
Approach LOS			B

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	264	149	132	477	34	43
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	1.00	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	287	149	143	518	37	47
Pedestrians	16			16	2	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.84		0.84	0.84
vC, conflicting volume			438		1185	379
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			232		1124	163
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		77	94
cM capacity (veh/h)			1117		163	728

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	436	662	18	18	23	23
Volume Left	0	143	18	18	0	0
Volume Right	149	0	0	0	23	23
cSH	1700	1117	163	163	728	728
Volume to Capacity	0.26	0.13	0.11	0.11	0.03	0.03
Queue Length 95th (ft)	0	11	9	9	2	2
Control Delay (s)	0.0	3.1	29.8	29.8	10.1	10.1
Lane LOS		A	D	D	B	B
Approach Delay (s)	0.0	3.1	18.8			
Approach LOS			C			

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	391	76	59	74	0	0	0	0	315	489	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.97						0.96	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1343		1770						4718	
Flt Permitted		1.00	1.00		0.53						0.98	
Satd. Flow (perm)		1863	1343		956						4718	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	425	83	64	80	0	0	0	0	342	532	39
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	425	50	0	144	0	0	0	0	0	910	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		26.0	26.0		26.0						46.0	
Effective Green, g (s)		26.0	26.0		26.0						46.0	
Actuated g/C Ratio		0.32	0.32		0.32						0.57	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		605	436		311						2713	
v/s Ratio Prot		c0.23										
v/s Ratio Perm			0.04		0.15						0.19	
v/c Ratio		0.70	0.11		0.46						0.34	
Uniform Delay, d1		23.6	18.9		21.5						9.0	
Progression Factor		1.00	1.00		1.00						0.94	
Incremental Delay, d2		3.7	0.1		1.1						0.3	
Delay (s)		27.3	19.0		22.5						8.7	
Level of Service		C	B		C						A	
Approach Delay (s)		26.0			22.5			0.0			8.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	279	4	0	49	48	12	253	188	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.94			1.00	0.87			
Flpb, ped/bikes		1.00			1.00			1.00	1.00			
Frt		1.00			0.93			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1852			1631			3515	1378			
Flt Permitted		0.99			1.00			1.00	1.00			
Satd. Flow (perm)		1846			1631			3515	1378			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	303	4	0	53	52	13	275	204	0	0	0
RTOR Reduction (vph)	0	1	0	0	19	0	0	0	166	0	0	0
Lane Group Flow (vph)	0	315	0	0	86	0	0	288	38	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		28.7			28.7			8.3	8.3			
Effective Green, g (s)		28.7			28.7			8.3	8.3			
Actuated g/C Ratio		0.64			0.64			0.18	0.18			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1177			1040			648	254			
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.17						0.08	0.03			
v/c Ratio		0.27			0.08			0.44	0.15			
Uniform Delay, d1		3.6			3.1			16.3	15.4			
Progression Factor		0.50			1.00			1.00	1.00			
Incremental Delay, d2		0.5			0.2			0.2	0.1			
Delay (s)		2.3			3.3			16.5	15.5			
Level of Service		A			A			B	B			
Approach Delay (s)		2.3			3.3			16.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	157	21	30	0	43	0	393	46	110	427	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	1.00			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			1.00			1.00			0.99	
Frt	1.00	0.98			0.92			0.98			1.00	
Flt Protected	0.95	1.00			0.98			1.00			0.99	
Satd. Flow (prot)	1752	1824			1651			3455			3482	
Flt Permitted	0.70	1.00			0.87			1.00			0.76	
Satd. Flow (perm)	1300	1824			1461			3455			2672	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	171	23	33	0	47	0	427	50	120	464	0
RTOR Reduction (vph)	0	11	0	0	27	0	0	20	0	0	0	0
Lane Group Flow (vph)	14	183	0	0	53	0	0	457	0	0	584	0
Confl. Peds. (#/hr)	16		16	17		17	43		43	44		44
Confl. Bikes (#/hr)			2						2			16
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	549	770			617			1305			1009	
v/s Ratio Prot		c0.10						0.13				
v/s Ratio Perm	0.01				0.04						c0.22	
v/c Ratio	0.03	0.24			0.09			0.35			0.58	
Uniform Delay, d1	7.6	8.3			7.8			10.0			11.1	
Progression Factor	1.00	1.00			1.19			1.00			1.00	
Incremental Delay, d2	0.1	0.7			0.3			0.7			2.4	
Delay (s)	7.7	9.1			9.5			10.8			13.6	
Level of Service	A	A			A			B			B	
Approach Delay (s)		9.0			9.5			10.8			13.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	116	24	15	237	125	40	547	51	193	194	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		1.00			0.99			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.95			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3422			3319			3477		1769	3381	
Flt Permitted		0.86			0.94			0.92		0.30	1.00	
Satd. Flow (perm)		2971			3120			3200		564	3381	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	126	26	16	252	136	43	558	55	210	211	76
RTOR Reduction (vph)	0	21	0	0	111	0	0	9	0	0	25	0
Lane Group Flow (vph)	0	155	0	0	293	0	0	647	0	210	262	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.0			11.0			27.1		40.0	40.0	
Effective Green, g (s)		11.0			11.0			27.1		40.0	40.0	
Actuated g/C Ratio		0.18			0.18			0.45		0.67	0.67	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		545			572			1445		545	2254	
v/s Ratio Prot										c0.05	0.08	
v/s Ratio Perm		0.05			c0.09			c0.20		0.20		
v/c Ratio		0.28			0.51			0.45		0.39	0.12	
Uniform Delay, d1		21.1			22.1			11.3		4.5	3.6	
Progression Factor		1.00			1.03			1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.7			1.0		0.5	0.1	
Delay (s)		21.4			23.6			12.3		4.9	3.7	
Level of Service		C			C			B		A	A	
Approach Delay (s)		21.4			23.6			12.3			4.2	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	226	71	56	185	131	69	561	97	76	479	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.98			0.96			0.99			1.00	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.97			0.95			0.98			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		3353			3158			3397			4981	
Flt Permitted		0.94			0.86			0.84			0.77	
Satd. Flow (perm)		3159			2733			2879			3836	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	246	77	61	201	142	75	603	105	83	521	33
RTOR Reduction (vph)	0	47	0	0	90	0	0	21	0	0	10	0
Lane Group Flow (vph)	0	287	0	0	314	0	0	762	0	0	627	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1158			1002			1452			1151	
v/s Ratio Prot								c0.06				
v/s Ratio Perm		0.09			c0.11			c0.19			0.16	
v/c Ratio		0.25			0.31			0.53			0.54	
Uniform Delay, d1		13.2			13.6			10.7			17.6	
Progression Factor		0.90			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.8			1.4			1.9	
Delay (s)		12.5			14.4			12.1			19.4	
Level of Service		B			B			B			B	
Approach Delay (s)		12.5			14.4			12.1			19.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	403	0	0	310	106	42	326	132	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3518			3364	1337		5024	1461			
Flt Permitted		0.91			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3220			3364	1337		5024	1461			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	438	0	0	337	115	46	354	143	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	25	0	0	121	0	0	0
Lane Group Flow (vph)	0	473	0	0	348	78	0	400	22	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		60.8			60.8	60.8		12.2	12.2			
Effective Green, g (s)		60.8			60.8	60.8		12.2	12.2			
Actuated g/C Ratio		0.76			0.76	0.76		0.15	0.15			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2447			2557	1016		766	223			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.15				0.06		0.08	0.01			
v/c Ratio		0.19			0.14	0.08		0.52	0.10			
Uniform Delay, d1		2.7			2.6	2.4		31.2	29.2			
Progression Factor		1.00			1.67	3.37		1.00	1.00			
Incremental Delay, d2		0.2			0.1	0.1		0.6	0.2			
Delay (s)		2.9			4.4	8.4		31.9	29.4			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.9			5.3			31.2			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	345	196	224	308	0	0	0	0	80	427	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.90	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.96	
Frt		1.00	0.85	1.00	1.00						0.97	
Flt Protected		1.00	1.00	0.95	0.99						0.99	
Satd. Flow (prot)		3539	1422	1610	3341						4472	
Flt Permitted		1.00	1.00	0.95	0.88						0.99	
Satd. Flow (perm)		3539	1422	1610	2974						4472	
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	375	206	243	335	0	0	0	0	87	464	116
RTOR Reduction (vph)	0	0	76	0	0	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	375	130	187	391	0	0	0	0	0	626	0
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		929	373	322	1598						1733	
v/s Ratio Prot		c0.11		c0.12	0.05							
v/s Ratio Perm			0.09		0.08						0.14	
v/c Ratio		0.40	0.35	0.58	0.24						0.36	
Uniform Delay, d1		24.3	23.9	29.0	10.9						17.4	
Progression Factor		1.00	1.09	1.52	0.56						1.07	
Incremental Delay, d2		1.3	2.5	0.9	0.0						0.0	
Delay (s)		25.6	28.6	45.0	6.2						18.7	
Level of Service		C	C	D	A						B	
Approach Delay (s)		26.7			18.7			0.0			18.7	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	109	181	204	102	108	451	531	589	116	0	32	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.94
Flpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.92				1.00	0.96	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.98				0.98	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1770	4724				3483	3238	1441	1583		1583	1490
Flt Permitted	0.95	0.98				0.98	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1770	4724				3483	3238	1441	1583		1583	1490
Peak-hour factor, PHF	0.98	0.92	0.92	0.94	0.94	0.96	0.92	0.96	0.96	0.92	0.98	0.98
Adj. Flow (vph)	111	197	222	109	115	470	577	614	121	0	33	30
RTOR Reduction (vph)	0	166	0	0	0	0	0	0	61	0	0	24
Lane Group Flow (vph)	111	253	0	0	0	694	823	368	60	0	33	6
Confl. Peds. (#/hr)	16								102			32
Confl. Bikes (#/hr)						6			10			2
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	7.3	20.2				24.0	16.8	29.7	29.7		3.0	16.8
Effective Green, g (s)	7.3	20.2				24.0	16.8	29.7	29.7		3.0	16.8
Actuated g/C Ratio	0.09	0.25				0.30	0.21	0.37	0.37		0.04	0.21
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	162	1193				1045	680	535	588		59	313
v/s Ratio Prot	c0.06	0.05				c0.20	c0.25	c0.26	0.04			
v/s Ratio Perm											c0.02	0.00
v/c Ratio	0.69	0.21				0.66	1.21	0.69	0.10		0.56	0.02
Uniform Delay, d1	35.2	23.6				24.5	31.6	21.2	16.4		37.9	25.1
Progression Factor	0.89	1.85				1.00	1.49	1.73	3.16		1.00	1.00
Incremental Delay, d2	10.9	0.4				1.2	107.2	6.6	0.3		6.4	0.0
Delay (s)	42.1	44.1				25.7	154.3	43.3	52.2		44.2	25.1
Level of Service	D	D				C	F	D	D		D	C
Approach Delay (s)		43.7				25.7	113.7			35.1		
Approach LOS		D				C	F			D		

Intersection Summary			
HCM Average Control Delay	74.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	577	56	544	1044	192	1148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	5018		3433	5085	3172	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	5018		3433	5085	3172	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.97
Adj. Flow (vph)	627	61	567	1135	209	1184
RTOR Reduction (vph)	14	0	0	0	344	344
Lane Group Flow (vph)	674	0	567	1135	457	248
Confl. Bikes (#/hr)				2		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	33.0		16.3	54.3	17.7	17.7
Effective Green, g (s)	33.0		16.3	54.3	17.7	17.7
Actuated g/C Ratio	0.41		0.20	0.68	0.22	0.22
Clearance Time (s)	5.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2070		699	3451	702	319
v/s Ratio Prot	0.13		c0.17	c0.22	0.14	
v/s Ratio Perm						c0.17
v/c Ratio	0.33		0.81	0.33	0.85dr	0.78
Uniform Delay, d1	15.9		30.4	5.3	28.3	29.3
Progression Factor	0.48		0.79	1.04	1.00	1.00
Incremental Delay, d2	0.4		8.9	0.2	2.2	11.3
Delay (s)	7.9		33.0	5.7	30.5	40.6
Level of Service	A		C	A	C	D
Approach Delay (s)	7.9			14.8	34.8	
Approach LOS	A			B	C	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	82	113	0	0	0	0	0	3650	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1770	3539						6403	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1770	3539						6403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	0	0	88	123	0	0	0	0	0	3802	15
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	88	123	0	0	0	0	0	3817	0
Confl. Peds. (#/hr)												14
Confl. Bikes (#/hr)			1									
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				9.2	9.2						56.8	
Effective Green, g (s)				9.2	9.2						56.8	
Actuated g/C Ratio				0.12	0.12						0.76	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				217	434						4849	
v/s Ratio Prot					0.03						c0.60	
v/s Ratio Perm				c0.05								
v/c Ratio				0.41	0.28						0.79	
Uniform Delay, d1				30.4	29.9						5.5	
Progression Factor				1.00	1.00						0.97	
Incremental Delay, d2				5.5	1.6						0.9	
Delay (s)				35.9	31.5						6.2	
Level of Service				D	C						A	
Approach Delay (s)		0.0			33.4			0.0			6.2	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	219	1178	646	96	594	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.97	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	4956		3376	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	4956		3376	
Peak-hour factor, PHF	0.92	0.96	0.95	0.92	0.94	0.92
Adj. Flow (vph)	238	1227	680	104	632	142
RTOR Reduction (vph)	30	0	24	0	0	0
Lane Group Flow (vph)	208	1227	760	0	774	0
Confl. Peds. (#/hr)				22		
Confl. Bikes (#/hr)				2		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	32.0	32.0	17.8		13.2	
Effective Green, g (s)	32.0	32.0	17.8		13.2	
Actuated g/C Ratio	0.43	0.43	0.24		0.18	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	755	2170	1176		594	
v/s Ratio Prot		c0.24	c0.15		c0.23	
v/s Ratio Perm	0.12					
v/c Ratio	0.27	0.57	0.65		1.30	
Uniform Delay, d1	14.0	16.2	25.8		30.9	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.9	1.1	1.2		148.3	
Delay (s)	14.9	17.3	27.0		179.2	
Level of Service	B	B	C		F	
Approach Delay (s)		16.9	27.0		179.2	
Approach LOS		B	C		F	

Intersection Summary			
HCM Average Control Delay	61.1	HCM Level of Service	E
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	182	281	357	358	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.99	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.99	1.00				
Frt					0.93	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3152	1423	1425	5925				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3152	1423	1425	5925				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	194	305	388	389	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	56	59	154	154	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	287	98	40	429	0	0	0	0
Confl. Peds. (#/hr)							5		5			
Confl. Bikes (#/hr)			6			2			5			
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					37.5	37.5	12.5	12.5				
Effective Green, g (s)					37.5	37.5	12.5	12.5				
Actuated g/C Ratio					0.62	0.62	0.21	0.21				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1970	889	297	1234				
v/s Ratio Prot					c0.09							
v/s Ratio Perm						0.07	0.03	0.07				
v/c Ratio					0.15	0.11	0.14	0.35				
Uniform Delay, d1					4.6	4.5	19.4	20.3				
Progression Factor					3.80	6.85	1.00	1.00				
Incremental Delay, d2					0.1	0.1	0.2	0.2				
Delay (s)					17.7	31.2	19.6	20.4				
Level of Service					B	C	B	C				
Approach Delay (s)		0.0			21.9			20.2			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	210	44	0	0	0	0	0	0	1216	1366	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	1.00	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3432								1522	4723	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3432								1522	4723	
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	226	48	0	0	0	0	0	0	1322	1485	41
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	345	63	0
Lane Group Flow (vph)	0	270	0	0	0	0	0	0	0	356	2084	0
Confl. Peds. (#/hr)	6		6									
Confl. Bikes (#/hr)			1						1			1
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		62.0								50.0	50.0	
Effective Green, g (s)		62.0								50.0	50.0	
Actuated g/C Ratio		0.52								0.42	0.42	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1773								634	1968	
v/s Ratio Prot		c0.08										
v/s Ratio Perm										0.23	0.44	
v/c Ratio		0.15								0.56	1.06	
Uniform Delay, d1		15.2								26.7	35.0	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.2								3.6	38.0	
Delay (s)		15.4								30.2	73.0	
Level of Service		B								C	E	
Approach Delay (s)		15.4			0.0			0.0			62.5	
Approach LOS		B			A			A			E	

Intersection Summary			
HCM Average Control Delay	58.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	353	0	0	740	649	157	711	31	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.97			
Flpb, ped/bikes		1.00			1.00	1.00		1.00	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3539	1548		3492	1531			
Flt Permitted		0.71			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2520			3539	1548		3492	1531			
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.96	0.92	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	384	0	0	804	676	171	741	34	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	108	0	0	16	0	0	0
Lane Group Flow (vph)	0	434	0	0	804	568	0	912	18	0	0	0
Confl. Peds. (#/hr)	35		35	6		6	26		26	2		2
Confl. Bikes (#/hr)			33			6		10				5
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		756			1062	464		1862	817			
v/s Ratio Prot					0.23							
v/s Ratio Perm		0.17				c0.37		0.26	0.01			
v/c Ratio		0.57			0.76	1.22		0.49	0.02			
Uniform Delay, d1		17.8			19.0	21.0		8.8	6.6			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		3.2			5.0	119.0		0.9	0.1			
Delay (s)		20.9			24.1	140.0		9.8	6.7			
Level of Service		C			C	F		A	A			
Approach Delay (s)		20.9			77.0			9.7			0.0	
Approach LOS		C			E			A			A	

Intersection Summary			
HCM Average Control Delay	46.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	315	135	156	930	0	0	0	0	212	429	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.99	1.00	
Frt		0.95			1.00					1.00	0.99	
Flt Protected		1.00			0.99					0.95	1.00	
Satd. Flow (prot)		3335			3507					1746	3506	
Flt Permitted		1.00			0.80					0.95	1.00	
Satd. Flow (perm)		3335			2819					1746	3506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	0	342	147	170	969	0	0	0	0	230	447	25
RTOR Reduction (vph)	0	85	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	404	0	0	1139	0	0	0	0	230	463	0
Confl. Peds. (#/hr)	36		36	28		28	18		18	16		16
Confl. Bikes (#/hr)			4			10			3			1
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1408			1190					737	1480	
v/s Ratio Prot		0.12									c0.13	
v/s Ratio Perm					c0.40					0.13		
v/c Ratio		0.29			0.96					0.31	0.31	
Uniform Delay, d1		8.5			12.6					8.7	8.7	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		0.5			17.6					1.1	0.6	
Delay (s)		9.1			30.2					9.8	9.2	
Level of Service		A			C					A	A	
Approach Delay (s)		9.1			30.2			0.0			9.4	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	191	14	9	460	114	76	500	31	34	87	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.97			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		3462			3387			3469			3348	
Flt Permitted		0.81			0.95			0.89			0.80	
Satd. Flow (perm)		2843			3222			3117			2723	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	208	15	10	500	124	83	543	34	37	95	35
RTOR Reduction (vph)	0	8	0	0	43	0	0	9	0	0	23	0
Lane Group Flow (vph)	0	270	0	0	591	0	0	651	0	0	144	0
Confl. Peds. (#/hr)	30		30	55		55	41		41	40		40
Confl. Bikes (#/hr)			7			19			6			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		21.7			21.7			15.8			15.8	
Effective Green, g (s)		21.7			21.7			15.8			15.8	
Actuated g/C Ratio		0.48			0.48			0.35			0.35	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1371			1554			1094			956	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.18			c0.21			0.05	
v/c Ratio		0.20			0.38			0.59			0.15	
Uniform Delay, d1		6.7			7.4			12.0			10.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.7			0.9			0.1	
Delay (s)		7.0			8.1			12.9			10.1	
Level of Service		A			A			B			B	
Approach Delay (s)		7.0			8.1			12.9			10.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	478	1728	0	0	0	0	0	603	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.98	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6291						4935	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6291						4935	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	520	1781	0	0	0	0	0	615	113
RTOR Reduction (vph)	0	0	0	0	84	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	2217	0	0	0	0	0	726	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2726						2180	
v/s Ratio Prot											c0.15	
v/s Ratio Perm					0.35							
v/c Ratio					0.81						0.33	
Uniform Delay, d1					14.9						11.0	
Progression Factor					0.48						1.00	
Incremental Delay, d2					2.1						0.4	
Delay (s)					9.2						11.4	
Level of Service					A						B	
Approach Delay (s)		0.0			9.2			0.0			11.4	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1936	89	374	932	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.98				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6342			6167				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6342			6167				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1996	97	402	1013	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2088	0	0	1414	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3160			2117				
v/s Ratio Prot					c0.33							
v/s Ratio Perm								0.23				
v/c Ratio					0.66			0.67				
Uniform Delay, d1					11.3			16.8				
Progression Factor					1.00			1.00				
Incremental Delay, d2					1.1			1.7				
Delay (s)					12.4			18.5				
Level of Service					B			B				
Approach Delay (s)		0.0			12.4			18.5			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	76	0	0	1252	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.99	0.92	0.92
Hourly flow rate (vph)	83	0	0	1265	0	0
Pedestrians	12					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	328	12	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	328	12	12			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	100	100			
cM capacity (veh/h)	634	1055	1589			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	83	316	316	316	316
Volume Left	83	0	0	0	0
Volume Right	0	0	0	0	0
cSH	634	1700	1700	1700	1700
Volume to Capacity	0.13	0.19	0.19	0.19	0.19
Queue Length 95th (ft)	11	0	0	0	0
Control Delay (s)	11.5	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.5	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	457	174	0	0	0	0	0	0	64	961	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6057									5063	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6057									5063	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	497	189	0	0	0	0	0	0	70	1012	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	660	0	0	0	0	0	0	0	0	1069	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2322									2194	
v/s Ratio Prot		c0.11										
v/s Ratio Perm											0.21	
v/c Ratio		0.28									0.49	
Uniform Delay, d1		12.8									12.2	
Progression Factor		0.76									0.96	
Incremental Delay, d2		0.3									0.7	
Delay (s)		10.1									12.3	
Level of Service		B									B	
Approach Delay (s)		10.1			0.0			0.0			12.3	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	463	0	0	0	0	0	460	68	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6277						6259				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6277						6259				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	498	0	0	0	0	0	500	74	0	0	0
RTOR Reduction (vph)	0	121	0	0	0	0	0	21	0	0	0	0
Lane Group Flow (vph)	0	522	0	0	0	0	0	553	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		10.0						43.0				
Effective Green, g (s)		10.0						43.0				
Actuated g/C Ratio		0.17						0.72				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1046						4486				
v/s Ratio Prot								c0.09				
v/s Ratio Perm		0.08										
v/c Ratio		0.50						0.12				
Uniform Delay, d1		22.7						2.6				
Progression Factor		1.05						1.00				
Incremental Delay, d2		0.1						0.1				
Delay (s)		23.9						2.7				
Level of Service		C						A				
Approach Delay (s)		23.9			0.0			2.7			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	746	0	0	0	0	0	1310	334	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.97				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6335						4908				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6335						4908				
Peak-hour factor, PHF	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	811	0	0	0	0	0	1424	363	0	0	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	38	0	0	0	0
Lane Group Flow (vph)	0	975	0	0	0	0	0	1749	0	0	0	0
Confl. Peds. (#/hr)	22		22	59		59	12		12	5		5
Confl. Bikes (#/hr)			6			4			2			1
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2534						1963				
v/s Ratio Prot								c0.36				
v/s Ratio Perm		0.15										
v/c Ratio		0.38						0.89				
Uniform Delay, d1		9.6						12.6				
Progression Factor		0.85						0.76				
Incremental Delay, d2		0.3						4.2				
Delay (s)		8.5						13.8				
Level of Service		A						B				
Approach Delay (s)		8.5			0.0			13.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	648	565	0	0	0	0	0	0	276	1584	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.93									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		5917									5040	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		5917									5040	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	704	614	0	0	0	0	0	0	300	1616	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	57	0
Lane Group Flow (vph)	0	1314	0	0	0	0	0	0	0	0	1859	0
Confl. Peds. (#/hr)	4		4	10		10	8		8	11		11
Confl. Bikes (#/hr)			1						7			2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2367									2240	
v/s Ratio Prot		c0.22										
v/s Ratio Perm											0.37	
v/c Ratio		0.95dr									0.83	
Uniform Delay, d1		10.4									11.0	
Progression Factor		1.00									1.00	
Incremental Delay, d2		0.9									3.7	
Delay (s)		11.4									14.7	
Level of Service		B									B	
Approach Delay (s)		11.4			0.0			0.0			14.7	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	13.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	27	401	61	260	325	0	0	192	2045
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.95		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1736	1863	1503		1821			1863	1558
Flt Permitted				0.95	1.00	1.00		0.76			1.00	1.00
Satd. Flow (perm)				1736	1863	1503		1413			1863	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.95
Adj. Flow (vph)	0	0	0	29	418	66	283	353	0	0	209	2153
RTOR Reduction (vph)	0	0	0	0	0	47	0	0	0	0	0	75
Lane Group Flow (vph)	0	0	0	29	418	19	0	636	0	0	209	2078
Confl. Peds. (#/hr)	1		1	23		23	2		2	5		5
Confl. Bikes (#/hr)			2									
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				12.8	12.8	12.8		21.2			21.2	21.2
Effective Green, g (s)				12.8	12.8	12.8		21.2			21.2	21.2
Actuated g/C Ratio				0.28	0.28	0.28		0.47			0.47	0.47
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				494	530	428		666			878	734
v/s Ratio Prot					c0.22						0.11	
v/s Ratio Perm				0.02		0.01		0.45				c1.33
v/c Ratio				0.06	0.79	0.04		0.95			0.24	2.83
Uniform Delay, d1				11.7	14.9	11.7		11.4			7.1	11.9
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	7.6	0.0		25.4			0.6	827.7
Delay (s)				11.8	22.5	11.7		36.9			7.7	839.6
Level of Service				B	C	B		D			A	F
Approach Delay (s)		0.0			20.5			36.9			766.0	
Approach LOS		A			C			D			F	

Intersection Summary			
HCM Average Control Delay	525.0	HCM Level of Service	F
HCM Volume to Capacity ratio	2.06		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	193.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	166	580	162	66	1038
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.90	0.85
Flt Protected			0.99		0.98	1.00
Satd. Flow (prot)			3497		3189	1441
Flt Permitted			0.99		0.98	1.00
Satd. Flow (perm)			3497		3189	1441
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92
Adj. Flow (vph)	0	180	604	176	72	1128
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	784	0	812	564
Confl. Peds. (#/hr)	51	2				
Confl. Bikes (#/hr)	2					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1148	519
v/s Ratio Prot						
v/s Ratio Perm			0.22		0.25	c0.39
v/c Ratio			0.62		0.99dr	1.09
Uniform Delay, d1			11.8		12.4	14.4
Progression Factor			0.85		1.00	1.00
Incremental Delay, d2			0.2		3.7	65.1
Delay (s)			10.2		16.1	79.5
Level of Service			B		B	E
Approach Delay (s)			10.2		42.0	
Approach LOS			B		D	

Intersection Summary			
HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	410	753	206	0	0	0	0	311	92	4	158	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		0.99						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.98						0.97			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4858						1800			1861	
Flt Permitted		0.99						1.00			0.99	
Satd. Flow (perm)		1850						1500			1600	
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	432	818	224	0	0	0	0	338	100	4	172	0
RTOR Reduction (vph)	0	57	0	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	1418	0	0	0	0	0	414	0	0	176	0
Confl. Peds. (#/hr)	14		14	52		52	1		1	4		4
Confl. Bikes (#/hr)			5			2						
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		925						620			551	
v/s Ratio Prot								c0.23				
v/s Ratio Perm		c0.77									0.11	
v/c Ratio		1.53						0.67			0.32	
Uniform Delay, d1		11.2						12.6			10.9	
Progression Factor		1.00						1.00			0.89	
Incremental Delay, d2		245.1						5.6			1.1	
Delay (s)		256.3						18.2			10.7	
Level of Service		F						B			B	
Approach Delay (s)		256.3			0.0			18.2			10.7	
Approach LOS		F			A			B			B	

Intersection Summary			
HCM Average Control Delay	185.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	418	267	631	309	154	1592
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3365		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3365		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	454	290	686	336	167	1730
RTOR Reduction (vph)	0	209	63	0	0	0
Lane Group Flow (vph)	454	81	959	0	167	1730
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	25.1	25.1	38.9		14.0	56.9
Effective Green, g (s)	25.1	25.1	38.9		14.0	56.9
Actuated g/C Ratio	0.28	0.28	0.43		0.16	0.63
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	494	441	1454		275	2237
v/s Ratio Prot	c0.26		0.29		0.09	c0.49
v/s Ratio Perm		0.05				
v/c Ratio	0.92	0.18	0.66		0.61	0.77
Uniform Delay, d1	31.5	24.7	20.3		35.4	11.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	22.1	0.2	2.4		9.6	2.7
Delay (s)	53.5	24.9	22.7		45.0	14.6
Level of Service	D	C	C		D	B
Approach Delay (s)	42.3		22.7			17.3
Approach LOS	D		C			B

Intersection Summary			
HCM Average Control Delay	23.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	427	437	466	220	223	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3369		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3369		1770	1583
Peak-hour factor, PHF	0.94	0.96	0.92	0.92	0.92	0.92
Adj. Flow (vph)	454	455	507	239	242	238
RTOR Reduction (vph)	0	0	82	0	0	181
Lane Group Flow (vph)	454	455	664	0	242	57
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.1	32.4	14.3		12.7	12.7
Effective Green, g (s)	14.1	32.4	14.3		12.7	12.7
Actuated g/C Ratio	0.27	0.61	0.27		0.24	0.24
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	470	2159	907		423	379
v/s Ratio Prot	c0.26	0.13	c0.20		c0.14	
v/s Ratio Perm						0.04
v/c Ratio	0.97	0.21	0.73		0.57	0.15
Uniform Delay, d1	19.3	4.6	17.7		17.8	15.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	32.6	0.0	3.1		1.9	0.2
Delay (s)	51.8	4.7	20.7		19.7	16.1
Level of Service	D	A	C		B	B
Approach Delay (s)		28.2	20.7		17.9	
Approach LOS		C	C		B	

Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	722	760	349	0	490	276	374	1595	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4904			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4904			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	785	826	379	0	527	300	407	1734	0
RTOR Reduction (vph)	0	0	0	12	0	0	0	129	0	0	0
Lane Group Flow (vph)	0	0	0	1978	0	0	527	171	407	1734	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1689			584	261	651	2020	
v/s Ratio Prot				c0.40			0.15		0.23	c0.49	
v/s Ratio Perm								0.11			
v/c Ratio				1.26dl			0.90	0.66	0.63	0.86	
Uniform Delay, d1				34.8			43.4	41.4	27.5	19.1	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				83.8			19.7	12.2	4.5	5.0	
Delay (s)				118.5			63.1	53.7	32.0	24.2	
Level of Service				F			E	D	C	C	
Approach Delay (s)	0.0			118.5			59.7			25.6	
Approach LOS	A			F			E			C	

Intersection Summary			
HCM Average Control Delay	68.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	291	591	239	228	398	323	26	739	50	516
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.93				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3111	1441		3288				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3111	1441		3288				1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	316	642	260	248	423	351	28	803	54	561
RTOR Reduction (vph)	0	0	76	0	2	0	0	0	0	0
Lane Group Flow (vph)	284	822	284	0	800	0	0	0	857	561
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	32.0	32.0	32.0		29.0				32.5	65.0
Effective Green, g (s)	32.0	32.0	32.0		29.0				32.5	65.0
Actuated g/C Ratio	0.30	0.30	0.30		0.27				0.31	0.61
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	486	939	435		900				543	2170
v/s Ratio Prot	0.18	c0.26	0.20		c0.24				c0.48	0.16
v/s Ratio Perm										
v/c Ratio	0.58	0.88	0.65		0.89				1.58	0.26
Uniform Delay, d1	31.4	35.1	32.2		37.0				36.8	9.4
Progression Factor	0.77	0.78	0.69		1.00				1.00	1.00
Incremental Delay, d2	0.6	3.3	1.2		12.7				269.0	0.3
Delay (s)	24.7	30.7	23.5		49.7				305.7	9.7
Level of Service	C	C	C		D				F	A
Approach Delay (s)		27.8			49.7					188.6
Approach LOS		C			D					F

Intersection Summary			
HCM Average Control Delay	94.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	3209	149	551	488	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.97				
Satd. Flow (prot)					5085	1583		4789				
Flt Permitted					1.00	1.00		0.97				
Satd. Flow (perm)					5085	1583		4789				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.93	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	3343	162	592	514	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	66	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	3343	96	0	1106	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					38.0	38.0		34.0				
Effective Green, g (s)					38.0	38.0		34.0				
Actuated g/C Ratio					0.48	0.48		0.42				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2415	752		2035				
v/s Ratio Prot					c0.66							
v/s Ratio Perm						0.06		0.23				
v/c Ratio					1.38	0.13		0.89dl				
Uniform Delay, d1					21.0	11.7		17.2				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					175.6	0.4		1.0				
Delay (s)					196.6	12.1		18.2				
Level of Service					F	B		B				
Approach Delay (s)		0.0			188.0			18.2			0.0	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	147.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	132.1%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1575	2049	0	0	0	0	0	1473	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4750						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4750						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.94	0.94
Adj. Flow (vph)	0	0	0	1624	2227	0	0	0	0	0	1567	46
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	942	2909	0	0	0	0	0	1610	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2731						1145	
v/s Ratio Prot											c0.46	
v/s Ratio Perm				c0.62	0.61							
v/c Ratio				1.08	1.07						1.41	
Uniform Delay, d1				17.0	17.0						27.0	
Progression Factor				1.36	1.35						1.00	
Incremental Delay, d2				36.7	30.2						188.2	
Delay (s)				59.8	53.1						215.2	
Level of Service				E	D						F	
Approach Delay (s)		0.0			54.7			0.0			215.2	
Approach LOS		A			D			A			F	

Intersection Summary			
HCM Average Control Delay	102.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	142.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	107	280	9	13	607	19	13	9	12	26	20	19
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	116	298	10	14	660	21	14	10	13	28	22	21

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	116	308	695	37	71
Volume Left (vph)	116	0	14	14	28
Volume Right (vph)	0	10	21	13	21
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	6.1	5.5	4.9	6.6	6.5
Degree Utilization, x	0.20	0.47	0.95	0.07	0.13
Capacity (veh/h)	590	643	721	513	520
Control Delay (s)	9.3	12.2	43.2	10.1	10.5
Approach Delay (s)	11.4		43.2	10.1	10.5
Approach LOS	B		E	B	B

Intersection Summary			
Delay	29.3		
HCM Level of Service	D		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):      6.5       Worst Case Level Of Service: C[ 21.8]
********************************************************************************
Street Name:         Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:      North Bound      South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign        Yield Sign
Rights:           Include          Include          Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     0 1022     0     0    0   439     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0     0 1022     0     0    0   439     0    0     0
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0    0     0     0 1022     0     0    0   439     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:      0    0     0     0 1111     0     0    0   477     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     0 1111     0     0    0   477     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   370  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   680  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   680  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.70  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   5.8  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  21.8 xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     C     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx            xxxxxx             21.8            xxxxxx
ApproachLOS:          *                 *                C                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
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Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	934	442	1649	841	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1738	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1738	3539	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1015	480	1792	914	135
RTOR Reduction (vph)	14	14	0	0	0
Lane Group Flow (vph)	727	740	1792	1049	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	17.1	17.1	35.4	13.5	
Effective Green, g (s)	17.1	17.1	35.4	13.5	
Actuated g/C Ratio	0.29	0.29	0.59	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	479	495	2088	356	
v/s Ratio Prot			c0.51	c0.66	
v/s Ratio Perm	c0.43	0.43			
v/c Ratio	1.52	1.49	0.86	2.95	
Uniform Delay, d1	21.4	21.4	10.2	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	243.3	233.0	3.6	883.6	
Delay (s)	264.7	254.4	13.8	906.8	
Level of Service	F	F	B	F	
Approach Delay (s)		259.5	343.5		
Approach LOS		F	F		

Intersection Summary			
HCM Average Control Delay	314.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	252	485	158	23	60	19	206	235	11	497	1331	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1525		3433	3485	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1525		3433	3485	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	268	516	168	24	65	21	224	255	12	540	1447	130
RTOR Reduction (vph)	0	0	6	0	0	0	0	209	0	0	8	0
Lane Group Flow (vph)	268	516	186	0	0	86	224	46	0	552	1569	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	17.6	25.8	25.8			8.0	16.2	16.2		15.0	27.2	
Effective Green, g (s)	17.6	25.8	25.8			8.0	16.2	16.2		15.0	27.2	
Actuated g/C Ratio	0.20	0.29	0.29			0.09	0.18	0.18		0.17	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	346	1015	454			157	335	275		572	1053	
v/s Ratio Prot	c0.15	0.15				0.05	c0.12			0.16	c0.45	
v/s Ratio Perm			0.12					0.03				
v/c Ratio	0.77	0.51	0.41			0.55	0.67	0.17		0.97	1.49	
Uniform Delay, d1	34.3	26.8	26.0			39.3	34.4	31.2		37.2	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.3	0.4	0.6			3.9	5.0	0.3		28.8	225.7	
Delay (s)	44.7	27.2	26.6			43.1	39.4	31.5		66.0	257.1	
Level of Service	D	C	C			D	D	C		E	F	
Approach Delay (s)		31.9					36.4				207.6	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	124.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBL	SBT	SBR	SBR2
Lane Configurations				
Volume (vph)	258	624	54	91
Ideal Flow (vphpl)	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		
Lane Util. Factor	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		
Frt	1.00	0.97		
Flt Protected	0.95	1.00		
Satd. Flow (prot)	1770	3439		
Flt Permitted	0.95	1.00		
Satd. Flow (perm)	1770	3439		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93
Adj. Flow (vph)	277	671	58	98
RTOR Reduction (vph)	0	12	0	0
Lane Group Flow (vph)	277	815	0	0
Confl. Peds. (#/hr)	26			
Confl. Bikes (#/hr)				
Turn Type	Prot			
Protected Phases	5	2		
Permitted Phases				
Actuated Green, G (s)	11.0	22.2		
Effective Green, g (s)	11.0	22.2		
Actuated g/C Ratio	0.12	0.25		
Clearance Time (s)	4.0	5.0		
Vehicle Extension (s)	3.0	3.0		
Lane Grp Cap (vph)	216	848		
v/s Ratio Prot	c0.16	0.24		
v/s Ratio Perm				
v/c Ratio	1.28	0.96		
Uniform Delay, d1	39.5	33.5		
Progression Factor	1.00	1.00		
Incremental Delay, d2	157.6	22.8		
Delay (s)	197.1	56.2		
Level of Service	F	E		
Approach Delay (s)		91.6		
Approach LOS		F		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	104	287	83	54	486	307	198	783	39	234	729	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95			0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1749	3383			3519	1536	1768	3510		1768	3447	
Flt Permitted	0.39	1.00			0.86	1.00	0.22	1.00		0.23	1.00	
Satd. Flow (perm)	716	3383			3048	1536	404	3510		420	3447	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	312	90	59	506	334	215	851	42	254	792	120
RTOR Reduction (vph)	0	31	0	0	0	48	0	4	0	0	14	0
Lane Group Flow (vph)	113	371	0	0	565	286	215	889	0	254	898	0
Confl. Peds. (#/hr)	32		32	10		10	6		6	5		5
Confl. Bikes (#/hr)			20			18			17			66
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			2	
Permitted Phases	4			8		8	2			2		
Actuated Green, G (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Effective Green, g (s)	36.0	36.0			36.0	36.0	38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.42	0.42			0.42	0.42	0.45	0.45		0.45	0.45	
Clearance Time (s)	5.5	5.5			5.5	5.5	5.5	5.5		5.5	5.5	
Lane Grp Cap (vph)	303	1433			1291	651	181	1569		188	1541	
v/s Ratio Prot		0.11						0.25			0.26	
v/s Ratio Perm	0.16				0.19	c0.19	0.53			c0.61		
v/c Ratio	0.37	0.26			0.44	0.44	1.19	0.57		1.35	0.58	
Uniform Delay, d1	16.8	15.9			17.3	17.3	23.5	17.4		23.5	17.6	
Progression Factor	0.90	0.90			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.5	0.3			1.1	2.1	126.5	1.5		188.8	1.6	
Delay (s)	17.6	14.6			18.4	19.5	150.0	18.9		212.3	19.2	
Level of Service	B	B			B	B	F	B		F	B	
Approach Delay (s)		15.3			18.8			44.3			61.3	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM Average Control Delay	39.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	465	156	73	734	131	238	582	54	154	537	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1554	1769	1863	1552	1765	3483		1764	3258	
Flt Permitted	0.12	1.00	1.00	0.28	1.00	1.00	0.14	1.00		0.30	1.00	
Satd. Flow (perm)	230	1863	1554	513	1863	1552	256	3483		553	3258	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	505	170	79	798	142	259	633	59	167	584	440
RTOR Reduction (vph)	0	0	104	0	0	81	0	8	0	0	161	0
Lane Group Flow (vph)	260	505	66	79	798	61	259	684	0	167	863	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.39	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	308	721	601	285	612	509	99	1352		215	1265	
v/s Ratio Prot	c0.11	0.27		0.02	c0.43			0.20			0.26	
v/s Ratio Perm	0.32		0.04	0.09		0.04	c1.01			0.30		
v/c Ratio	0.84	0.70	0.11	0.28	1.30	0.12	2.62	0.51		0.78	0.68	
Uniform Delay, d1	19.8	21.9	16.7	17.2	28.6	20.0	26.0	19.8		22.8	21.6	
Progression Factor	1.00	1.00	1.00	1.53	1.38	2.24	0.74	0.65		1.00	1.00	
Incremental Delay, d2	17.9	5.6	0.4	0.2	146.8	0.4	752.0	0.1		14.7	1.2	
Delay (s)	37.8	27.5	17.0	26.5	186.1	45.1	771.3	13.0		37.5	22.9	
Level of Service	D	C	B	C	F	D	F	B		D	C	
Approach Delay (s)		28.5			154.1			219.5			24.9	
Approach LOS		C			F			F			C	

Intersection Summary			
HCM Average Control Delay	103.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.84		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	109.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	753	0	0	293	1197	25	1005	87	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	0.91	0.91			0.95	0.88		0.91				
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			1.00	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1609	3384			3539	2787		5013				
Flt Permitted	0.56	0.93			1.00	1.00		1.00				
Satd. Flow (perm)	947	3167			3539	2787		5013				
Peak-hour factor, PHF	0.93	0.92	0.25	0.25	0.92	0.97	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	301	818	0	0	318	1234	27	1092	95	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	28	0	25	0	0	0	0
Lane Group Flow (vph)	268	851	0	0	318	1206	0	1189	0	0	0	0
Confl. Peds. (#/hr)	2		2				4		4	3		3
Confl. Bikes (#/hr)			4						5			7
Turn Type	Perm					Perm	Perm					
Protected Phases		4			8			2				
Permitted Phases	4					8	2					
Actuated Green, G (s)	16.0	16.0			16.0	16.0		16.0				
Effective Green, g (s)	16.0	16.0			16.0	16.0		16.0				
Actuated g/C Ratio	0.40	0.40			0.40	0.40		0.40				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	379	1267			1416	1115		2005				
v/s Ratio Prot					0.09							
v/s Ratio Perm	0.28	0.27				c0.43		0.24				
v/c Ratio	0.71	0.67			0.22	1.08		0.59				
Uniform Delay, d1	10.0	9.8			7.9	12.0		9.4				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	10.6	2.9			0.4	52.0		1.3				
Delay (s)	20.7	12.7			8.3	64.0		10.7				
Level of Service	C	B			A	E		B				
Approach Delay (s)		14.6			52.6			10.7			0.0	
Approach LOS		B			D			B			A	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	562	44	13	278	0	0	0	0	477	352	237
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.98		1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00					1.00	1.00	1.00
Frt		1.00	0.85		1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00		1.00					0.95	0.98	1.00
Satd. Flow (prot)		3539	1552		3531					1605	3325	1558
Flt Permitted		1.00	1.00		0.93					0.95	0.98	1.00
Satd. Flow (perm)		3539	1552		3276					1605	3325	1558
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	592	48	14	302	0	0	0	0	518	383	258
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	0	0	0	125
Lane Group Flow (vph)	0	592	17	0	316	0	0	0	0	295	606	133
Confl. Peds. (#/hr)	4		4	4		4	1		1	3		3
Confl. Bikes (#/hr)			5			9			1			1
Turn Type			Perm	Perm						Perm		Perm
Protected Phases		4			8						6	
Permitted Phases			4	8						6		6
Actuated Green, G (s)		21.0	21.0		21.0					31.0	31.0	31.0
Effective Green, g (s)		21.0	21.0		21.0					31.0	31.0	31.0
Actuated g/C Ratio		0.35	0.35		0.35					0.52	0.52	0.52
Clearance Time (s)		4.0	4.0		4.0					4.0	4.0	4.0
Lane Grp Cap (vph)		1239	543		1147					829	1718	805
v/s Ratio Prot		c0.17										
v/s Ratio Perm			0.01		0.10					c0.18	0.18	0.09
v/c Ratio		0.48	0.03		0.28					0.36	0.35	0.17
Uniform Delay, d1		15.2	12.8		14.0					8.6	8.6	7.7
Progression Factor		1.00	1.00		1.00					1.00	1.00	1.00
Incremental Delay, d2		1.3	0.1		0.6					1.2	0.6	0.4
Delay (s)		16.5	12.9		14.6					9.8	9.1	8.1
Level of Service		B	B		B					A	A	A
Approach Delay (s)		16.3			14.6			0.0			9.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	313	656	724	555	236	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		0.97	0.91
Frpb, ped/bikes	1.00	1.00	0.98		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.94		0.99	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3265		3422	1421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3265		3422	1421
Peak-hour factor, PHF	0.92	0.93	0.92	0.97	0.92	0.92
Adj. Flow (vph)	340	705	787	572	257	134
RTOR Reduction (vph)	0	0	138	0	6	105
Lane Group Flow (vph)	340	705	1221	0	264	16
Confl. Peds. (#/hr)	14			18		
Confl. Bikes (#/hr)				7		1
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	22.8	61.4	34.6		10.6	10.6
Effective Green, g (s)	22.8	61.4	34.6		10.6	10.6
Actuated g/C Ratio	0.29	0.77	0.43		0.13	0.13
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	504	2716	1412		453	188
v/s Ratio Prot	c0.19	0.20	c0.37		c0.08	
v/s Ratio Perm						0.01
v/c Ratio	0.67	0.26	0.86		0.58	0.09
Uniform Delay, d1	25.3	2.7	20.6		32.6	30.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.8	0.2	7.3		1.2	0.1
Delay (s)	28.1	2.9	27.9		33.9	30.5
Level of Service	C	A	C		C	C
Approach Delay (s)		11.1	27.9		32.8	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	800	36	21	1010	157	110	651	39	164	499	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1763	3341		1769	3506		1762	3405	
Flt Permitted	0.16	1.00	1.00	0.16	1.00		0.32	1.00		0.37	1.00	
Satd. Flow (perm)	303	3427	1532	302	3341		588	3506		681	3405	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	34	870	39	23	1098	171	120	708	42	178	525	134
RTOR Reduction (vph)	0	0	28	0	14	0	0	5	0	0	23	0
Lane Group Flow (vph)	34	870	11	23	1255	0	120	745	0	178	636	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			pm+pt			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4			2			6		
Actuated Green, G (s)	24.6	24.6	24.6	24.6	24.6		49.9	49.9		39.4	39.4	
Effective Green, g (s)	24.6	24.6	24.6	24.6	24.6		49.9	49.9		39.4	39.4	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29		0.59	0.59		0.46	0.46	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	992	443	87	967		429	2058		316	1578	
v/s Ratio Prot		0.25			c0.38		0.02	c0.21			0.19	
v/s Ratio Perm	0.11		0.01	0.08			0.14			c0.26		
v/c Ratio	0.39	0.88	0.03	0.26	1.30		0.28	0.36		0.56	0.40	
Uniform Delay, d1	24.2	28.8	21.6	23.2	30.2		8.4	9.2		16.6	15.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.25	1.27	
Incremental Delay, d2	12.3	10.8	0.1	7.3	141.6		0.1	0.5		5.9	0.6	
Delay (s)	36.5	39.6	21.7	30.5	171.8		8.5	9.7		26.6	19.7	
Level of Service	D	D	C	C	F		A	A		C	B	
Approach Delay (s)		38.7			169.3			9.5			21.2	
Approach LOS		D			F			A			C	

Intersection Summary			
HCM Average Control Delay	71.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	546	47	120	405	40	382	778	201	66	586	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	*0.92			*0.92		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	0.98	1.00	0.99	
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99			0.99		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1765	3381			3351		1766	3539	1550	1755	3415	
Flt Permitted	0.29	1.00			0.60		0.31	1.00	1.00	0.29	1.00	
Satd. Flow (perm)	540	3381			2042		573	3539	1550	533	3415	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	593	51	130	440	43	415	819	218	72	637	136
RTOR Reduction (vph)	0	9	0	0	8	0	0	0	78	0	18	0
Lane Group Flow (vph)	101	635	0	0	605	0	415	819	140	72	755	0
Confl. Peds. (#/hr)	8		8	2		2	8		8	32		32
Confl. Bikes (#/hr)			6			6			4			28
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	27.2	27.2			27.2		44.8	44.8	44.8	44.8	44.8	
Effective Green, g (s)	27.2	27.2			27.2		44.8	44.8	44.8	44.8	44.8	
Actuated g/C Ratio	0.34	0.34			0.34		0.56	0.56	0.56	0.56	0.56	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.0	2.0			2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	184	1150			694		321	1982	868	298	1912	
v/s Ratio Prot		0.19						0.23			0.22	
v/s Ratio Perm	0.19				c0.30		c0.72		0.09	0.14		
v/c Ratio	0.55	0.55			0.87		1.29	0.41	0.16	0.24	0.40	
Uniform Delay, d1	21.4	21.4			24.8		17.6	10.1	8.5	9.0	9.9	
Progression Factor	1.00	1.00			1.16		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	0.3			11.1		153.1	0.6	0.4	1.9	0.6	
Delay (s)	23.2	21.8			39.8		170.7	10.7	8.9	10.9	10.6	
Level of Service	C	C			D		F	B	A	B	B	
Approach Delay (s)		22.0			39.8			56.2			10.6	
Approach LOS		C			D			E			B	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	767	247	136	436	3	0	0	0	107	311	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						3.0	
Lane Util. Factor		*0.92		1.00	*0.92						0.95	
Frpb, ped/bikes		0.95		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.96		1.00	1.00						0.97	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		3125		1770	3423						3381	
Flt Permitted		0.95		0.11	1.00						0.99	
Satd. Flow (perm)		2973		211	3423						3381	
Peak-hour factor, PHF	0.92	0.99	0.92	0.93	0.92	0.92	0.25	0.25	0.25	0.92	0.94	0.92
Adj. Flow (vph)	8	775	268	146	474	3	0	0	0	116	331	100
RTOR Reduction (vph)	0	38	0	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	0	1013	0	146	477	0	0	0	0	0	523	0
Confl. Peds. (#/hr)	106		106	8		8	36		36	11		11
Confl. Bikes (#/hr)			18			14			2			8
Turn Type	Perm			pm+pt						Perm		
Protected Phases		2		1	6						4	
Permitted Phases	2			6						4		
Actuated Green, G (s)		30.3		43.0	43.0						29.0	
Effective Green, g (s)		30.3		43.0	43.0						29.0	
Actuated g/C Ratio		0.38		0.54	0.54						0.36	
Clearance Time (s)		5.0		5.0	5.0						3.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		1126		263	1840						1226	
v/s Ratio Prot				c0.05	0.14							
v/s Ratio Perm		c0.34		0.24							0.15	
v/c Ratio		0.90		0.56	0.26						0.43	
Uniform Delay, d1		23.4		13.7	9.9						19.2	
Progression Factor		1.57		1.00	1.00						1.00	
Incremental Delay, d2		11.2		1.4	0.3						1.1	
Delay (s)		47.9		15.2	10.3						20.3	
Level of Service		D		B	B						C	
Approach Delay (s)		47.9			11.4			0.0			20.3	
Approach LOS		D			B			A			C	

Intersection Summary			
HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	392	731	166	420	969	52	13	1560	1418	3	744	220
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1483	3433	3539	1458		5083	1466		4832	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.91	
Satd. Flow (perm)	3433	3539	1483	3433	3539	1458		4705	1466		4382	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.93	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	426	795	180	429	1042	57	14	1696	1541	3	775	239
RTOR Reduction (vph)	0	0	28	0	0	7	0	0	242	0	56	0
Lane Group Flow (vph)	426	795	152	429	1042	50	0	1710	1299	0	961	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	15.1	33.9	33.9	15.1	34.9	34.9		36.0	36.0		36.0	
Effective Green, g (s)	15.1	33.9	33.9	15.1	34.9	34.9		36.0	36.0		36.0	
Actuated g/C Ratio	0.15	0.34	0.34	0.15	0.35	0.35		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	518	1200	503	518	1235	509		1694	528		1578	
v/s Ratio Prot	0.12	0.22		c0.12	c0.29							
v/s Ratio Perm			0.10			0.03		0.36	c0.89		0.22	
v/c Ratio	0.82	0.66	0.30	0.83	0.84	0.10		1.01	2.46		0.61	
Uniform Delay, d1	41.2	28.2	24.3	41.2	30.0	21.9		32.0	32.0		26.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	9.7	2.9	1.5	10.0	7.1	0.4		24.2	662.9		1.8	
Delay (s)	50.8	31.1	25.9	51.2	37.2	22.3		56.2	694.9		28.0	
Level of Service	D	C	C	D	D	C		E	F		C	
Approach Delay (s)		36.4			40.6			358.9			28.0	
Approach LOS		D			D			F			C	

Intersection Summary			
HCM Average Control Delay	181.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	144.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	807	172	119	1792	1082	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		4.0	4.5	4.5	
Lane Util. Factor	0.97		1.00	*0.50	0.86	
Frpb, ped/bikes	0.99		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	0.97		1.00	1.00	0.98	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	3357		1766	3725	6269	
Flt Permitted	0.96		0.14	1.00	1.00	
Satd. Flow (perm)	3357		256	3725	6269	
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.92	0.92
Adj. Flow (vph)	877	187	129	1867	1176	198
RTOR Reduction (vph)	25	0	0	0	34	0
Lane Group Flow (vph)	1039	0	129	1867	1340	0
Confl. Peds. (#/hr)	30	30	106			
Confl. Bikes (#/hr)		2				
Turn Type			pm+pt			
Protected Phases	4		1	2	2	
Permitted Phases			2			
Actuated Green, G (s)	30.6		35.9	29.0	29.0	
Effective Green, g (s)	30.6		35.9	29.0	29.0	
Actuated g/C Ratio	0.38		0.45	0.36	0.36	
Clearance Time (s)	5.0		4.0	4.5	4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1284		245	1350	2273	
v/s Ratio Prot	c0.31		c0.05	c0.50	0.21	
v/s Ratio Perm			0.19			
v/c Ratio	0.81		0.53	1.38	0.59	
Uniform Delay, d1	22.1		14.1	25.5	20.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	3.9		2.0	177.0	1.1	
Delay (s)	25.9		16.1	202.5	21.8	
Level of Service	C		B	F	C	
Approach Delay (s)	25.9			190.5	21.8	
Approach LOS	C			F	C	

Intersection Summary			
HCM Average Control Delay	98.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	612	11	28	297	12	337
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	651	12	30	323	13	366
Pedestrians	18			18		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	533			360		
pX, platoon unblocked						
vC, conflicting volume			663		1059	675
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			663		1059	675
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		94	18
cM capacity (veh/h)			926		237	447

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	663	353	379
Volume Left	0	30	13
Volume Right	12	0	366
cSH	1700	926	434
Volume to Capacity	0.39	0.03	0.87
Queue Length 95th (ft)	0	3	225
Control Delay (s)	0.0	1.1	48.8
Lane LOS		A	E
Approach Delay (s)	0.0	1.1	48.8
Approach LOS			E

Intersection Summary			
Average Delay	13.5		
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	401	41	66	244	30	222
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	436	45	72	265	33	241
Pedestrians	27			27		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	470			423		
pX, platoon unblocked						
vC, conflicting volume			480		894	485
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			480		894	485
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		89	58
cM capacity (veh/h)			1082		284	569

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	480	337	274
Volume Left	0	72	33
Volume Right	45	0	241
cSH	1700	1082	508
Volume to Capacity	0.28	0.07	0.54
Queue Length 95th (ft)	0	5	79
Control Delay (s)	0.0	2.4	20.1
Lane LOS		A	C
Approach Delay (s)	0.0	2.4	20.1
Approach LOS			C

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	481	32	35	186	115	209
Sign Control	Free			Free	Yield	
Grade	0%			0%	0%	
Peak Hour Factor	0.97	0.92	0.92	0.94	0.92	0.92
Hourly flow rate (vph)	496	35	38	198	125	227
Pedestrians	20			20		
Lane Width (ft)	12.0			12.0		
Walking Speed (ft/s)	4.0			4.0		
Percent Blockage	2			2		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	80			813		
pX, platoon unblocked			0.87		0.87	0.87
vC, conflicting volume			531		807	533
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			391		708	394
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		62	60
cM capacity (veh/h)			1021		332	563

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	531	236	62	62	114	114
Volume Left	0	38	62	62	0	0
Volume Right	35	0	0	0	114	114
cSH	1700	1021	332	332	563	563
Volume to Capacity	0.31	0.04	0.19	0.19	0.20	0.20
Queue Length 95th (ft)	0	3	17	17	19	19
Control Delay (s)	0.0	1.7	18.3	18.3	13.0	13.0
Lane LOS		A	C	C	B	B
Approach Delay (s)	0.0	1.7	14.9			
Approach LOS			B			

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	284	127	92	277	0	0	0	0	89	648	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.91	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1438		1807						4818	
Flt Permitted		1.00	1.00		0.75						0.99	
Satd. Flow (perm)		1863	1438		1367						4818	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	309	138	100	301	0	0	0	0	97	668	38
RTOR Reduction (vph)	0	0	9	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	309	129	0	401	0	0	0	0	0	799	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		29.7	29.7		29.7						42.3	
Effective Green, g (s)		29.7	29.7		29.7						42.3	
Actuated g/C Ratio		0.37	0.37		0.37						0.53	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		692	534		507						2548	
v/s Ratio Prot		0.17										
v/s Ratio Perm			0.09		c0.29						0.17	
v/c Ratio		0.45	0.24		0.79						0.31	
Uniform Delay, d1		19.0	17.4		22.4						10.6	
Progression Factor		1.00	1.00		1.00						1.22	
Incremental Delay, d2		0.5	0.2		8.2						0.3	
Delay (s)		19.4	17.6		30.6						13.2	
Level of Service		B	B		C						B	
Approach Delay (s)		18.9			30.6			0.0			13.2	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	137	1	0	148	119	25	458	242	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0			
Lane Util. Factor		1.00			1.00			0.95	1.00			
Frpb, ped/bikes		1.00			0.97			1.00	0.82			
Flpb, ped/bikes		1.00			1.00			0.99	1.00			
Frt		1.00			0.94			1.00	0.85			
Flt Protected		1.00			1.00			1.00	1.00			
Satd. Flow (prot)		1845			1694			3510	1299			
Flt Permitted		0.97			1.00			1.00	1.00			
Satd. Flow (perm)		1793			1694			3510	1299			
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	16	149	1	0	161	129	27	492	263	0	0	0
RTOR Reduction (vph)	0	0	0	0	46	0	0	0	196	0	0	0
Lane Group Flow (vph)	0	166	0	0	244	0	0	519	67	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2						1		1			
Actuated Green, G (s)		25.5			25.5			11.5	11.5			
Effective Green, g (s)		25.5			25.5			11.5	11.5			
Actuated g/C Ratio		0.57			0.57			0.26	0.26			
Clearance Time (s)		4.0			4.0			4.0	4.0			
Vehicle Extension (s)		2.0			2.0			2.0	2.0			
Lane Grp Cap (vph)		1016			960			897	332			
v/s Ratio Prot					c0.14							
v/s Ratio Perm		0.09						0.15	0.05			
v/c Ratio		0.16			0.25			0.58	0.20			
Uniform Delay, d1		4.7			4.9			14.6	13.1			
Progression Factor		0.47			1.00			1.00	1.00			
Incremental Delay, d2		0.3			0.6			0.6	0.1			
Delay (s)		2.5			5.6			15.2	13.3			
Level of Service		A			A			B	B			
Approach Delay (s)		2.5			5.6			14.5			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	60	27	92	0	96	0	697	56	52	587	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			5.0			5.0	
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99			0.99			0.99			1.00	
Flpb, ped/bikes	0.99	1.00			0.99			1.00			1.00	
Frt	1.00	0.95			0.93			0.99			1.00	
Flt Protected	0.95	1.00			0.98			1.00			1.00	
Satd. Flow (prot)	1750	1761			1656			3477			3518	
Flt Permitted	0.68	1.00			0.83			1.00			0.82	
Satd. Flow (perm)	1244	1761			1407			3477			2895	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.99	0.92
Adj. Flow (vph)	20	65	29	100	0	104	0	758	61	57	593	0
RTOR Reduction (vph)	0	17	0	0	32	0	0	13	0	0	0	0
Lane Group Flow (vph)	20	77	0	0	172	0	0	806	0	0	650	0
Confl. Peds. (#/hr)	22		22	24		24	40		40	48		48
Confl. Bikes (#/hr)			3						17			7
Turn Type	Perm			Perm						Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2						4		
Actuated Green, G (s)	19.0	19.0			19.0			17.0			17.0	
Effective Green, g (s)	19.0	19.0			19.0			17.0			17.0	
Actuated g/C Ratio	0.42	0.42			0.42			0.38			0.38	
Clearance Time (s)	4.0	4.0			4.0			5.0			5.0	
Vehicle Extension (s)	2.0	2.0			2.0			2.0			2.0	
Lane Grp Cap (vph)	525	744			594			1314			1094	
v/s Ratio Prot		0.04						c0.23				
v/s Ratio Perm	0.02				c0.12						0.22	
v/c Ratio	0.04	0.10			0.29			0.61			0.59	
Uniform Delay, d1	7.6	7.9			8.6			11.3			11.2	
Progression Factor	1.00	1.00			0.91			1.00			1.00	
Incremental Delay, d2	0.1	0.3			1.2			2.1			2.4	
Delay (s)	7.8	8.1			9.0			13.5			13.6	
Level of Service	A	A			A			B			B	
Approach Delay (s)		8.1			9.0			13.5			13.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	206	37	14	262	271	32	807	37	50	221	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5			4.5		4.5	4.5	
Lane Util. Factor		0.95			0.95			0.95		1.00	0.95	
Frpb, ped/bikes		0.99			0.98			1.00		1.00	0.99	
Flpb, ped/bikes		1.00			1.00			1.00		1.00	1.00	
Frt		0.98			0.93			0.99		1.00	0.96	
Flt Protected		0.99			1.00			1.00		0.95	1.00	
Satd. Flow (prot)		3422			3213			3503		1769	3371	
Flt Permitted		0.77			0.94			0.93		0.19	1.00	
Satd. Flow (perm)		2654			3029			3275		357	3371	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	38	224	40	15	285	295	35	877	40	52	240	85
RTOR Reduction (vph)	0	24	0	0	186	0	0	4	0	0	32	0
Lane Group Flow (vph)	0	278	0	0	409	0	0	948	0	52	293	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.9			13.9			28.8		37.1	37.1	
Effective Green, g (s)		13.9			13.9			28.8		37.1	37.1	
Actuated g/C Ratio		0.23			0.23			0.48		0.62	0.62	
Clearance Time (s)		4.5			4.5			4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)		615			702			1572		310	2084	
v/s Ratio Prot										0.01	c0.09	
v/s Ratio Perm		0.10			c0.14			c0.29		0.09		
v/c Ratio		0.45			0.58			0.60		0.17	0.14	
Uniform Delay, d1		19.8			20.5			11.4		5.8	4.8	
Progression Factor		1.00			0.66			1.00		1.00	1.00	
Incremental Delay, d2		0.5			0.9			1.7		0.3	0.1	
Delay (s)		20.3			14.3			13.1		6.1	4.9	
Level of Service		C			B			B		A	A	
Approach Delay (s)		20.3			14.3			13.1			5.1	
Approach LOS		C			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	186	110	70	331	141	127	931	135	52	656	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		0.95			0.95			0.95			0.91	
Frpb, ped/bikes		0.97			0.97			0.99			0.99	
Flpb, ped/bikes		1.00			0.99			1.00			1.00	
Frt		0.95			0.96			0.98			0.99	
Flt Protected		1.00			0.99			0.99			1.00	
Satd. Flow (prot)		3226			3236			3413			4990	
Flt Permitted		0.89			0.86			0.65			0.77	
Satd. Flow (perm)		2887			2798			2240			3879	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	28	202	120	76	360	153	138	1012	142	57	713	49
RTOR Reduction (vph)	0	76	0	0	33	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	274	0	0	556	0	0	1276	0	0	807	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm			Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		22.0			22.0			29.0			18.0	
Effective Green, g (s)		22.0			22.0			29.0			18.0	
Actuated g/C Ratio		0.37			0.37			0.48			0.30	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		1059			1026			1220			1164	
v/s Ratio Prot								c0.12				
v/s Ratio Perm		0.09			c0.20			c0.38			0.21	
v/c Ratio		0.26			0.54			1.05			0.69	
Uniform Delay, d1		13.3			15.0			15.5			18.6	
Progression Factor		2.12			1.00			1.00			1.00	
Incremental Delay, d2		0.6			2.1			38.6			3.4	
Delay (s)		28.7			17.1			54.1			22.0	
Level of Service		C			B			D			C	
Approach Delay (s)		28.7			17.1			54.1			22.0	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	421	0	0	542	151	95	507	356	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.91	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3514			3369	1319		4995	1460			
Flt Permitted		0.86			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3021			3369	1319		4995	1460			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	50	458	0	0	589	161	103	551	383	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	51	0	0	152	0	0	0
Lane Group Flow (vph)	0	508	0	0	604	94	0	654	231	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		52.0			52.0	52.0		21.0	21.0			
Effective Green, g (s)		52.0			52.0	52.0		21.0	21.0			
Actuated g/C Ratio		0.65			0.65	0.65		0.26	0.26			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		1964			2190	857		1311	383			
v/s Ratio Prot					c0.18							
v/s Ratio Perm		0.17				0.07		0.13	c0.16			
v/c Ratio		0.26			0.28	0.11		0.50	0.60			
Uniform Delay, d1		5.9			6.0	5.3		25.0	25.9			
Progression Factor		1.00			0.62	0.15		1.00	1.00			
Incremental Delay, d2		0.3			0.3	0.2		0.3	2.7			
Delay (s)		6.2			4.0	1.0		25.3	28.5			
Level of Service		A			A	A		C	C			
Approach Delay (s)		6.2			3.4			26.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	544	232	190	545	0	0	0	0	100	651	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor		0.95	1.00	0.91	0.91						0.91	
Frpb, ped/bikes		1.00	0.91	1.00	1.00						0.95	
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.97	
Frt		1.00	0.85	1.00	1.00						0.98	
Flt Protected		1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)		3539	1439	1610	3379						4527	
Flt Permitted		1.00	1.00	0.95	0.94						0.99	
Satd. Flow (perm)		3539	1439	1610	3174						4527	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	591	252	207	592	0	0	0	0	109	708	159
RTOR Reduction (vph)	0	0	26	0	0	0	0	0	0	0	36	0
Lane Group Flow (vph)	0	591	226	186	613	0	0	0	0	0	940	0
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		
Protected Phases		2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	
Lane Grp Cap (vph)		1239	504	201	1692						1698	
v/s Ratio Prot		c0.17		c0.12	0.05							
v/s Ratio Perm			0.16		0.14						0.21	
v/c Ratio		0.48	0.45	0.93	0.36						0.55	
Uniform Delay, d1		20.3	20.0	34.6	11.1						19.7	
Progression Factor		1.05	1.05	1.00	1.00						1.29	
Incremental Delay, d2		1.3	2.7	42.2	0.0						0.2	
Delay (s)		22.6	23.8	76.8	11.2						25.6	
Level of Service		C	C	E	B						C	
Approach Delay (s)		22.9			26.5			0.0			25.6	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	14	505	127	270	85	1018	233	374	114	0	163	208
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	0.48	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.97				1.00	0.93	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	841	4899				3494	3166	1441	1583		1583	1554
Flt Permitted	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	841	4899				3494	3166	1441	1583		1583	1554
Peak-hour factor, PHF	0.98	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	14	549	138	293	92	1107	253	407	124	0	166	212
RTOR Reduction (vph)	0	69	0	0	0	0	0	0	72	0	0	160
Lane Group Flow (vph)	14	618	0	0	0	1492	452	208	52	0	166	52
Confl. Peds. (#/hr)	22								74			
Confl. Bikes (#/hr)						7			8			7
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	0.8	12.8				16.0	17.2	29.2	29.2		8.0	17.2
Effective Green, g (s)	0.8	12.8				16.0	17.2	29.2	29.2		8.0	17.2
Actuated g/C Ratio	0.01	0.18				0.23	0.25	0.42	0.42		0.11	0.25
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	10	896				799	778	601	660		181	382
v/s Ratio Prot	0.02	c0.13				c0.43	c0.14	0.14	0.03			
v/s Ratio Perm											c0.10	0.03
v/c Ratio	1.40	0.69				1.87	0.58	0.35	0.08		0.92	0.14
Uniform Delay, d1	34.6	26.7				27.0	23.2	13.9	12.3		30.7	20.6
Progression Factor	1.00	1.00				1.00	1.45	1.72	3.68		1.00	1.00
Incremental Delay, d2	438.6	4.3				395.1	0.7	1.5	0.2		42.9	0.1
Delay (s)	473.2	31.1				422.1	34.5	25.4	45.5		73.6	20.7
Level of Service	F	C				F	C	C	D		E	C
Approach Delay (s)		39.9				422.1	33.8			43.9		
Approach LOS		D				F	C			D		

Intersection Summary			
HCM Average Control Delay	208.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1276	170	953	518	188	984
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.91		0.97	0.91	0.97	0.91
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	0.89	0.85
Flt Protected	1.00		0.95	1.00	0.99	1.00
Satd. Flow (prot)	4993		3433	5085	3178	1441
Flt Permitted	1.00		0.95	1.00	0.99	1.00
Satd. Flow (perm)	4993		3433	5085	3178	1441
Peak-hour factor, PHF	0.95	0.92	0.99	0.92	0.92	0.93
Adj. Flow (vph)	1343	185	963	563	204	1058
RTOR Reduction (vph)	25	0	0	0	370	370
Lane Group Flow (vph)	1503	0	963	563	363	159
Confl. Bikes (#/hr)				16		
Turn Type			Prot			Perm
Protected Phases	8		7	4	6	
Permitted Phases						6
Actuated Green, G (s)	18.0		19.0	41.0	21.0	21.0
Effective Green, g (s)	18.0		19.0	41.0	21.0	21.0
Actuated g/C Ratio	0.26		0.27	0.59	0.30	0.30
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1284		932	2978	953	432
v/s Ratio Prot	c0.30		c0.28	0.11	c0.11	
v/s Ratio Perm						0.11
v/c Ratio	1.17		1.03	0.19	0.38	0.37
Uniform Delay, d1	26.0		25.5	6.8	19.4	19.3
Progression Factor	1.05		1.00	1.00	1.00	1.00
Incremental Delay, d2	77.5		38.4	0.1	1.2	2.4
Delay (s)	104.7		63.9	6.9	20.5	21.7
Level of Service	F		E	A	C	C
Approach Delay (s)	104.7			42.9	21.0	
Approach LOS	F			D	C	

Intersection Summary			
HCM Average Control Delay	58.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	150	168	0	0	0	0	0	1554	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.0	3.0						6.0	
Lane Util. Factor				1.00	0.95						0.86	
Frpb, ped/bikes				1.00	1.00						1.00	
Flpb, ped/bikes				1.00	1.00						1.00	
Frt				1.00	1.00						0.98	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1766	3539						6292	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1766	3539						6292	
Peak-hour factor, PHF	0.25	0.95	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	0	0	163	183	0	0	0	0	0	1602	196
RTOR Reduction (vph)	0	0	0	1	0	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	162	183	0	0	0	0	0	1782	0
Confl. Peds. (#/hr)	15		15	2		2				2		2
Confl. Bikes (#/hr)			4									2
Turn Type				Perm								
Protected Phases					4						6	
Permitted Phases				4								
Actuated Green, G (s)				18.2	18.2						47.8	
Effective Green, g (s)				18.2	18.2						47.8	
Actuated g/C Ratio				0.24	0.24						0.64	
Clearance Time (s)				3.0	3.0						6.0	
Vehicle Extension (s)				3.0	3.0						4.0	
Lane Grp Cap (vph)				429	859						4010	
v/s Ratio Prot					0.05						c0.28	
v/s Ratio Perm				c0.09								
v/c Ratio				0.38	0.21						0.44	
Uniform Delay, d1				23.7	22.7						6.9	
Progression Factor				1.00	1.00						0.79	
Incremental Delay, d2				2.5	0.6						0.1	
Delay (s)				26.2	23.2						5.6	
Level of Service				C	C						A	
Approach Delay (s)		0.0			24.6			0.0			5.6	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	NBT	NBR	NEL	NER
Lane Configurations						
Volume (vph)	200	397	1492	95	424	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	4.0		5.0	
Lane Util. Factor	1.00	0.91	0.91		0.97	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.98	
Flt Protected	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1770	5085	5028		3405	
Flt Permitted	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1770	5085	5028		3405	
Peak-hour factor, PHF	0.92	0.93	0.93	0.92	0.92	0.92
Adj. Flow (vph)	217	427	1604	103	461	54
RTOR Reduction (vph)	1	0	9	0	0	0
Lane Group Flow (vph)	216	427	1698	0	515	0
Confl. Peds. (#/hr)				17		
Confl. Bikes (#/hr)				6		
Turn Type	Perm					
Protected Phases		4	2		1	
Permitted Phases	4					
Actuated Green, G (s)	15.3	15.3	24.5		23.2	
Effective Green, g (s)	15.3	15.3	24.5		23.2	
Actuated g/C Ratio	0.20	0.20	0.33		0.31	
Clearance Time (s)	3.0	3.0	4.0		5.0	
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	361	1037	1642		1053	
v/s Ratio Prot		0.08	c0.34		c0.15	
v/s Ratio Perm	c0.12					
v/c Ratio	0.60	0.41	1.03		0.49	
Uniform Delay, d1	27.1	25.9	25.2		21.1	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	7.2	1.2	31.4		0.4	
Delay (s)	34.2	27.1	56.7		21.4	
Level of Service	C	C	E		C	
Approach Delay (s)		29.5	56.7		21.4	
Approach LOS		C	E		C	

Intersection Summary			
HCM Average Control Delay	44.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	311	1000	1172	605	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	5.0	5.0				
Lane Util. Factor					0.91	0.91	0.81	0.81				
Frpb, ped/bikes					0.99	0.98	1.00	1.00				
Flpb, ped/bikes					1.00	1.00	0.98	0.99				
Frt					0.91	0.85	1.00	1.00				
Flt Protected					1.00	1.00	0.95	0.98				
Satd. Flow (prot)					3046	1417	1403	5828				
Flt Permitted					1.00	1.00	0.95	0.98				
Satd. Flow (perm)					3046	1417	1403	5828				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	338	1087	1274	651	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	51	51	284	253	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	831	492	353	1035	0	0	0	0
Confl. Peds. (#/hr)	1		1	4		4	14		14			
Confl. Bikes (#/hr)						1						4
Turn Type						Perm	Perm					
Protected Phases					4			2				
Permitted Phases						4	2					
Actuated Green, G (s)					39.5	39.5	25.5	25.5				
Effective Green, g (s)					39.5	39.5	25.5	25.5				
Actuated g/C Ratio					0.53	0.53	0.34	0.34				
Clearance Time (s)					5.0	5.0	5.0	5.0				
Vehicle Extension (s)					3.0	3.0	3.0	3.0				
Lane Grp Cap (vph)					1604	746	477	1982				
v/s Ratio Prot					0.27							
v/s Ratio Perm						c0.35	c0.25	0.18				
v/c Ratio					0.52	0.66	0.74	0.52				
Uniform Delay, d1					11.6	12.9	21.8	19.9				
Progression Factor					1.00	1.00	1.00	1.00				
Incremental Delay, d2					1.2	4.5	5.9	0.2				
Delay (s)					12.8	17.4	27.7	20.1				
Level of Service					B	B	C	C				
Approach Delay (s)		0.0			14.5			22.6			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	285	82	0	0	0	0	0	0	642	1040	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0								4.0	4.0	
Lane Util. Factor		0.95								0.86	0.86	
Frpb, ped/bikes		1.00								1.00	1.00	
Flpb, ped/bikes		1.00								1.00	1.00	
Frt		0.97								1.00	0.99	
Flt Protected		1.00								0.95	0.99	
Satd. Flow (prot)		3406								1522	4730	
Flt Permitted		1.00								0.95	0.99	
Satd. Flow (perm)		3406								1522	4730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	310	89	0	0	0	0	0	0	698	1130	68
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	259	42	0
Lane Group Flow (vph)	0	383	0	0	0	0	0	0	0	202	1393	0
Confl. Peds. (#/hr)	5		5									
Confl. Bikes (#/hr)			2									2
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		35.0								32.0	32.0	
Effective Green, g (s)		35.0								32.0	32.0	
Actuated g/C Ratio		0.47								0.43	0.43	
Clearance Time (s)		4.0								4.0	4.0	
Vehicle Extension (s)		3.0								3.0	3.0	
Lane Grp Cap (vph)		1589								649	2018	
v/s Ratio Prot		c0.11										
v/s Ratio Perm										0.13	0.29	
v/c Ratio		0.24								0.31	0.69	
Uniform Delay, d1		12.0								14.2	17.5	
Progression Factor		1.00								1.00	1.00	
Incremental Delay, d2		0.4								1.3	2.0	
Delay (s)		12.4								15.5	19.4	
Level of Service		B								B	B	
Approach Delay (s)		12.4			0.0			0.0			18.5	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	1070	0	0	495	304	239	742	49	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Util. Factor		0.95			0.95	1.00		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.96			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3524			3539	1461		3472	1520			
Flt Permitted		0.84			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		2959			3539	1461		3472	1520			
Peak-hour factor, PHF	0.92	0.92	0.25	0.99	0.96	0.96	0.92	0.92	0.92	0.25	0.25	0.25
Adj. Flow (vph)	80	1163	0	0	516	317	260	807	53	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	87	0	0	2	0	0	0
Lane Group Flow (vph)	0	1243	0	0	516	230	0	1067	51	0	0	0
Confl. Peds. (#/hr)	36		36	52		52	35		35	10		10
Confl. Bikes (#/hr)			5			21						22
Turn Type	Perm			Perm		Perm	Perm		Perm			
Protected Phases		4			8			2				
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)		18.0			18.0	18.0		32.0	32.0			
Effective Green, g (s)		18.0			18.0	18.0		32.0	32.0			
Actuated g/C Ratio		0.30			0.30	0.30		0.53	0.53			
Clearance Time (s)		5.0			5.0	5.0		5.0	5.0			
Lane Grp Cap (vph)		888			1062	438		1852	811			
v/s Ratio Prot					0.15							
v/s Ratio Perm		c0.42				0.16		0.31	0.03			
v/c Ratio		1.40			0.49	0.53		0.58	0.06			
Uniform Delay, d1		21.0			17.2	17.5		9.4	6.8			
Progression Factor		1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2		186.7			1.6	4.5		1.3	0.1			
Delay (s)		207.7			18.8	21.9		10.7	6.9			
Level of Service		F			B	C		B	A			
Approach Delay (s)		207.7			20.0			10.6			0.0	
Approach LOS		F			B			B			A	

Intersection Summary			
HCM Average Control Delay	89.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	751	85	47	653	0	0	0	0	684	782	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0					4.0	4.0	
Lane Util. Factor		0.95			0.95					1.00	0.95	
Frpb, ped/bikes		0.99			1.00					1.00	1.00	
Flpb, ped/bikes		1.00			1.00					0.98	1.00	
Frt		0.98			1.00					1.00	0.99	
Flt Protected		1.00			1.00					0.95	1.00	
Satd. Flow (prot)		3464			3526					1734	3511	
Flt Permitted		1.00			0.87					0.95	1.00	
Satd. Flow (perm)		3464			3062					1734	3511	
Peak-hour factor, PHF	0.25	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.25	0.94	0.96	0.92
Adj. Flow (vph)	0	816	92	51	710	0	0	0	0	728	815	38
RTOR Reduction (vph)	0	19	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	889	0	0	761	0	0	0	0	728	845	0
Confl. Peds. (#/hr)	50		50	25		25	17		17	24		24
Confl. Bikes (#/hr)			16			17			2			
Turn Type				Perm						Perm		
Protected Phases		8			4						6	
Permitted Phases				4						6		
Actuated Green, G (s)		19.0			19.0					19.0	19.0	
Effective Green, g (s)		19.0			19.0					19.0	19.0	
Actuated g/C Ratio		0.42			0.42					0.42	0.42	
Clearance Time (s)		3.0			3.0					4.0	4.0	
Vehicle Extension (s)		2.0			2.0					2.0	2.0	
Lane Grp Cap (vph)		1463			1293					732	1482	
v/s Ratio Prot		c0.26									0.24	
v/s Ratio Perm					0.25					c0.42		
v/c Ratio		0.61			0.59					0.99	0.57	
Uniform Delay, d1		10.1			10.0					12.9	9.9	
Progression Factor		1.00			1.00					1.00	1.00	
Incremental Delay, d2		1.9			2.0					32.0	1.6	
Delay (s)		12.0			12.0					44.9	11.5	
Level of Service		B			B					D	B	
Approach Delay (s)		12.0			12.0			0.0			26.9	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	501	10	22	467	52	81	523	29	133	226	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		1.00			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		3486			3456			3475			3369	
Flt Permitted		0.82			0.92			0.84			0.60	
Satd. Flow (perm)		2869			3200			2946			2068	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92
Adj. Flow (vph)	92	545	11	24	508	57	88	568	32	145	233	64
RTOR Reduction (vph)	0	3	0	0	17	0	0	8	0	0	32	0
Lane Group Flow (vph)	0	645	0	0	572	0	0	680	0	0	410	0
Confl. Peds. (#/hr)	80		80	58		58	44		44	41		41
Confl. Bikes (#/hr)			14			10			7			4
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		21.6			21.6			15.9			15.9	
Effective Green, g (s)		21.6			21.6			15.9			15.9	
Actuated g/C Ratio		0.48			0.48			0.35			0.35	
Clearance Time (s)		3.5			3.5			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1377			1536			1041			731	
v/s Ratio Prot												
v/s Ratio Perm		c0.22			0.18			c0.23			0.20	
v/c Ratio		0.47			0.37			0.65			0.56	
Uniform Delay, d1		7.9			7.4			12.2			11.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.1			0.7			1.5			1.0	
Delay (s)		9.0			8.1			13.7			12.7	
Level of Service		A			A			B			B	
Approach Delay (s)		9.0			8.1			13.7			12.7	
Approach LOS		A			A			B			B	

Intersection Summary				
HCM Average Control Delay	10.8	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.55			
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.5	
Intersection Capacity Utilization	76.7%	ICU Level of Service	D	
Analysis Period (min)	15			
c Critical Lane Group				

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	290	1096	0	0	0	0	0	895	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.86						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					6270						5026	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					6270						5026	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	315	1130	0	0	0	0	0	973	62
RTOR Reduction (vph)	0	0	0	0	27	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	1418	0	0	0	0	0	1023	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2717						2220	
v/s Ratio Prot											c0.20	
v/s Ratio Perm					0.23							
v/c Ratio					0.52						0.46	
Uniform Delay, d1					12.4						11.7	
Progression Factor					0.65						1.00	
Incremental Delay, d2					0.6						0.7	
Delay (s)					8.7						12.4	
Level of Service					A						B	
Approach Delay (s)		0.0			8.7			0.0			12.4	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1183	70	436	1152	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5			4.0				
Lane Util. Factor					0.86			0.86				
Frpb, ped/bikes					1.00			1.00				
Flpb, ped/bikes					1.00			0.97				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6330			6107				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6330			6107				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1245	76	474	1200	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	16	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1319	0	0	1658	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type							Perm					
Protected Phases					6			4				
Permitted Phases							4					
Actuated Green, G (s)					29.9			20.6				
Effective Green, g (s)					29.9			20.6				
Actuated g/C Ratio					0.50			0.34				
Clearance Time (s)					5.5			4.0				
Lane Grp Cap (vph)					3154			2097				
v/s Ratio Prot					c0.21							
v/s Ratio Perm								0.27				
v/c Ratio					0.42			0.79				
Uniform Delay, d1					9.5			17.8				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.4			3.1				
Delay (s)					9.9			20.9				
Level of Service					A			C				
Approach Delay (s)		0.0			9.9			20.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	80	0	0	1262	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.25	0.92	0.25	0.25
Hourly flow rate (vph)	87	0	0	1372	0	0
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				1055	320	
pX, platoon unblocked						
vC, conflicting volume	349	6	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	349	6	6			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	100	100			
cM capacity (veh/h)	619	1069	1605			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	NB 4
Volume Total	87	343	343	343	343
Volume Left	87	0	0	0	0
Volume Right	0	0	0	0	0
cSH	619	1700	1700	1700	1700
Volume to Capacity	0.14	0.20	0.20	0.20	0.20
Queue Length 95th (ft)	12	0	0	0	0
Control Delay (s)	11.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.8	0.0			
Approach LOS	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	29.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1295	226	0	0	0	0	0	0	60	1100	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5									5.5	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		0.99									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.98									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		6225									5068	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		6225									5068	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	1349	246	0	0	0	0	0	0	65	1183	0
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1580	0	0	0	0	0	0	0	0	1244	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type										Perm		
Protected Phases		2									4	
Permitted Phases										4		
Actuated Green, G (s)		23.0									26.0	
Effective Green, g (s)		23.0									26.0	
Actuated g/C Ratio		0.38									0.43	
Clearance Time (s)		5.5									5.5	
Lane Grp Cap (vph)		2386									2196	
v/s Ratio Prot		c0.25										
v/s Ratio Perm											0.25	
v/c Ratio		0.66									0.57	
Uniform Delay, d1		15.3									12.8	
Progression Factor		0.83									0.55	
Incremental Delay, d2		1.4									1.0	
Delay (s)		14.1									8.0	
Level of Service		B									A	
Approach Delay (s)		14.1			0.0			0.0			8.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	844	0	0	0	0	0	387	156	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.86						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		6385						6043				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		6385						6043				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	38	917	0	0	0	0	0	421	161	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	943	0	0	0	0	0	568	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		15.4						37.6				
Effective Green, g (s)		15.4						37.6				
Actuated g/C Ratio		0.26						0.63				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1639						3787				
v/s Ratio Prot								c0.09				
v/s Ratio Perm		0.15										
v/c Ratio		0.58						0.15				
Uniform Delay, d1		19.4						4.6				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.3						0.1				
Delay (s)		19.8						4.7				
Level of Service		B						A				
Approach Delay (s)		19.8			0.0			4.7			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	208	1541	0	0	0	0	0	1102	1185	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5						4.5				
Lane Util. Factor		0.86						0.91				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.92				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		6355						4638				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		6355						4638				
Peak-hour factor, PHF	0.92	0.98	0.25	0.25	0.25	0.25	0.25	0.94	0.96	0.25	0.25	0.25
Adj. Flow (vph)	226	1572	0	0	0	0	0	1172	1234	0	0	0
RTOR Reduction (vph)	0	11	0	0	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1787	0	0	0	0	0	2404	0	0	0	0
Confl. Peds. (#/hr)	22		22	50		50	14		14	6		6
Confl. Bikes (#/hr)			16			1			2			2
Turn Type	Perm											
Protected Phases		1						2				
Permitted Phases	1											
Actuated Green, G (s)		18.0						18.0				
Effective Green, g (s)		18.0						18.0				
Actuated g/C Ratio		0.40						0.40				
Clearance Time (s)		4.5						4.5				
Lane Grp Cap (vph)		2542						1855				
v/s Ratio Prot								c0.52				
v/s Ratio Perm		0.28										
v/c Ratio		0.70						1.93dr				
Uniform Delay, d1		11.3						13.5				
Progression Factor		0.78						1.35				
Incremental Delay, d2		0.6						136.6				
Delay (s)		9.4						154.8				
Level of Service		A						F				
Approach Delay (s)		9.4			0.0			154.8			0.0	
Approach LOS		A			A			F			A	

Intersection Summary			
HCM Average Control Delay	92.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1580	485	0	0	0	0	0	0	544	1756	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									3.0	
Lane Util. Factor		0.86									0.91	
Frpb, ped/bikes		1.00									1.00	
Flpb, ped/bikes		1.00									1.00	
Frt		0.96									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		6145									5015	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		6145									5015	
Peak-hour factor, PHF	0.25	0.99	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.95	0.25
Adj. Flow (vph)	0	1596	527	0	0	0	0	0	0	591	1848	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	2121	0	0	0	0	0	0	0	0	2437	0
Confl. Peds. (#/hr)	4		4	8		8	2		2	12		12
Confl. Bikes (#/hr)			2			2			2			
Turn Type										Perm		
Protected Phases		4									6	
Permitted Phases										6		
Actuated Green, G (s)		18.0									20.0	
Effective Green, g (s)		18.0									20.0	
Actuated g/C Ratio		0.40									0.44	
Clearance Time (s)		4.0									3.0	
Vehicle Extension (s)		2.0									2.0	
Lane Grp Cap (vph)		2458									2229	
v/s Ratio Prot		c0.35										
v/s Ratio Perm											0.49	
v/c Ratio		0.86									1.09	
Uniform Delay, d1		12.4									12.5	
Progression Factor		1.00									1.00	
Incremental Delay, d2		4.3									49.9	
Delay (s)		16.7									62.4	
Level of Service		B									E	
Approach Delay (s)		16.7			0.0			0.0			62.4	
Approach LOS		B			A			A			E	

Intersection Summary			
HCM Average Control Delay	41.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	8	430	66	409	410	0	0	251	1916
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1817			1863	1559
Flt Permitted				0.95	1.00	1.00		0.71			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1316			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	9	467	72	445	446	0	0	273	1955
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	0	28
Lane Group Flow (vph)	0	0	0	9	467	17	0	891	0	0	273	1927
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.5	14.5	14.5		34.5			34.5	34.5
Effective Green, g (s)				14.5	14.5	14.5		34.5			34.5	34.5
Actuated g/C Ratio				0.24	0.24	0.24		0.57			0.57	0.57
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				417	450	355		757			1071	896
v/s Ratio Prot					c0.25						0.15	
v/s Ratio Perm				0.01		0.01		0.68				c1.24
v/c Ratio				0.02	1.04	0.05		1.18			0.25	2.15
Uniform Delay, d1				17.3	22.8	17.5		12.8			6.3	12.8
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	52.5	0.1		93.2			0.6	521.5
Delay (s)				17.4	75.3	17.5		105.9			6.9	534.3
Level of Service				B	E	B		F			A	F
Approach Delay (s)		0.0			66.8			105.9			469.6	
Approach LOS		A			E			F			F	

Intersection Summary			
HCM Average Control Delay	321.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	199.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBR	NBL	NBT	NWL2	NWL	NWR
Lane Configurations						
Volume (vph)	0	215	731	77	66	855
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			3.5		2.0	2.0
Lane Util. Factor			0.95		0.97	0.91
Frpb, ped/bikes			1.00		1.00	1.00
Flpb, ped/bikes			1.00		1.00	1.00
Frt			1.00		0.89	0.85
Flt Protected			0.99		0.99	1.00
Satd. Flow (prot)			3499		3170	1441
Flt Permitted			0.99		0.99	1.00
Satd. Flow (perm)			3499		3170	1441
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94
Adj. Flow (vph)	0	234	795	84	72	910
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1029	0	611	455
Confl. Peds. (#/hr)	46					
Confl. Bikes (#/hr)	3					
Turn Type	custom	Perm		Perm		Perm
Protected Phases			3		1	
Permitted Phases	2	3		1		1
Actuated Green, G (s)			16.3		16.2	16.2
Effective Green, g (s)			16.3		16.2	16.2
Actuated g/C Ratio			0.36		0.36	0.36
Clearance Time (s)			3.5		2.0	2.0
Lane Grp Cap (vph)			1267		1141	519
v/s Ratio Prot						
v/s Ratio Perm			0.29		0.19	c0.32
v/c Ratio			0.81		0.54	0.88
Uniform Delay, d1			13.0		11.4	13.5
Progression Factor			0.76		1.00	1.00
Incremental Delay, d2			0.5		1.8	18.5
Delay (s)			10.4		13.2	32.0
Level of Service			B		B	C
Approach Delay (s)			10.4		21.2	
Approach LOS			B		C	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	339	711	96	0	0	0	0	622	86	1	81	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.98			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4924						1832			1862	
Flt Permitted		0.99						1.00			0.72	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.92	0.93	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.25
Adj. Flow (vph)	368	765	104	0	0	0	0	676	93	1	88	0
RTOR Reduction (vph)	0	24	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	1213	0	0	0	0	0	758	0	0	89	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						631			448	
v/s Ratio Prot								c0.41				
v/s Ratio Perm		c1.21									0.07	
v/c Ratio		2.43						1.20			0.20	
Uniform Delay, d1		11.2						14.8			10.4	
Progression Factor		1.00						1.00			0.08	
Incremental Delay, d2		647.8						105.1			0.9	
Delay (s)		659.0						119.9			1.7	
Level of Service		F						F			A	
Approach Delay (s)		659.0			0.0			119.9			1.7	
Approach LOS		F			A			F			A	

Intersection Summary			
HCM Average Control Delay	433.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.93		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	207	182	1395	1030	213	1166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3311		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3311		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	225	198	1484	1120	232	1267
RTOR Reduction (vph)	0	161	146	0	0	0
Lane Group Flow (vph)	225	37	2458	0	232	1267
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	16.8	16.8	37.7		23.5	65.2
Effective Green, g (s)	16.8	16.8	37.7		23.5	65.2
Actuated g/C Ratio	0.19	0.19	0.42		0.26	0.72
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	330	295	1387		462	2564
v/s Ratio Prot	c0.13		c0.74		0.13	c0.36
v/s Ratio Perm		0.02				
v/c Ratio	0.68	0.13	1.77		0.50	0.49
Uniform Delay, d1	34.1	30.5	26.2		28.3	5.3
Progression Factor	1.00	1.00	1.00		0.73	0.82
Incremental Delay, d2	5.7	0.2	350.3		1.6	0.3
Delay (s)	39.8	30.7	376.4		22.1	4.6
Level of Service	D	C	F		C	A
Approach Delay (s)	35.5		376.4			7.3
Approach LOS	D		F			A

Intersection Summary

HCM Average Control Delay	222.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	273	487	265	151	718	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3347		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3347		1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	529	288	164	780	520
RTOR Reduction (vph)	0	0	131	0	0	310
Lane Group Flow (vph)	297	529	321	0	780	210
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	13.0	27.7	10.7		24.1	24.1
Effective Green, g (s)	13.0	27.7	10.7		24.1	24.1
Actuated g/C Ratio	0.22	0.46	0.18		0.40	0.40
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	385	1639	599		713	638
v/s Ratio Prot	c0.17	0.15	c0.10		c0.44	
v/s Ratio Perm						0.13
v/c Ratio	0.77	0.32	0.54		1.09	0.33
Uniform Delay, d1	22.0	10.1	22.3		17.8	12.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	9.2	0.1	0.9		62.3	0.3
Delay (s)	31.2	10.2	23.2		80.1	12.6
Level of Service	C	B	C		F	B
Approach Delay (s)		17.8	23.2		53.1	
Approach LOS		B	C		D	

Intersection Summary			
HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	340	2180	346	0	615	861	738	1165	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4940			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4940			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	354	2370	376	0	661	936	802	1266	0
RTOR Reduction (vph)	0	0	0	21	0	0	0	16	0	0	0
Lane Group Flow (vph)	0	0	0	3079	0	0	661	920	802	1266	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1647			688	308	580	2005	
v/s Ratio Prot				c0.62			0.19		c0.45	0.36	
v/s Ratio Perm								c0.58			
v/c Ratio				1.87			0.96	2.99	1.38	0.63	
Uniform Delay, d1				30.0			35.9	36.2	30.3	13.2	
Progression Factor				1.00			1.51	1.52	1.00	1.00	
Incremental Delay, d2				393.7			4.6	894.8	182.8	0.7	
Delay (s)				423.7			58.7	949.9	213.1	13.8	
Level of Service				F			E	F	F	B	
Approach Delay (s)	0.0			423.7			581.0			91.1	
Approach LOS	A			F			F			F	

Intersection Summary			
HCM Average Control Delay	359.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	123.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	489	2163	881	183	372	1030	148	575	26	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.99	0.85		0.89				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3180	1441		3136				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3180	1441		3136				1770	3539
Peak-hour factor, PHF	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	532	2301	958	199	404	1120	161	625	28	334
RTOR Reduction (vph)	0	0	10	0	9	0	0	0	0	0
Lane Group Flow (vph)	479	2459	1042	0	1676	0	0	0	653	334
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	989	448		1289				236	2084
v/s Ratio Prot	0.30	c0.77	0.72		c0.53				c0.37	0.09
v/s Ratio Perm										
v/c Ratio	0.96	2.49	2.33		1.91dr				2.77	0.16
Uniform Delay, d1	30.4	31.0	31.0		26.5				39.0	8.4
Progression Factor	0.62	0.63	0.62		1.00				1.00	1.00
Incremental Delay, d2	5.5	669.1	597.6		141.0				806.9	0.2
Delay (s)	24.4	688.7	616.8		167.5				845.9	8.6
Level of Service	C	F	F		F				F	A
Approach Delay (s)		590.0			167.5					562.5
Approach LOS		F			F					F

Intersection Summary			
HCM Average Control Delay	479.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	153.6%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2113	296	416	1356	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0	4.0		4.0				
Lane Util. Factor					0.91	1.00		*0.88				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1583		4862				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1583		4862				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.96	0.92	0.98	0.94	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2201	322	424	1443	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	3	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2201	320	0	1866	0	0	0	0
Turn Type						Perm	Perm					
Protected Phases					2			4				
Permitted Phases						2	4					
Actuated Green, G (s)					30.0	30.0		22.0				
Effective Green, g (s)					30.0	30.0		22.0				
Actuated g/C Ratio					0.50	0.50		0.37				
Clearance Time (s)					4.0	4.0		4.0				
Lane Grp Cap (vph)					2543	792		1783				
v/s Ratio Prot					c0.43							
v/s Ratio Perm						0.20		0.38				
v/c Ratio					0.87	0.40		1.05				
Uniform Delay, d1					13.2	9.4		19.0				
Progression Factor					1.00	1.00		1.12				
Incremental Delay, d2					4.3	1.5		22.8				
Delay (s)					17.5	10.9		44.1				
Level of Service					B	B		D				
Approach Delay (s)		0.0			16.6			44.1			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM Average Control Delay	28.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	844	1734	0	0	0	0	0	912	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4775						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4775						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	917	1788	0	0	0	0	0	991	90
RTOR Reduction (vph)	0	0	0	17	17	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	634	2037	0	0	0	0	0	1077	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2308						1340	
v/s Ratio Prot											c0.31	
v/s Ratio Perm				0.42	0.43							
v/c Ratio				0.86	0.88						0.80	
Uniform Delay, d1				13.7	14.0						16.5	
Progression Factor				1.29	1.29						1.00	
Incremental Delay, d2				6.4	2.6						5.2	
Delay (s)				24.2	20.6						21.7	
Level of Service				C	C						C	
Approach Delay (s)		0.0			21.5			0.0			21.7	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	21.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	291	698	14	22	313	26	21	31	38	86	64	57
Peak Hour Factor	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	743	15	24	340	28	23	34	41	93	70	62

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	316	758	392	98	225
Volume Left (vph)	316	0	24	23	93
Volume Right (vph)	0	15	28	41	62
Hadj (s)	0.53	0.02	0.00	-0.17	-0.05
Departure Headway (s)	6.9	6.4	6.3	7.3	6.9
Degree Utilization, x	0.61	1.34	0.68	0.20	0.43
Capacity (veh/h)	513	566	557	435	489
Control Delay (s)	18.8	184.4	21.7	12.1	15.2
Approach Delay (s)	135.7		21.7	12.1	15.2
Approach LOS	F		C	B	C

Intersection Summary			
Delay	88.8		
HCM Level of Service	F		
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

APPENDIX G.3

Revision of Measure DD Configuration for Harrison Street / Lakeside Drive / 20th Street Triangle

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Memorandum

Date:	January 12, 2009
To:	Margaret Stanzione, City of Oakland, Community and Economic Development Agency Tomas Schoenberg, The Swig Company, LLC
From:	Jeffrey Chan, PTP
Subject:	Revision of Measure DD Configuration for Harrison Street / Lakeside Drive / 20th Street Triangle

This memorandum summarizes the proposed revision of the Measure DD configuration for the three intersections at the confluence of Harrison Street, Lakeside Drive, and 20th Street, herein referred to as the "Triangle." The analysis presented below considers the following two intersections, which would be most affected by implementation of Measure DD:

24. Harrison Street / 20th Street / Kaiser Center Access Road; and,
26. Harrison Street / Lakeside Drive.

The third intersection in the Triangle (Intersection #27: Lakeside Drive / 20th Street) would be removed with implementation of Measure DD and would operate without conflicting movements.

Measure DD Configuration

The aim of Measure DD is to enlarge Snow Park and provide enhanced pedestrian access to open space along the shore of Lake Merritt. As originally proposed, Measure DD would remove the 20th Street leg of the Triangle. The primary result of this reconfiguration would be the following changes in traffic flow in the Triangle:

- Eastbound-through vehicles (eastbound vehicles on 20th Street attempting to access Lakeside Drive) would need to first turn left onto northbound Harrison Street before turning right onto Lakeside Drive); and,
- Westbound-through vehicles (westbound vehicles on Lakeside Drive attempting to reach 20th Street) would first need to turn left at Intersection #26.

As Measure DD has already been approved, the Cumulative plus Project Conditions scenario presented in the Measure DD Implementation Project Environmental Impact Report (EIR) was assumed to be the cumulative base scenario for analysis of the Kaiser Center Redevelopment Project—i.e., Cumulative Conditions without the project. Project-related traffic was then added on top to generate Cumulative plus Project Conditions.

Cumulative plus Project Conditions (Kaiser Center Redevelopment Project EIR)

The LOS results for Cumulative plus Project Conditions for the Kaiser Center Redevelopment Project EIR are summarized in **Table 1**.

Table 1: Intersection Level of Service Comparison

Intersection		Existing Conditions	Cumulative Conditions		Cumulative plus Project Conditions
		Kaiser EIR (2008)	DD EIR (2025)(1)	Kaiser EIR (2030)(2)	DD Geometry(3)
AM Peak Hour					
24	Harrison Street / 20th Street	D 40.6	C 25.2	C 28.4	**F 272.8**
26	Harrison Street / Lakeside Drive	A 7.6	C 23.3	C 23.8	C 26.3
PM Peak Hour					
24	Harrison Street / 20th Street	C 34.1	C 22.5	D 47.9	**F 255.9**
26	Harrison Street / Lakeside Drive	B 13.1	C 25.3	D 53.0	**E 66.2**

Notes:
Bold indicates intersections operating at **LOS E** or **LOS F**.
(1) Cumulative plus Project Conditions as presented in the Measure DD Implementation Project EIR.
(2) Cumulative Conditions for the Kaiser Center Redevelopment EIR, assuming identical geometry at Measure DD intersections (#24 and #26) as that presented in the Measure DD Implementation Project EIR for Cumulative plus Project Conditions.
(3) Assumes minor timing and phasing adjustments to accommodate the additional southeastbound approach to be constructed at Intersection #24 as part of the project. An additional eastbound left-turn pocket would be provided, as the existing pocket immediately before the intersection would be removed. Cycle length, however, is assumed to remain constant.

As shown in **Table 1**, the project would contribute to significant cumulative impacts under both the AM and PM peak hours at the intersection of Harrison Street / 20th Street. The project would also potentially contribute to a significant cumulative impact under the PM peak hour at the intersection of Harrison Street / Lakeside Drive.

In order to mitigate the project's contribution to cumulative impacts at the intersection of Harrison Street / 20th Street, the following changes would be required:

- For the AM peak hour, an additional southbound-through lane would be needed, with timing adjustments to increase the green time to this movement.
- For the PM peak hour, the following changes would need to be made:
  - The southeastbound approach (the internal access road) would need to be reconfigured from a through-left and exclusive right to an exclusive left, exclusive through, and exclusive right; and,

  - o The northbound approach (Harrison Street) would need to be reconfigured from a shared left-through-right and exclusive right to an exclusive left, exclusive through, and two exclusive rights.

These changes would be in addition to the "basic" changes necessitated by the new approach, as detailed in Note #3 of **Table 1**. After these changes, the two intersections would operate at acceptable levels of service.

Microsimulation Analysis

Because of the proximity of the intersections of Harrison Street / 20th Street and Harrison Street / Lakeside Drive and the resulting potential for queuing impacts, a preliminary microsimulation analysis of the roadways and intersections in the immediate vicinity of the project was conducted. The microsimulation analysis concluded the following:

- Substantial queuing would occur on the following movements after reconfiguration:
  - o All movements on the northbound approach at Harrison Street / 20th Street, especially the northbound-left and northbound-right movements;
  - o All movements on the southeastbound approach (internal access road) at Harrison Street / 20th Street;
  - o Eastbound-through movement at Harrison Street / Lakeside Drive (Harrison Street to Harrison Street), leading to spillback queuing affecting throughput at Harrison Street / 20th Street;
  - o Southbound-left movement at Harrison Street / Lakeside Drive (Harrison Street to Lakeside Drive), leading to spillback queuing affecting throughput at Harrison Street / 21st Street; and,
  - o Northbound-through movement at Harrison Street / Lakeside Drive (Lakeside Drive to Harrison Street).
- The removal of the eastern 20th Street leg at Harrison Street / 20th Street introduces traffic flow conflicts between northbound Harrison Street vehicles bound for Grand Avenue and I-580 and eastbound 20th Street vehicles attempting to access southbound Lakeside Drive to reach 11th / 12th Streets and I-880. This increases the potential for collisions as vehicles attempt to weave into the appropriate lane or make sudden lane changes and turning movements over short distances.

Improvement Measures

Based on the microsimulation analysis, the reconfiguration of the Harrison Street / Lakeside Drive / 20th Street Triangle as originally proposed by Measure DD would result in substantial queuing issues and weaving conflicts as detailed above. These issues would be complicated by the addition of project-generated traffic.

As a possible alternative configuration, it was proposed that the Lakeside Drive section of the Triangle be removed instead. This would present the following benefits:

- Complete removal of one intersection from the roadway network, streamlining traffic flows. The reconfiguration as originally proposed by Measure DD would have removed the 20th Street section of the Triangle, but the intersection of Harrison Street / 20th Street would still have remained because of the presence of conflicting movements.

- Elimination of the intersection queuing and associated spillback queuing impacts at the intersection of Harrison Street / Lakeside Drive. The alternative configuration would result in approximately 600 feet of unobstructed queuing storage along Harrison Street.
- Elimination of the weaving conflicts and potential for collisions discussed previously, as eastbound-through vehicles from 20th Street would no longer have to use Harrison Street to access Lakeside Drive.
- Placement of the new open space where it results in the most benefits. The original proposal called for Snow Park to be expanded, but the new open space would still be separated from Lake Merritt by Lakeside Drive. The alternative configuration removes the Lakeside Drive section of the Triangle and allows existing open space abutting the lake to be expanded west. This reduces the number of crosswalks by one for pedestrians attempting to access the lakeshore from 20th Street west of Harrison Street and enhances the attractiveness of the shoreline area as a lunchtime or recreational spot for employees in nearby office buildings.
- Improved options for project-related traffic, as the alternative configuration improves connections to Lakeside Drive for vehicles coming to and from the internal access road.

The alternative reconfiguration would require changes to lane striping and configuration and signal timing and phasing. The alternative reconfiguration would also likely result in higher delays and poorer level of service (LOS) at the intersection of Harrison Street / 20th Street than the original reconfiguration. Given, however, that it would produce the benefits described above, particularly the improvement of non-auto access to open space—a primary goal of Measure DD—it is recommended that the analysis proceed assuming the alternative configuration.

Next Steps

AECOM will conduct a microsimulation analysis under Cumulative plus Project Conditions of intersections immediately adjacent to the project site and develop a preliminary design for the intersections of Harrison Street / 20th Street, Harrison Street / Lakeside Drive, and, potentially, Harrison Street / 21st Street. The preliminary design will include the following elements:

- Intersection geometry;
- Roadway geometry;
- Signal timing plans;
- Signal phasing plans; and,
- Any additional considerations such as off-peak access to the parking garage, access to the loading docks, pedestrian access, and bikeway facilities.

The proposed design will be presented to City of Oakland Community and Economic Development Agency (CEDA) and Transportation Services Division (TSD) staff for preliminary approval before proceeding with the rest of the analysis.

APPENDIX G.4

Pedestrian Facilities Survey

Inventory of Pedestrian Signals

	Intersection	Crosswalk	Signal Head?	Countdown?
13	Harrison Street / 21st Street	S	Y	**N**
		W	NB: Y / **SB: N**	**N**
---	Kaiser Plaza / 21st Street	N	N/A	N/A
		E	N/A	N/A
		W	N/A	N/A
17	Webster Street / 21st Street	N	**N**	**N**
		S	**N**	**N**
		E	NB: Y / **SB: N**	**N**
		W	NB: Y / **SB: N**	**N**
18	Franklin Street / 21st Street	N	Y	Y
		S	Y	Y
		E	Y	Y
		W	Y	Y
22	Franklin Street / 20th Street	N	Y	Y
		S	Y	Y
		E	Y	Y
		W	Y	Y
23	Webster Street / 20th Street	N	Y	Y
		S	**EB: N** / WB: Y	**EB: N** / WB: Y
		E	Y	Y
		W	Y	Y
24	Harrison Street / 20th Street / Kaiser Center Access Road	S	Y	Y
		E	Y	Y
		W	Y	Y
26	Harrison Street / Lakeside Drive	SE	Y	Y
		SW	**EB: N** / WB: Y	**EB: N** / WB: Y

Inventory of Curb Ramps

Intersection		Corner	Curb Ramp?	Detectable Warning?
13	Harrison Street / 21st Street	NW	Y	Y
		SE	Y	Y
		SW	Y	**N**
---	Kaiser Plaza / 21st Street	NE	**Y, but not aligned with crosswalk**	**N**
		NW	N: Y / **W: N**	**N**
		SE	**Y, but not aligned with crosswalk**	**N**
		SW	**N**	**N**
17	Webster Street / 21st Street	NE	Y	**N**
		NW	Y	**N**
		SE	Y	**N**
		SW	Y	**N**
18	Franklin Street / 21st Street	NE	Y	Y
		NW	Y	**N**
		SE	Y	**N**
		SW	Y	**N**
22	Franklin Street / 20th Street	NE	Y	**N**
		NW	Y	**N**
		SE	Y	**N**
		SW	Y	**N**
23	Webster Street / 20th Street	NE	Y	**N**
		NW	Y	**N**
		SE	Y	**N**
		SW	Y	**N**
24	Harrison Street / 20th Street / Kaiser Center Access Road	NE	Y	**N**
		NW	Y	**N**
		SE	Y	**N**
		SW	Y	**N**
26	Harrison Street / Lakeside Drive	SE	Y	**N**
		SW	Y	**N**

APPENDIX G.5

Mode Split Findings

AECOM
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Memorandum

Date:	October 17, 2008
To:	Margaret Stanzione, Community and Economic Development Agency, City of Oakland Gordon Lum, Transportation Services Division, Community and Economic Development Agency, City of Oakland
From:	Jeffrey Chan, PTP
Subject:	Kaiser Center Redevelopment Project Transportation Impact Analysis – Mode Split Findings

This memorandum summarizes the findings from the comparison of mode split and average vehicle occupancy (AVO) results contained in various technical sources documenting travel behavior for the Downtown area in the City of Oakland[(1)]. The results of the comparison facilitate the determination of the most suitable mode split and AVO to be used for the proposed Kaiser Center Redevelopment Project located in the City of Oakland, herein referred to as the Project.

Project Description

The proposed project would primarily consist of two new office towers totaling 1,320,000 square feet of office space adjacent to the existing Kaiser Center office tower, located on the west corner of the block bounded by 21st Street on the north, 20th Street on the south, Webster Street on the west and Harrison Street / Lakeside Drive on the east, herein defined as the "Kaiser Center block." Approximately 48,000 square feet of existing retail space would be removed and replaced with 46,000 square feet of retail located at street level along 20th Street and Webster Street and on the sixth floor adjacent to the existing Kaiser Center rooftop garden.

The project is divided into two phases:

- Development Phase I consists of the 42-story North Tower in conjunction with the street level retail complex along Webster Street, comprising approximately 768,000 square feet of office space and approximately 19,000 square feet of retail space located at street level and on the sixth floor; and,
- Development Phase II, which would be commenced concurrently with or following Development Phase I, consists of the 34-story South Tower in conjunction with the street level retail complex along 20th Street, comprising approximately 552,000 square feet of office space and approximately 27,000 square feet of retail space located at street level and on the sixth floor.

(1) Downtown is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south, and I-980 / Brush Street to the west.

A total of 48,000 square feet of existing retail space would be demolished as part of the project. The removal of retail space would be spread across the two phases.

In summary, the overall project (Phase I and Phase II) proposes the following net changes in land use to the Kaiser Center block:

- Increase of 1.32 million square feet of office space; and,
- Decrease of 2,000 square feet of retail space.

The project also proposes new subterranean and above-grade parking consisting of an additional 697 parking spaces. The new parking structures would be incorporated into the existing Kaiser Center Garage. Pedestrian entrances to the office towers would be located on Harrison Street, Webster Street, and 20th Street, while vehicular entrances to the project complex would be via driveways on Harrison Street, 20th Street, and 21st Street. Vehicular access to the garage structure would be provided via the existing entrances and exits located on 21st Street and via the access road on the eastern portion of the block (entrances currently via Harrison Street, 20th Street, and 21st Street).

Data Sources

The mode split and AVO findings were compiled from four different sources with various publication / completion dates:

- *Standard Operating Procedure: Technical Guidelines for Transportation Impact Study*, published by the City of Oakland Community and Economic Development Agency's (CEDA) Transportation Services Division (TSD) in March 2007;
- *Alameda County Congestion Management Agency (ACCMA) Transportation Survey* for the Oakland City Center Complex, commissioned by the Alameda County Congestion Management Agency (ACCMA) in May 1993;
- *Downtown Transportation and Parking Plan*, compiled by Dowling Associates for CEDA and the City of Oakland Redevelopment Agency in October 2003; and,
- Journey to Work Surveys for the 2000 U.S. Census, compiled by the U.S Census Bureau in May 2000.

The results of the mode split and AVO findings from these four sources are summarized in **Table 1**.

Normally, the City of Oakland CEDA TSD has specific mode splits contained in the TSD Guidelines, which are deemed appropriate for projects in Downtown Oakland and account for the extensive transit facilities available in the Downtown area. However, as shown in **Table 1**, different areas of Downtown exhibit different mode split characteristics. These differences are partly a result of the variability in the degree of accessibility by transit facilities, with the City Center Complex being the most accessible by transit facilities and areas north of Downtown being less accessible by transit facilities. The differences are also likely due in part to the availability and cost of parking in the area, with the City Center Garage at high occupancies despite relatively high cost compared to other parking facilities in the Downtown area.

In order to adequately evaluate the potential impacts to area transit facilities due to the Project, it is evident that an alternative mode split would be needed to account for the extensive transit facilities in the vicinity of the Project. In addition, the mode split contained in the TSD Guidelines has a much higher automobile split of 83 percent, compared to the other sources outlined in **Table 1**, which range from 42 percent to 66 percent.

Table 1: Mode Split and Average Vehicle Occupancy Summary

Data		Source				
		Oakland CEDA TSD Guidelines[(a)]	ACCMA Travel Survey[(b)]	Downtown Transportation and Parking Plan[(c)]		2000 U.S. Census[(d)]
Area of Downtown		Entire Downtown	City Center Complex[(1)]	City Center Complex[(1)]	Rest of Downtown[(2)]	Entire Downtown
Mode Split	Auto	83%	65%	42%	66%	54%
	Transit	17%	30%	55%	30%	27%
	Other	--	5%	3%	4%	19%
Average Vehicle Occupancy (AVO)		--	1.48[(3)]	1.13	1.16	1.16

Source:
(a) *Transportation Impact Study* (TIS) *Technical Guidelines* - Section 3B, Transportation Services Division, dated March 9, 2007.
(b) *Alameda County Transportation Survey – City Center Complex, Oakland* (ID Number: 10-7-1), data collected May 1993.
(c) *Downtown Transportation and Parking Plan*, Dowling Associates, dated October 2003.
(d) Average of Census Tracts 4013, 4028, 4029, 4030, 4031, 4033, 4034, 4035, and 4036 from the 2000 U.S. Census.

Notes:
(1) "City Center Complex" is defined as the area of Downtown Oakland bounded by 14th Street to the north, 8th Street to the south, Broadway to the east, and Martin Luther King, Jr. Way to the west.
(2) "Rest of Downtown" is defined as the remainder of Downtown Oakland excluding the City Center Complex.
(3) Adjusted average vehicle occupancy.

Upon reviewing the mode split results contained in the four sources, it was determined that the mode split and AVO results from the 2000 U.S. Census would be inappropriate for the purposes of transportation impact analysis for the Project, as the survey compiled information for home-based work trips originating in Downtown Oakland—i.e., trips by residents living in Downtown Oakland. The two other surveys—conducted by ACCMA and by Dowling Associates—were compiled for work trips terminating in Downtown Oakland—i.e., trips by people who work in Downtown Oakland. As the Project land use program consists of office and retail uses, the 2000 U.S. Census results would not be appropriate.

In addition, it was determined that the mode split and AVO results contained in the transportation survey for the Oakland City Center Complex commissioned by ACCMA in May 1993 are superseded by those contained in the *Downtown Transportation and Parking Plan* compiled by Dowling Associates in October 2003. Specifically, the Dowling Associates study evaluated a specific survey subarea coinciding with the area surveyed for the City Center Complex transportation survey by ACCMA. The survey methodologies were also similar, consisting of paper survey forms distributed to employers in the Oakland City Center Complex. Since the Dowling Associates study was completed in October 2003, the study and its associated results for the Oakland City Center Complex effectively supersede and replace those of the ACCMA transportation survey from 1993.

Finally, it was determined that the mode split and AVO results for the "Rest of Downtown" area from the Dowling Associates study would be the most appropriate due to the survey being the most recent and most applicable in terms of location. The "Rest of Downtown" area is generally well-served by transit facilities but includes areas with varying degrees of transit accessibility, with some areas less accessible to transit facilities than others, unlike the City Center Complex, which is immediately adjacent to the Oakland City Center / 12th Street BART Station. It is important to note that in the survey, "Rest of Downtown" area includes the following areas:

- Old Oakland, in the vicinity of Washington Street / 8th Street, within three blocks of the Oakland City Center / 12th Street BART Station;

- Metro Center, in the vicinity of Harrison Street / 8th Street, adjacent to the Lake Merritt BART Station;
- County Center, in the vicinity of Oak Street / 14th Street, within six blocks of both the Lake Merritt BART Station and 12th Street BART Station; and,
- Upper Downtown, in the vicinity of Harrison Street / 20th Street, adjacent to the Project and within two blocks of the 19th Street / Oakland BART Station.

It must be stressed that for the transportation surveys distributed in Metro Center, County Center, and some Upper Downtown office buildings such as the Caltrans Building, the transit mode share tended to be higher than other office buildings in the "Rest of Downtown" area, as the aforementioned office buildings contain offices of State and County public agencies. State and County agencies provide transit subsidies as part of employee benefits, therefore resulting in a higher transit mode share than typically observed at other office buildings.

Therefore, it would be most prudent to use the mode split and AVO results from the *Downtown Transportation and Parking Plan* compiled by Dowling Associates in October 2003, with a mode split of 66 percent automobile, 30 percent transit, and 4 percent other to be used in the Transportation Impact Analysis for the Project. These numbers would be used in lieu of the standard mode split of 83 percent automobile and 17 percent transit as outlined in the City of Oakland CEDA TSD Guidelines. To simplify the analysis, a mode split of 70 percent automobile and 30 percent transit was assumed in all trip generation calculations.

APPENDIX G.6

Travel Demand Model Land Use Findings

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Memorandum

Date:	May 1, 2009
To:	Margaret Stanzione, Community and Economic Development Agency, City of Oakland Gordon Lum, Transportation Services Division, Community and Economic Development Agency, City of Oakland
From:	Jeffrey Chan, PTP
Subject:	Kaiser Center Redevelopment Project Transportation Impact Analysis – Travel Demand Model Land Use Findings

This memorandum summarizes the findings from the comparison of land use (LU) information contained in the Alameda County Congestion Management Agency's Travel Demand Model (ACCMA Model), CUBE Version 2007, based on Association of Bay Area Governments' (ABAG) and Metropolitan Transportation Commission's (MTC) *Projections 2005* LU information.

ACCMA Model *Projections 2005* Land Use Information

The ACCMA *Projections 2005* LU information allocations represent estimates of existing (Year 2005) and future development (Year 2030) in Alameda County. This land use information was assembled during April 2005 through June 2006. The source data were obtained solely from secondary sources such as Census 2000 counts and estimates, the *Census Planning Package 2000*, development capacity and growth projections from General Plan studies, and comments submitted by local jurisdictions.

The final LU allocations in the ACCMA Model for Year 2030 were adjusted to maintain close compliance to the county-wide control totals, within one (1) percent variance from ABAG and MTC *Projections 2005* control totals, as specified by MTC's publication *Guidance for Consistency of Congestion Management Programs with the Regional Transportation Plan.*

The *Projections 2005* LU information contained in the ACCMA Model for the Transportation Analysis Zones (TAZ) within the City of Oakland (City) were summarized for Year 2005 and Year 2030, aggregated by number of households and number of employment by category. **Table 1** summarizes the LU information in the ACCMA Model for the City, with the ABAG control totals for the City also presented for comparison purposes.

Table 1: ACCMA Model *Projections 2005* Land Use Information – City of Oakland

Land Use Type	Year 2005		Year 2030		Growth Year 2005 to Year 2030	
	ACCMA Model	**ABAG Projections**	**ACCMA Model**	**ABAG Projections**	**ACCMA Model**	**ABAG Projections**
Residential						
Households	154,726	154,330	195,909	195,690	41,183	41,360
Employment						
Retail	24,470	n/d	39,821	n/d	15,351	n/d
Service	90,051	n/d	131,926	n/d	41,875	n/d
Agricultural	290	n/d	354	n/d	64	n/d
Manufacturing	16,512	n/d	28,530	n/d	12,018	n/d
Wholesale	6,490	n/d	6,470	n/d	-20	n/d
Other	70,687	n/d	73,776	n/d	3,089	n/d
Total	*208,500*	*207,100*	*280,877*	*279,340*	*72,377*	*72,240*

Source: Alameda County Congestion Management Agency, 2006; Association of Bay Area Governments, 2005; AECOM, 2009.

Note: n/d denotes no data available.

As shown in **Table 1**, the ACCMA Model *Projections 2005* LU information for TAZ within the City are within one (1) percent variance of the ABAG *Projections 2005* control totals for both residential and employment LU information types, for both Year 2005 and Year 2030, as specified by the MTC. Therefore, it was prudent and reasonable to use ACCMA Model citywide LU information projections for Year 2005 and Year 2030 for the purpose of traffic projections for the Kaiser Center Project (Project) Transportation Impact Analysis (TIA).

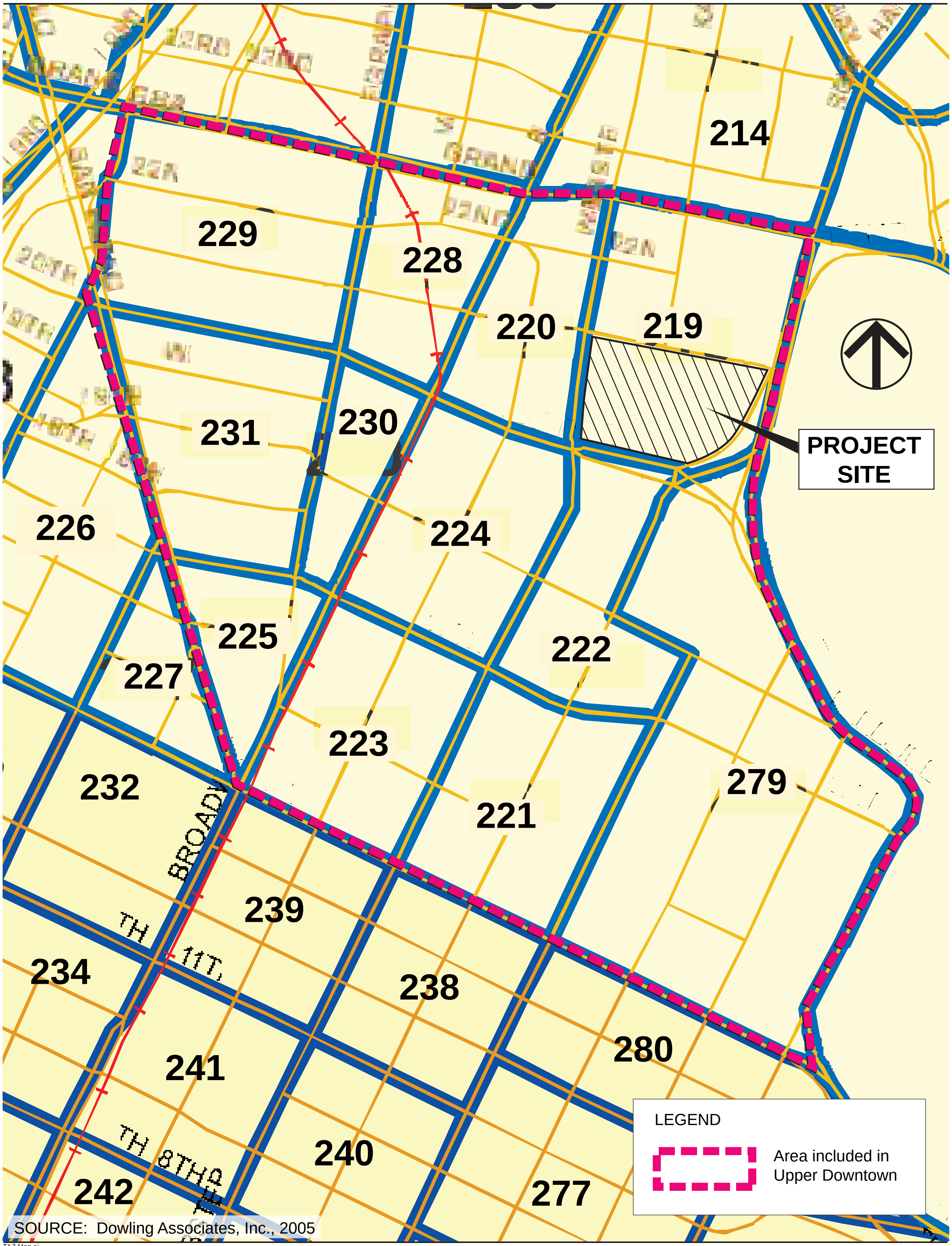
Project Vicinity – Area of Influence

As recommended in the *Mode Split Findings Memorandum* dated October 17, 2008, the Upper Downtown[1] portion of the “Rest of Downtown” area, as specified in the *Downtown Transportation and Parking Study Report* competed by Dowling Associates in October 2003, contained travel characteristics most suitable for the purpose of the Project TIA. This project vicinity area also contains LU information that are expected to have the most influence on travel demand projections for the purpose of Project TIA.

Specifically, the Upper Downtown area, in the vicinity of Harrison Street / 20th Street, adjacent to the Project and within two (2) to three (3) blocks of the 19th Street / Oakland BART Station, contains the Project and other approved, pending, and concurrent developments, is chosen as the area of influence for LU information comparison purposes.

In terms of geographic features, the Upper Downtown area is bounded by Grand Avenue to the north, Lake Merritt to the east, 14th Street to the south, and San Pablo Avenue to the west. Technically, the Upper Downtown area is comprised of twelve (12) ACCMA Model TAZ – TAZ 219 to TAZ 225, TAZ 228 to TAZ 231, and TAZ 279. **Figure 1** shows the Upper Downtown area TAZ locations in relation to the rest of the City.

(1) Downtown is defined in the Land Use and Transportation Element of the General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south, and I-980 / Brush Street to the west.



SOURCE: Dowling Associates, Inc., 2005

TAZ Map.ai

Figure 1

TAZ MAP – UPPER DOWNTOWN OAKLAND

Land Use Adjustments in Project Vicinity

The following two (2) adjustments were made as part of the Project TIA efforts:

- **TAZ 219**, which contains the Project, had its LU information adjusted to remove 190 retail employment and 1,372 service employment to result in zero (0) net growth from Year 2005 to Year 2030 as part of the TIA, as the TIA adopted a methodology to use Institute of Transportation Engineers' (ITE) *Trip Generation Manual, 7th Edition* trip generation rates combined with mode split information contained in the *Mode Split Findings Memorandum* dated October 17, 2008 for Project-generated trips in lieu of ACCMA Model growth projections for solely this Project; and,
- **TAZ 279**, which contains the Emerald Views Condominiums at 222 19th Street, had its LU information adjusted by an additional 370 dwelling units (DU) and three (3) retail employment (equivalent of approximately 933 square feet (SF) café) as part of the TIA.

All other ACCMA Model TAZ LU information were not adjusted as part of the Project TIA efforts.

Table 2 below summarizes the LU information in the TAZ in the Upper Downtown area and the adjustments made to these LU information as part of the Project TIA.

Table 2: ACCMA Model *Projections 2005* Land Use Information – Upper Downtown

Land Use Type	Year 2005	Year 2030	Growth Year 2005 to Year 2030		
	ACCMA Model	ACCMA Model	ACCMA Model	Kaiser TIA Adjustments	Net After Adjustments
Residential					
Households	3,961	7,360	3,399	370	3,769
Employment					
Retail	1,674	2,802	1,128	-190	938
Service	13,312	20,132	6,820	-1,372	5,448
Agricultural	0	0	0	n/a	0
Manufacturing	1,122	2,175	1,053	n/a	1,053
Wholesale	282	276	-6	n/a	-6
Other	10,710	11,171	461	n/a	461
Total	*27,100*	*36,556*	*9,456*	*-1,562*	*7,894*

Source: Alameda County Congestion Management Agency, 2006; Association of Bay Area Governments, 2005; City of Oakland, 2009; AECOM, 2009.

Note: n/a denotes not adjusted.

Land Use Information from Past, Present, Existing, Approved, Pending, and Reasonably Foreseeable Future Developments in Project Vicinity

The following developments are in the Upper Downtown area, and are considered past, present, existing, approved, pending, and reasonably foreseeable future developments as of the Project's Notice of Preparation date on May 22, 2008. The developments and their respective LU information, aggregated by locations of the development by ACCMA Model TAZ, are as follows:

- **TAZ 223 –** in the vicinity of east of Broadway between 14th Street and 17th Street, encompasses:
    - 1538 Broadway – 69 DU; and,
    - 1640 Broadway – 254 DU, 177,600 SF office, 4,700 SF retail.
- **TAZ 224 –** in the vicinity of east of Broadway between 17th Street and 20th Street, encompasses:
    - 1938 Broadway – 220 DU, 829,500 SF office, 85,200 SF retail.
- **TAZ 229 –** in the vicinity of west of Telegraph Avenue between 20th Street amd West Grand Avenue, encompasses:
    - 630 Thomas Berkley Square – 88 DU, three (3) commercial spaces.
- **TAZ 231 –** in the vicinity of west of Telegraph Avenue between 17th Street and 20th Street, encompasses:
    - Fox Courts – 80 DU, 2,500 SF childcare, art studio;
    - 1755 Broadway – 24 DU;
    - Uptown Development – 665 DU, 14,000 SF retail; and,
    - Uptown Parcel 4 – 370 DU.
- **TAZ 279 –** in the vicinity of east of Alice Street between 14th Street and 20th Street, encompasses:
    - Emerald Views Condominiums at 222 19th Street – 370 DU, 933 SF café; and,
    - Jackson Courtyard Condominiums – 45 DU.

Table 3 below summarizes the Upper Downtown area TAZ LU information from all the above mentioned past, present, existing, approved, pending, and reasonably foreseeable future developments against the net growth after adjustments made to the LU information as part of the Project TIA. Note that LU information for TAZ 279 for the Emerald Views Condominiums at 222 19th Street had been adjusted as part of the Project TIA, and thus are not included in the calculation of past, present, existing, approved, pending, and reasonably foreseeable future developments in the Project vicinity. Detailed calculations of LU information by TAZ are presented in the **Appendix** to this memorandum.

Table 3: ACCMA Model *Projections 2005* Land Use Information – Upper Downtown

Land Use Type	Growth Year 2005 to Year 2030				
	ACCMA Model	**Kaiser TIA Adjustments**	**Net After Adjustments**	**Past, Present, Existing, Approved, Pending, and Reasonably Foreseeable Future Developments**	**Difference**
Residential					
Households	3,399	370	3,769	1,815	1,954
Employment					
Retail	1,128	-190	938	211	727
Service	6,820	-1,372	5,448	3,398	2,050
Agricultural	0	n/a	0	n/a	0
Manufacturing	1,053	n/a	1,053	n/a	1,053
Wholesale	-6	n/a	-6	n/a	-6
Other	461	n/a	461	n/a	461
Total	*9,456*	*-1,562*	*7,894*	*3,609*	*4,285*

Source: Alameda County Congestion Management Agency, 2006; Association of Bay Area Governments, 2005; City of Oakland, 2009; AECOM, 2009.
Note: n/a denotes not adjusted.

As shown in **Table 3**, the calculated growth in the ACCMA Model *Projections 2005* LU information from Year 2005 to Year 2030, even after adjustments made to LU information in TAZ 219 and TAZ 279 as part of the Project TIA, overestimates past, present, existing, approved, pending, and reasonably foreseeable future developments by the following amounts in the LU information for the Upper Downtown area – 1,954 DU, 727 retail employment (equivalent of approximately 363,500 SF of retail space), and 2,050 service employment (equivalent of approximately 615,000 SF of office space). These excesses in LU information were accounted for in the projections of the 2030 Cumulative No Project intersections and roadway traffic volumes in the Project TIA, and as such, represent the maximum-probable development scenario for the Upper Downtown area, as contained in the ACCMA Model *Projections 2005* LU information, which is deemed to be consistent within one (1) percent of the ABAG LU *Projections 2005*.

Therefore, it would be most prudent to recommend no further adjustments to the ACCMA Model LU information for the purpose of the Project TIA, and retain the hybrid trip generation methodology of using ITE *Trip Generation Manual, 7th Edition* trip generation rates in conjunction with the mode split and other travel characteristics results as summarized in the *Mode Split Findings Memorandum* dated October 17, 2008 for the purpose of evaluating Project-related trips and their potential impacts.

Appendix: Kaiser Center Redevelopment Project - Travel Demand Model Land Use Findings - Land Use Calculations and Adjustments

ACCMA Model Year 2005 Land Uses - Upper Downtown Oakland Area

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP
219	1	1	1	0	0	1	22	0	34	0.2290	7522	223	2753	4018	0	464	64
220	1	4	4	0	0	1	12	0	4	0.2290	857	90	340	397	0	30	0
221	823	1178	1178	556	36	787	17	5	6	0.2290	1430	135	395	842	0	58	0
222	2	2	2	1	0	2	13	0	20	0.2290	4494	120	2678	1337	0	269	90
223	23	28	46	22	1	22	17	0	12	0.2290	2654	300	1235	1019	0	80	20
224	44	77	77	34	1	43	17	0	13	0.2290	2922	180	2034	641	0	67	0
225	45	68	68	16	1	44	8	1	15	0.2570	1755	96	942	703	0	10	4
228	0	0	0	0	0	0	12	0	10	0.2570	1206	60	773	302	0	36	35
229	429	597	630	177	15	414	23	9	8	0.2570	958	45	436	438	0	28	11
230	0	0	0	0	0	0	7	0	6	0.2570	740	305	275	130	0	20	10
231	0	0	0	0	0	0	19	0	2	0.2570	239	40	172	27	0	0	0
279	2593	3912	3988	2029	25	2568	49	42	25	0.1990	2323	80	1279	856	0	60	48
Total	**3961**	**5867**	**5994**	**2835**	**79**	**3882**	**216**	**57**	**155**		**27100**	**1674**	**13312**	**10710**	**0**	**1122**	**282**

ACCMA Model Year 2030 Land Uses - Upper Downtown Oakland Area

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP
219	1	1	1	0	0	1	22	0	8	0.1910	9414	416	4125	4086	0	724	63
220	1	5	5	0	0	1	12	4	6	0.1910	2144	211	1026	461	0	446	0
221	1104	1894	1880	894	12	1092	17	0	18	0.1910	1545	173	469	845	0	58	0
222	2	2	2	1	0	2	13	1	21	0.1910	4581	158	2725	1341	0	269	88
223	185	273	436	216	4	181	17	0	18	0.1910	5437	400	3558	1177	0	283	19
224	44	92	92	41	0	44	17	0	8	0.1910	4591	309	3227	776	0	279	0
225	45	83	75	19	4	41	8	6	10	0.2130	2029	182	1127	706	0	10	4
228	0	0	0	0	0	0	12	13	3	0.2130	1409	112	920	307	0	36	34
229	1875	3173	3025	925	154	1721	23	0	6	0.2130	727	85	193	438	0	0	11
230	0	0	0	0	0	0	7	10	3	0.2130	1364	408	780	146	0	20	10
231	1427	3180	3181	934	83	1344	19	0	44	0.2130	650	228	390	32	0	0	0
279	2676	4452	4505	2511	25	2651	49	2	9	0.2270	2665	120	1592	856	0	50	47
Total	**7360**	**13155**	**13202**	**5541**	**282**	**7078**	**216**	**36**	**154**		**36556**	**2802**	**20132**	**11171**	**0**	**2175**	**276**

ACCMA Model Year 2005 to Year 2030 Growth

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP
219	0	0	0	0	0	0	0	0	-26	0	1892	193	1372	68	0	260	-1
220	0	1	1	0	0	0	0	4	2	0	1287	121	686	64	0	416	0
221	281	716	702	338	-24	305	0	-5	12	0	115	38	74	3	0	0	0
222	0	0	0	0	0	0	0	1	1	0	87	38	47	4	0	0	-2
223	162	245	390	194	3	159	0	0	6	0	2783	100	2323	158	0	203	-1
224	0	15	15	7	-1	1	0	0	-5	0	1669	129	1193	135	0	212	0
225	0	15	7	3	3	-3	0	5	-5	0	274	86	185	3	0	0	0
228	0	0	0	0	0	0	0	13	-7	0	203	52	147	5	0	0	-1
229	1446	2576	2395	748	139	1307	0	-9	-2	0	-231	40	-243	0	0	-28	0
230	0	0	0	0	0	0	0	10	-3	0	624	103	505	16	0	0	0
231	1427	3180	3181	934	83	1344	0	0	42	0	411	188	218	5	0	0	0
279	83	540	517	482	0	83	0	-40	-16	0	342	40	313	0	0	-10	-1
Total	**3399**	**7288**	**7208**	**2706**	**203**	**3196**	**0**	**-21**	**-1**		**9456**	**1128**	**6820**	**461**	**0**	**1053**	**-6**

Appendix: Kaiser Center Redevelopment Project - Travel Demand Model Land Use Findings - Land Use Calculations and Adjustments

Kaiser Center TIA Adjustments

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP	
219											-1565	-193	-1372					* Adjusted to zero-out Kaiser Center Project growth
220																		
221																		
222																		
223																		
224																		
225																		
228																		
229																		
230																		
231																		
279	370										3	3						* Adjusted to account for 222-10th Street Development
Total	370	0	0	0	0	0	0	0	0		-1562	-190	-1372	0	0	0	0	

Net Growth After Kaiser Center TIA Adjustments

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP
219	0	0	0	0	0	0	0	0	-26	-0.0380	327	0	0	68	0	260	-1
220	0	1	1	0	0	0	0	4	2	-0.0380	1287	121	686	64	0	416	0
221	281	716	702	338	-24	305	0	-5	12	-0.0380	115	38	74	3	0	0	0
222	0	0	0	0	0	0	0	1	1	-0.0380	87	38	47	4	0	0	-2
223	162	245	390	194	3	159	0	0	6	-0.0380	2783	100	2323	158	0	203	-1
224	0	15	15	7	-1	1	0	0	-5	-0.0380	1669	129	1193	135	0	212	0
225	0	15	7	3	3	-3	0	5	-5	-0.0440	274	86	185	3	0	0	0
228	0	0	0	0	0	0	0	13	-7	-0.0440	203	52	147	5	0	0	-1
229	1446	2576	2395	748	139	1307	0	-9	-2	-0.0440	-231	40	-243	0	0	-28	0
230	0	0	0	0	0	0	0	10	-3	-0.0440	624	103	505	16	0	0	0
231	1427	3180	3181	934	83	1344	0	0	42	-0.0440	411	188	218	5	0	0	0
279	453	540	517	482	0	83	0	-40	-16	0.0280	345	43	313	0	0	-10	-1
Total	3769	7288	7208	2706	203	3196	0	-21	-1		7894	938	5448	461	0	1053	-6

Approved, Pending, and Planned Project Adjustments

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP	
219																		
220																		
221																		
222																		
223	323										601	9	592					* Adjusted to include 1538, 1640 Broadway
224	220										2964	171	2793					* Adjusted to include 1938 Broadway
225																		
228																		
229	88										6	3	3					* Adjusted to include 630 Thomas Berkley Square
230	1139										38	28	10					* Adjusted to include Fox Courts, 1755 Broadway,
231																		Uptown Development, Uptown Parcel 4
279	45																	* Adjusted to include Jackson Courtyard
Total	1815	0	0	0	0	0	0	0	0		3609	211	3398	0	0	0	0	

Appendix: Kaiser Center Redevelopment Project - Travel Demand Model Land Use Findings - Land Use Calculations and Adjustments

Difference

ZONE	TOTHH	HHPOP	TOTPOP	EMPRES	SFHH	MFHH	TACRES	RESACRE	CIACRE	Z2SHARE	TEMP	RETEMP	SEREMP	OTHEMP	AGEMP	MANEMP	WHOEMP
219	0	0	0	0	0	0	0	0	-26		327	0	0	68	0	260	-1
220	0	1	1	0	0	0	0	4	2		1287	121	686	64	0	416	0
221	281	716	702	338	-24	305	0	-5	12		115	38	74	3	0	0	0
222	0	0	0	0	0	0	0	1	1		87	38	47	4	0	0	-2
223	-161	245	390	194	3	159	0	0	6		2182	91	1731	158	0	203	-1
224	-220	15	15	7	-1	1	0	0	-5		-1295	-42	-1600	135	0	212	0
225	0	15	7	3	3	-3	0	5	-5		274	86	185	3	0	0	0
228	0	0	0	0	0	0	0	13	-7		203	52	147	5	0	0	-1
229	1358	2576	2395	748	139	1307	0	-9	-2		-237	37	-246	0	0	-28	0
230	-1139	0	0	0	0	0	0	10	-3		586	75	495	16	0	0	0
231	1427	3180	3181	934	83	1344	0	0	42		411	188	218	5	0	0	0
279	408	540	517	482	0	83	0	-40	-16		345	43	313	0	0	-10	-1
Total	**1954**	**7288**	**7208**	**2706**	**203**	**3196**	**0**	**-21**	**-1**		**4285**	**727**	**2050**	**461**	**0**	**1053**	**-6**

Conversion Rates

Office	**300**	SQFT / Employee
Retail	**500**	SQFT / Employee

Abbreviations

TOTHH	Total Households
HHPOP	Household Population
TOTPOP	Total Population
EMPRES	Employed Residents
SFHH	Single Family Households
MFHH	Multi-Family Households
TEMP	Total Employment
RETEMP	Retail Employment
SEREMP	Service Employment
OTHEMP	Other Employment
AGEMP	Agricultural Employment
MANEMP	Manufacturing Employment
WHOEMP	Wholesale Employment

APPENDIX G.7

Queue Calculations

Existing Conditions

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	28	308	52	505	175	1589
v/c Ratio	0.06	0.64	0.12	0.71	0.19	1.78
Control Delay	11.9	21.2	5.2	17.8	7.7	372.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	21.2	5.2	17.8	7.7	372.1
Queue Length 50th (ft)	5	68	0	95	23	~640
Queue Length 95th (ft)	14	124	16	#228	46	#869
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	487	715	928	894
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.55	0.11	0.71	0.19	1.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2: Oakland Avenue & I-580 Off-ramp

Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	457	470	1028	693
v/c Ratio	0.86	0.95	0.48	1.89
Control Delay	34.2	53.6	7.4	433.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	34.2	53.6	7.4	433.0
Queue Length 50th (ft)	123	160	93	~402
Queue Length 95th (ft)	#272	#294	128	#589
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	534	495	2155	366
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.86	0.95	0.48	1.89

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: 27th Street & Harrison Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	194	388	108	69	182	208	320	1117	199	539
v/c Ratio	0.53	0.38	0.23	0.41	0.62	0.50	0.64	1.02	0.92	0.56
Control Delay	40.0	27.9	25.3	44.9	43.8	8.9	42.2	64.9	85.2	30.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	27.9	25.3	44.9	43.8	8.9	42.2	64.9	85.2	30.0
Queue Length 50th (ft)	99	95	43	38	98	0	89	~345	114	134
Queue Length 95th (ft)	#213	142	89	72	143	45	129	#486	#242	191
Internal Link Dist (ft)		1001			87			632		676
Turn Bay Length (ft)	70						90		70	
Base Capacity (vph)	368	1034	470	216	559	608	572	1092	216	961
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.38	0.23	0.32	0.33	0.34	0.56	1.02	0.92	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

24: 20th Street & Harrison Street

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR	SBR2
Lane Group Flow (vph)	253	179	11	145	879	199	86	40
v/c Ratio	0.32	0.43	0.06	0.43	0.78	0.43	0.14	0.06
Control Delay	23.2	23.7	26.1	32.1	30.1	39.4	18.6	11.0
Queue Delay	0.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	24.3	26.1	32.1	30.1	39.4	18.6	11.0
Queue Length 50th (ft)	45	56	5	36	209	57	35	0
Queue Length 95th (ft)	79	119	8	32	255	77	75	29
Internal Link Dist (ft)		30		382	601	222		
Turn Bay Length (ft)			175				90	90
Base Capacity (vph)	792	412	221	435	1225	458	624	708
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	116	59	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.51	0.05	0.33	0.72	0.43	0.14	0.06

Intersection Summary

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	12	395	56	676	196	1388
v/c Ratio	0.03	0.89	0.14	0.85	0.18	1.47
Control Delay	17.7	48.1	7.1	24.1	6.6	235.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	48.1	7.1	24.1	6.6	235.2
Queue Length 50th (ft)	3	138	0	181	30	~710
Queue Length 95th (ft)	8	#218	21	#398	56	#943
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	417	450	398	795	1078	945
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.88	0.14	0.85	0.18	1.47

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	891	684	80
v/c Ratio	1.67	1.07	0.18
Control Delay	327.0	74.1	1.2
Queue Delay	0.0	0.0	0.0
Total Delay	327.0	74.1	1.2
Queue Length 50th (ft)	~130	~204	0
Queue Length 95th (ft)	#197	#275	0
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	534	642	448
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.67	1.07	0.18

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	NWL	NWR	NET	SWL	SWT
Lane Group Flow (vph)	269	327	1897	255	810
v/c Ratio	0.73	0.27	1.25	0.59	0.33
Control Delay	44.1	1.4	142.4	30.4	6.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	1.4	142.4	30.4	6.5
Queue Length 50th (ft)	143	0	~682	121	86
Queue Length 95th (ft)	208	15	#822	m#237	m204
Internal Link Dist (ft)	560		322		429
Turn Bay Length (ft)	150			150	
Base Capacity (vph)	511	1208	1516	434	2484
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.27	1.25	0.59	0.33

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1421	748	667	389	811
v/c Ratio	0.86	0.91	1.43	0.74	0.40
Control Delay	33.4	51.2	223.8	37.3	11.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	51.2	223.8	37.3	11.2
Queue Length 50th (ft)	251	~262	~500	189	124
Queue Length 95th (ft)	309	m217	m#412	290	164
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1681	819	468	580	2046
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.85	0.91	1.43	0.67	0.40

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Near-Term (2015) without Project Conditions

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MITIG8 - AM                Wed Aug 26, 2009 11:04:01                  Page 1-1
---------------------------------------------------------------------------------
---------------------------------------------------------------------------------
                       Level Of Service Computation Report
            2000 HCM Unsignalized Method (Future Volume Alternative)
*********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
*********************************************************************************
Average Delay (sec/veh):      9.0       Worst Case Level Of Service: D[ 28.3]
*********************************************************************************
Street Name:          Harrison Street            Stanley Place / I-580 EB Off-Ramp
Approach:       North Bound       South Bound       East Bound        West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled      Uncontrolled       Yield Sign        Yield Sign
Rights:           Include           Include           Include           Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1060     0     0    0   491     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1060     0     0    0   491     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1060     0     0    0   491     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.92  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1152     0     0    0   534     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1152     0     0    0   534     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   384  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   668  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   668  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.80  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   8.1  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  28.3 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     D     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx            xxxxxx              28.3            xxxxxx
ApproachLOS:        *                 *                 D                 *
*********************************************************************************
Note: Queue reported is the number of cars per lane.
*********************************************************************************
```


Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	26	362	58	553	182	1871
v/c Ratio	0.06	0.71	0.13	0.80	0.20	2.21
Control Delay	11.7	23.7	5.1	23.0	8.0	563.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	23.7	5.1	23.0	8.0	563.9
Queue Length 50th (ft)	5	80	0	116	26	~834
Queue Length 95th (ft)	17	#156	18	#275	54	#1064
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	492	694	901	848
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.65	0.12	0.80	0.20	2.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1274	382	154
v/c Ratio	1.30	0.59	0.28
Control Delay	157.9	15.5	11.6
Queue Delay	0.0	0.0	0.0
Total Delay	157.9	15.5	11.6
Queue Length 50th (ft)	~159	70	43
Queue Length 95th (ft)	#235	137	m78
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	983	644	551
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.30	0.59	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWT	NWR	NET
Lane Group Flow (vph)	2679	137	929
v/c Ratio	1.11	0.17	0.46
Control Delay	78.5	3.1	17.3
Queue Delay	81.0	0.0	0.1
Total Delay	159.6	3.1	17.4
Queue Length 50th (ft)	~569	1	121
Queue Length 95th (ft)	#664	29	157
Internal Link Dist (ft)	378		334
Turn Bay Length (ft)			
Base Capacity (vph)	2415	821	2036
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	341	0	238
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.29	0.17	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	585	596	1352	756
v/c Ratio	1.20	1.20	0.63	2.12
Control Delay	130.1	130.3	9.1	535.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	130.1	130.3	9.1	535.1
Queue Length 50th (ft)	~263	~272	140	~450
Queue Length 95th (ft)	#449	#458	195	#636
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	489	498	2153	356
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.20	1.20	0.63	2.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	226	452	126	74	196	224	383	1175	239	646
v/c Ratio	0.64	0.44	0.27	0.43	0.63	0.51	0.72	1.08	1.11	0.69
Control Delay	44.9	28.9	26.2	45.4	43.6	8.6	44.5	81.5	131.8	33.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.9	28.9	26.2	45.4	43.6	8.6	44.5	81.5	131.8	33.7
Queue Length 50th (ft)	118	113	52	40	105	0	106	~394	~156	172
Queue Length 95th (ft)	#270	165	104	81	161	56	154	#525	#301	234
Internal Link Dist (ft)		1001			87			632		676
Turn Bay Length (ft)	70						90		70	
Base Capacity (vph)	355	1028	467	216	559	619	572	1091	216	931
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	0.44	0.27	0.34	0.35	0.36	0.67	1.08	1.11	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	228	438	148	70	576	124	190	571	145	879
v/c Ratio	0.78	0.59	0.21	0.20	0.92	0.21	1.31	0.42	0.54	0.62
Control Delay	35.9	25.1	4.2	19.5	60.1	12.2	202.3	13.3	29.3	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	25.1	4.2	19.5	60.1	12.2	202.3	13.3	29.3	16.3
Queue Length 50th (ft)	67	186	0	23	330	9	~135	71	59	133
Queue Length 95th (ft)	#177	296	37	m45	#526	m41	m#245	m92	123	195
Internal Link Dist (ft)		468			962			1466		318
Turn Bay Length (ft)				150			70		80	
Base Capacity (vph)	311	746	711	443	623	602	145	1360	268	1427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.59	0.21	0.16	0.92	0.21	1.31	0.42	0.54	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	145	684	140	333	910	46	1262	1084	696
v/c Ratio	0.49	0.55	0.24	0.71	0.62	0.07	0.74	1.39	0.41
Control Delay	48.9	28.3	12.6	50.1	25.8	6.1	31.2	204.4	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	28.3	12.6	50.1	25.8	6.1	31.2	204.4	24.2
Queue Length 50th (ft)	46	183	27	105	235	0	253	~761	117
Queue Length 95th (ft)	75	248	73	148	316	22	309	#1011	152
Internal Link Dist (ft)		526			509		546		632
Turn Bay Length (ft)	240			230					
Base Capacity (vph)	549	1253	575	549	1465	630	1702	779	1693
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.55	0.24	0.61	0.62	0.07	0.74	1.39	0.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

24: 20th Street & Harrison Street

Lane Group	EBL	NBT	SBT	SBR	SBR2
Lane Group Flow (vph)	535	1028	341	154	55
v/c Ratio	0.40	0.79	0.54	0.21	0.07
Control Delay	19.2	24.6	24.6	9.5	2.5
Queue Delay	0.0	62.1	2.1	1.5	0.0
Total Delay	19.2	86.7	26.6	11.0	2.5
Queue Length 50th (ft)	54	204	57	32	0
Queue Length 95th (ft)	87	260	86	63	m11
Internal Link Dist (ft)	30	601	103		
Turn Bay Length (ft)				90	90
Base Capacity (vph)	1332	1407	637	743	843
Starvation Cap Reductn	0	0	169	435	0
Spillback Cap Reductn	12	497	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.41	1.13	0.73	0.50	0.07

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	8	401	61	765	235	1662
v/c Ratio	0.02	0.90	0.15	0.98	0.22	1.77
Control Delay	17.6	49.1	7.0	44.3	6.8	367.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	49.1	7.0	44.3	6.8	367.2
Queue Length 50th (ft)	2	140	0	240	37	~932
Queue Length 95th (ft)	11	#284	24	#480	66	#1174
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	417	450	402	779	1075	941
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.89	0.15	0.98	0.22	1.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

44: 5th St. & Oak St.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1019	660	76
v/c Ratio	1.94	1.03	0.17
Control Delay	446.4	62.2	1.6
Queue Delay	0.0	0.0	0.0
Total Delay	446.4	62.2	1.6
Queue Length 50th (ft)	~160	~172	1
Queue Length 95th (ft)	#230	#354	m2
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	526	643	448
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.94	1.03	0.17

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

45: El Embarcadero (WB) & Grand Avenue

Lane Group	NWL	NWR	NET	SWL	SWT
Lane Group Flow (vph)	209	185	2146	162	895
v/c Ratio	0.66	0.43	1.34	0.37	0.35
Control Delay	44.0	7.7	179.8	21.1	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	7.7	179.8	21.1	2.5
Queue Length 50th (ft)	112	0	~810	41	23
Queue Length 95th (ft)	169	50	#989	m87	m89
Internal Link Dist (ft)	560		322		429
Turn Bay Length (ft)	150			150	
Base Capacity (vph)	511	589	1603	435	2594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.41	0.31	1.34	0.37	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1963	614	730	533	1128
v/c Ratio	1.18	0.89	2.03	0.92	0.56
Control Delay	116.3	54.2	492.1	52.7	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	116.3	54.2	492.1	52.7	13.4
Queue Length 50th (ft)	~479	191	~638	289	196
Queue Length 95th (ft)	#574	m160	m#480	#485	252
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	688	359	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.18	0.89	2.03	0.92	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	405	1485	647	1051	384	264
v/c Ratio	0.81	1.52	1.39	1.01dr	1.63	0.13
Control Delay	21.3	258.2	200.8	28.4	329.8	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.3	258.2	200.8	28.4	329.8	8.4
Queue Length 50th (ft)	178	~686	~527	265	~318	32
Queue Length 95th (ft)	m124	m#477	m#357	348	#491	49
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	975	464	1322	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.52	1.39	0.80	1.63	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Cumulative (2030) without Project Conditions

```
MITIG8 - AM                Wed Aug 26, 2009 11:58:13                 Page 1-1
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                      Level Of Service Computation Report
            2000 HCM Unsignalized Method (Future Volume Alternative)
*******************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
*******************************************************************************
Average Delay (sec/veh):     21.6       Worst Case Level Of Service: F[ 68.7]
*******************************************************************************
Street Name:          Harrison Street           Stanley Place / I-580 EB Off-Ramp
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1253     0     0    0   581     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1253     0     0    0   581     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1253     0     0    0   581     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1362     0     0    0   625     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1362     0     0    0   625     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   454  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   610  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   610  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  1.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  16.2  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  68.7 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     F     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             68.7            xxxxxx
ApproachLOS:        *                *                 F                *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************


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```


Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	388	394	1289	577
v/c Ratio	0.86	0.85	0.57	1.45
Control Delay	38.2	36.9	7.9	240.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	38.2	36.9	7.9	240.6
Queue Length 50th (ft)	113	114	130	~311
Queue Length 95th (ft)	#250	#250	181	#480
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	495	508	2247	398
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.78	0.57	1.45

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	88	153	182	125	217	186	546	725	177	1530
v/c Ratio	0.45	0.25	0.65	0.64	0.58	0.42	0.79	0.53	0.70	1.32
Control Delay	44.3	31.4	41.9	53.2	39.5	7.6	44.2	24.0	53.0	178.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	31.4	41.9	53.2	39.5	7.6	44.2	24.0	53.0	178.4
Queue Length 50th (ft)	47	40	90	68	116	0	147	170	94	~635
Queue Length 95th (ft)	93	61	143	#126	174	50	#249	243	#210	#815
Internal Link Dist (ft)		998			87			632		676
Turn Bay Length (ft)							90		70	
Base Capacity (vph)	196	904	399	216	580	594	692	1378	258	1160
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.17	0.46	0.58	0.37	0.31	0.79	0.53	0.69	1.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	126	279	109	672	907	149	1400	426	1644
v/c Ratio	0.45	0.24	0.22	1.22	0.61	0.21	3.84dl	0.54	1.23
Control Delay	48.8	25.1	24.4	153.5	25.2	5.7	98.4	5.2	139.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	25.1	24.4	153.5	25.2	5.7	98.4	5.2	139.7
Queue Length 50th (ft)	40	67	47	~273	232	8	~379	0	~469
Queue Length 95th (ft)	68	100	90	#385	311	47	#473	65	#567
Internal Link Dist (ft)		526			2242		546		632
Turn Bay Length (ft)	240			230					
Base Capacity (vph)	549	1168	492	549	1483	695	1245	783	1336
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.24	0.22	1.22	0.61	0.21	1.12	0.54	1.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues — Cumulative AM
42: I-880 NB On-ramp & Jackson Street
Kaiser Center Transportation Study

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	29	417	66	636	209	2151
v/c Ratio	0.06	0.79	0.14	0.95	0.24	2.66
Control Delay	11.7	28.0	4.9	42.6	8.4	764.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	28.0	4.9	42.6	8.4	764.3
Queue Length 50th (ft)	5	95	0	149	30	~1015
Queue Length 95th (ft)	18	#208	19	#333	61	#1253
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	497	666	878	810
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.75	0.13	0.95	0.24	2.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues — Cumulative AM
44: 5th St. & Oak St.
Kaiser Center Transportation Study

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1467	438	176
v/c Ratio	1.49	0.68	0.32
Control Delay	244.7	18.5	11.4
Queue Delay	0.0	0.0	0.0
Total Delay	244.7	18.5	11.4
Queue Length 50th (ft)	~202	85	50
Queue Length 95th (ft)	#280	#177	m74
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	983	644	551
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.49	0.68	0.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues — Cumulative AM
47: MacArthur Blvd (EB) & Grand Avenue
Kaiser Center Transportation Study

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1990	527	298	407	1486
v/c Ratio	1.24dl	0.90	0.76	0.63	0.73
Control Delay	113.0	63.7	34.2	32.7	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	113.0	63.7	34.2	32.7	19.2
Queue Length 50th (ft)	~567	186	94	224	365
Queue Length 95th (ft)	#663	#283	#221	329	451
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1710	584	390	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.16	0.90	0.76	0.63	0.73

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues — Cumulative AM
48: MacArthur Blvd (EB) & Lakeshore Drive
Kaiser Center Transportation Study

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	284	820	360	800	857	561
v/c Ratio	0.58	0.87	0.70	0.89	1.58	0.26
Control Delay	26.2	32.1	18.6	50.0	298.1	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.2	32.1	18.6	50.0	298.1	10.0
Queue Length 50th (ft)	137	262	108	273	~842	87
Queue Length 95th (ft)	m159	m273	m86	#382	#1079	116
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	969	524	902	543	2170
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.85	0.69	0.89	1.58	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWT	NWR	NET
Lane Group Flow (vph)	3167	162	1098
v/c Ratio	1.31	0.20	0.89dl
Control Delay	166.3	4.1	18.4
Queue Delay	158.2	0.0	0.2
Total Delay	324.4	4.1	18.5
Queue Length 50th (ft)	~758	8	150
Queue Length 95th (ft)	#851	38	191
Internal Link Dist (ft)	378		334
Turn Bay Length (ft)			
Base Capacity (vph)	2415	821	2036
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	511	0	238
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.66	0.20	0.61

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Lane Group	NWL	NWT	SWT
Lane Group Flow (vph)	898	2778	1568
v/c Ratio	1.03	1.02	1.37
Control Delay	41.1	33.3	196.5
Queue Delay	177.0	201.6	0.0
Total Delay	218.1	234.8	196.5
Queue Length 50th (ft)	~403	~409	~557
Queue Length 95th (ft)	m310	m307	#693
Internal Link Dist (ft)		191	1680
Turn Bay Length (ft)			
Base Capacity (vph)	876	2736	1148
Starvation Cap Reductn	252	854	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.44	1.48	1.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	741	754	1711	835
v/c Ratio	1.59	1.57	0.79	2.35
Control Delay	297.8	287.7	12.5	633.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	297.8	287.7	12.5	633.1
Queue Length 50th (ft)	~416	~421	212	~511
Queue Length 95th (ft)	#618	#624	299	#705
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	466	481	2153	356
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.59	1.57	0.79	2.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	257	516	188	86	224	255	446	1292	277	784
v/c Ratio	0.78	0.51	0.41	0.48	0.67	0.52	0.81	1.19	1.28	0.86
Control Delay	55.5	30.2	29.9	46.6	43.6	8.1	48.6	122.7	192.6	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	30.2	29.9	46.6	43.6	8.1	48.6	122.7	192.6	42.8
Queue Length 50th (ft)	140	134	86	47	120	0	126	~469	~202	221
Queue Length 95th (ft)	#334	189	153	92	179	57	#192	#602	#355	#325
Internal Link Dist (ft)		1001			87			632		676
Turn Bay Length (ft)	70						90		70	
Base Capacity (vph)	330	1015	460	216	559	641	572	1090	216	907
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.51	0.41	0.40	0.40	0.40	0.78	1.19	1.28	0.86

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

5: 27th Street & Telegraph Avenue

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	260	499	168	79	657	141	221	662	167	1018
v/c Ratio	0.85	0.67	0.23	0.26	1.08	0.24	2.19	0.49	0.74	0.71
Control Delay	45.2	28.0	4.2	19.8	94.9	12.6	581.7	13.7	44.5	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	28.0	4.2	19.8	94.9	12.6	581.7	13.7	44.5	19.2
Queue Length 50th (ft)	86	222	0	26	~416	9	~197	84	75	175
Queue Length 95th (ft)	#222	#357	40	m46	m#593	m41	m#310	m104	#182	248
Internal Link Dist (ft)		468			962			1466		318
Turn Bay Length (ft)				150			70		80	
Base Capacity (vph)	311	741	719	395	611	596	101	1360	227	1426
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.67	0.23	0.20	1.08	0.24	2.19	0.49	0.74	0.71

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

12: Grand Avenue & Harrison Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	416	786	177	381	1042	57	1335	1398	972
v/c Ratio	0.81	0.64	0.32	0.77	0.84	0.11	0.79	1.82	0.58
Control Delay	54.4	30.8	19.2	52.2	37.7	19.2	32.8	391.9	24.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.4	30.8	19.2	52.2	37.7	19.2	32.8	391.9	24.9
Queue Length 50th (ft)	131	222	57	120	323	19	275	~1200	164
Queue Length 95th (ft)	#187	292	115	170	#422	48	333	#1461	208
Internal Link Dist (ft)		526			509		546		632
Turn Bay Length (ft)	240			230					
Base Capacity (vph)	549	1225	547	549	1241	519	1689	770	1683
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.64	0.32	0.69	0.84	0.11	0.79	1.82	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

13: 21st Street & Harrison Street

Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	495	127	1835	1274
v/c Ratio	0.68	0.37	0.89	0.36
Control Delay	30.6	8.5	26.0	11.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.6	8.5	26.0	11.6
Queue Length 50th (ft)	105	18	391	97
Queue Length 95th (ft)	141	45	#682	156
Internal Link Dist (ft)	280		400	546
Turn Bay Length (ft)	200	160		
Base Capacity (vph)	1450	373	2057	3506
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.34	0.89	0.36

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

24: 20th Street & Harrison Street

Lane Group	EBL	NBT	SBT	SBR	SBR2
Lane Group Flow (vph)	658	1480	448	205	124
v/c Ratio	0.55	1.06	0.71	0.29	0.15
Control Delay	22.6	64.6	28.6	11.9	2.2
Queue Delay	0.4	461.0	6.8	3.2	0.8
Total Delay	23.0	525.6	35.3	15.1	3.1
Queue Length 50th (ft)	76	~377	72	50	0
Queue Length 95th (ft)	109	#503	108	94	m20
Internal Link Dist (ft)	30	601	103		
Turn Bay Length (ft)				90	90
Base Capacity (vph)	1187	1397	633	700	833
Starvation Cap Reductn	0	0	139	395	499
Spillback Cap Reductn	170	690	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.65	2.09	0.91	0.67	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	1243	516	317	1061	53
v/c Ratio	1.40	0.49	0.60	0.57	0.07
Control Delay	209.7	19.1	16.2	11.0	6.7
Queue Delay	0.0	0.0	0.0	3.4	0.0
Total Delay	209.7	19.1	16.2	14.3	6.7
Queue Length 50th (ft)	~327	79	55	123	8
Queue Length 95th (ft)	#442	120	129	173	21
Internal Link Dist (ft)	299	570		197	
Turn Bay Length (ft)					
Base Capacity (vph)	888	1062	527	1852	813
Starvation Cap Reductn	0	0	0	672	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.40	0.49	0.60	0.90	0.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBT
Lane Group Flow (vph)	1755	2399
v/c Ratio	0.69	1.93dr
Control Delay	9.0	156.0
Queue Delay	0.0	24.3
Total Delay	9.0	180.3
Queue Length 50th (ft)	81	~320
Queue Length 95th (ft)	m86	m#412
Internal Link Dist (ft)	276	196
Turn Bay Length (ft)		
Base Capacity (vph)	2554	1858
Starvation Cap Reductn	0	75
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.69	1.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	9	467	72	891	273	1936
v/c Ratio	0.02	1.04	0.18	1.18	0.25	2.10
Control Delay	17.6	79.4	6.7	111.2	7.1	514.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	79.4	6.7	111.2	7.1	514.2
Queue Length 50th (ft)	2	~188	0	~399	43	~1163
Queue Length 95th (ft)	12	#345	26	#596	77	#1414
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	417	450	410	757	1071	924
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	1.04	0.18	1.18	0.25	2.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1186	769	89
v/c Ratio	2.26	1.20	0.20
Control Delay	589.5	122.8	1.7
Queue Delay	13.7	18.6	0.0
Total Delay	603.2	141.4	1.7
Queue Length 50th (ft)	~196	~255	1
Queue Length 95th (ft)	#270	#429	m2
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	525	643	448
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	7	22	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	2.29	1.24	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NWR	NET	SWL	SWT
Lane Group Flow (vph)	225	198	2452	232	1216
v/c Ratio	0.68	0.43	1.60	0.50	0.47
Control Delay	44.0	7.4	296.9	23.0	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.3
Total Delay	44.0	7.4	296.9	23.0	5.5
Queue Length 50th (ft)	120	0	~1043	67	64
Queue Length 95th (ft)	179	51	#1185	m135	m188
Internal Link Dist (ft)	560		322		429
Turn Bay Length (ft)	150			150	
Base Capacity (vph)	511	598	1530	462	2562
Starvation Cap Reductn	0	0	0	0	616
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.44	0.33	1.60	0.50	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	3100	661	861	802	1215
v/c Ratio	1.86	0.96	2.66	1.38	0.60
Control Delay	412.1	58.5	768.0	210.6	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	412.1	58.5	768.0	210.6	14.1
Queue Length 50th (ft)	~969	212	~858	~612	220
Queue Length 95th (ft)	#1061	m148	m#534	#833	282
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1668	688	324	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.86	0.96	2.66	1.38	0.60

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	479	2406	1032	1607	653	334
v/c Ratio	0.96	2.44	2.25	1.81dr	2.77	0.16
Control Delay	27.4	663.9	583.0	141.3	825.8	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	663.9	583.0	141.3	825.8	8.6
Queue Length 50th (ft)	231	~1322	~1041	~606	~639	41
Queue Length 95th (ft)	m83	m#549	m#415	#744	#847	61
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	988	458	1296	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.96	2.44	2.25	1.24	2.77	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Existing plus Project (Phase I and II) Conditions

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	28	309	52	505	175	1592
v/c Ratio	0.06	0.64	0.12	0.71	0.19	1.78
Control Delay	11.9	21.2	5.2	17.9	7.7	374.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.9	21.2	5.2	17.9	7.7	374.3
Queue Length 50th (ft)	5	68	0	95	24	~643
Queue Length 95th (ft)	14	125	16	#228	46	#871
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	487	714	928	893
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.55	0.11	0.71	0.19	1.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

2: Oakland Avenue & Harrison Street

Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	457	470	1112	907
v/c Ratio	0.88	0.95	0.52	2.54
Control Delay	38.6	53.6	7.8	719.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	38.6	53.6	7.8	719.4
Queue Length 50th (ft)	131	160	103	~567
Queue Length 95th (ft)	#285	#294	143	#766
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	519	495	2155	357
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.88	0.95	0.52	2.54

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: 27th Street & Harrison Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	204	388	113	69	182	208	426	1402	199	582
v/c Ratio	0.55	0.38	0.24	0.41	0.62	0.50	0.78	1.28	0.92	0.64
Control Delay	40.9	27.9	25.7	44.9	43.8	8.9	47.0	163.3	85.2	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	27.9	25.7	44.9	43.8	8.9	47.0	163.3	85.2	32.5
Queue Length 50th (ft)	104	95	46	38	98	0	120	~541	114	151
Queue Length 95th (ft)	#228	142	94	72	143	45	#173	#676	#242	208
Internal Link Dist (ft)		1001			87			632		676
Turn Bay Length (ft)	70						90		70	
Base Capacity (vph)	368	1034	470	216	559	608	572	1093	216	914
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.38	0.24	0.32	0.33	0.34	0.74	1.28	0.92	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

24: 20th Street & Harrison Street

Lane Group	EBL2	EBL	EBT	WBL	WBT	NBT	SBT	SBR	SBR2	SEL	SER2
Lane Group Flow (vph)	16	280	182	11	149	893	204	87	40	215	103
v/c Ratio	0.05	0.46	0.57	0.06	0.44	1.12	0.45	0.48	0.17	1.29	0.38
Control Delay	47.0	53.0	55.7	25.0	32.7	100.8	29.3	35.8	9.2	199.8	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.0	53.0	55.7	25.0	32.7	100.8	29.3	35.8	9.2	199.8	16.1
Queue Length 50th (ft)	9	85	102	5	38	~275	56	48	4	~139	11
Queue Length 95th (ft)	m27	128	164	14	61	#407	79	98	27	#273	57
Internal Link Dist (ft)			450		382	601	222			205	
Turn Bay Length (ft)	100	100		175				90	90		50
Base Capacity (vph)	354	604	319	221	434	799	458	180	233	167	270
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.46	0.57	0.05	0.34	1.12	0.45	0.48	0.17	1.29	0.38

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	12	395	56	676	196	1407
v/c Ratio	0.03	0.89	0.14	0.85	0.18	1.49
Control Delay	17.7	48.1	7.1	24.1	6.6	244.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	48.1	7.1	24.1	6.6	244.1
Queue Length 50th (ft)	3	138	0	181	30	~725
Queue Length 95th (ft)	8	#218	21	#398	56	#959
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	417	450	398	795	1078	945
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.88	0.14	0.85	0.18	1.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

44: 5th St. & Oak St.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	941	684	80
v/c Ratio	1.77	1.07	0.18
Control Delay	373.0	74.1	1.2
Queue Delay	0.0	0.0	0.0
Total Delay	373.0	74.1	1.2
Queue Length 50th (ft)	~141	~204	0
Queue Length 95th (ft)	#209	#275	0
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	531	642	448
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.77	1.07	0.18

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

45: El Embarcadero (WB) & Grand Avenue

Lane Group	NWL	NWR	NET	SWL	SWT
Lane Group Flow (vph)	269	327	2056	255	875
v/c Ratio	0.73	0.27	1.35	0.59	0.35
Control Delay	44.1	1.4	186.9	30.5	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	1.4	186.9	30.5	7.0
Queue Length 50th (ft)	143	0	~782	130	153
Queue Length 95th (ft)	208	15	#922	m#236	m225
Internal Link Dist (ft)	560		322		429
Turn Bay Length (ft)	150			150	
Base Capacity (vph)	511	1208	1519	434	2484
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.53	0.27	1.35	0.59	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

47: MacArthur Blvd (EB) & Grand Avenue

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1421	748	749	389	863
v/c Ratio	0.86	0.92	1.61	0.74	0.42
Control Delay	33.4	50.4	302.7	37.0	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.4	50.4	302.7	37.0	11.5
Queue Length 50th (ft)	251	~261	~602	189	135
Queue Length 95th (ft)	309	m204	m#453	290	177
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1681	813	466	580	2041
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.85	0.92	1.61	0.67	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Near-Term (2015) plus Project (Phase I) Conditions

Queues
42: I-880 NB On-ramp & Jackson Street

Near-Term + I AM
Kaiser Center Transportation Study

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	26	362	58	553	182	1872
v/c Ratio	0.06	0.71	0.13	0.80	0.20	2.21
Control Delay	11.7	23.7	5.1	23.0	8.0	564.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	23.7	5.1	23.0	8.0	564.4
Queue Length 50th (ft)	5	80	0	116	26	~835
Queue Length 95th (ft)	17	#156	18	#275	54	#1065
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	492	694	901	848
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.65	0.12	0.80	0.20	2.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
44: 5th St. & Oak St.

Near-Term + I AM
Kaiser Center Transportation Study

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1278	382	154
v/c Ratio	1.30	0.59	0.28
Control Delay	160.2	15.5	11.6
Queue Delay	0.0	0.0	0.0
Total Delay	160.2	15.5	11.6
Queue Length 50th (ft)	~160	70	43
Queue Length 95th (ft)	#236	137	m77
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	982	644	551
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.30	0.59	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
49: Santa Clara Avenue & Oakland Avenue

Near-Term + I AM
Kaiser Center Transportation Study

Lane Group	NWT	NWR	NET
Lane Group Flow (vph)	2724	137	932
v/c Ratio	1.13	0.17	0.46
Control Delay	86.3	3.3	17.3
Queue Delay	87.8	0.0	0.1
Total Delay	174.0	3.3	17.4
Queue Length 50th (ft)	~586	2	121
Queue Length 95th (ft)	#681	30	157
Internal Link Dist (ft)	378		334
Turn Bay Length (ft)			
Base Capacity (vph)	2415	820	2036
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	359	0	238
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.32	0.17	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis
2: Oakland Avenue & I-580 Off-ramp

Near-Term + I PM
Kaiser Center Transportation Study

Movement	SEL2	SET	NET	NER	NER2
Lane Configurations					
Volume (vph)	738	349	1276	680	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	3.5	3.5	
Lane Util. Factor	0.95	0.95	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	
Flt Protected	0.95	0.98	1.00	1.00	
Satd. Flow (prot)	1681	1738	3539	1583	
Flt Permitted	0.95	0.98	1.00	1.00	
Satd. Flow (perm)	1681	1738	3539	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	802	379	1387	739	107
RTOR Reduction (vph)	37	34	0	0	0
Lane Group Flow (vph)	548	562	1387	846	0
Confl. Peds. (#/hr)				2	
Confl. Bikes (#/hr)					
Turn Type	Perm			custom	
Protected Phases		4	5	1	
Permitted Phases	4			1	
Actuated Green, G (s)	16.0	16.0	36.5	13.5	
Effective Green, g (s)	16.0	16.0	36.5	13.5	
Actuated g/C Ratio	0.27	0.27	0.61	0.22	
Clearance Time (s)	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	448	463	2153	356	
v/s Ratio Prot			c0.39	c0.53	
v/s Ratio Perm	c0.33	0.32			
v/c Ratio	1.22	1.21	0.64	2.38	
Uniform Delay, d1	22.0	22.0	7.6	23.2	
Progression Factor	1.00	1.00	1.00	1.00	
Incremental Delay, d2	118.7	114.3	1.5	628.0	
Delay (s)	140.7	136.3	9.1	651.2	
Level of Service	F	F	A	F	
Approach Delay (s)		138.5	252.4		
Approach LOS		F	F		

Intersection Summary

HCM Average Control Delay	213.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM
3: 27th Street & Harrison Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	212	425	101	20	52	16	180	206	10	391	1093	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00			1.00	1.00	1.00		0.97	0.95	
Frpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	0.96		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85			1.00	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1583			1770	1863	1522		3433	3482	
Flt Permitted	0.95	1.00	1.00			0.95	1.00	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3539	1583			1770	1863	1522		3433	3482	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	226	452	107	21	57	17	196	224	11	425	1188	112
RTOR Reduction (vph)	0	0	7	0	0	0	0	187	0	0	8	0
Lane Group Flow (vph)	226	452	121	0	0	74	196	37	0	436	1292	0
Confl. Peds. (#/hr)	26											20
Confl. Bikes (#/hr)								20				9
Turn Type	Prot		Perm		Prot	Prot		Perm	Prot	Prot		
Protected Phases	3	8			7	7	4		1	1	6	
Permitted Phases			8					4				
Actuated Green, G (s)	18.9	26.1	26.1			7.7	14.9	14.9		14.5	27.2	
Effective Green, g (s)	18.9	26.1	26.1			7.7	14.9	14.9		14.5	27.2	
Actuated g/C Ratio	0.21	0.29	0.29			0.09	0.17	0.17		0.16	0.30	
Clearance Time (s)	4.0	5.0	5.0			4.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0			3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	372	1026	459			151	308	252		553	1052	
v/s Ratio Prot	c0.13	0.13				0.04	c0.11			0.13	c0.37	
v/s Ratio Perm			0.08					0.02				
v/c Ratio	0.61	0.44	0.26			0.49	0.64	0.15		0.79	1.23	
Uniform Delay, d1	32.2	26.0	24.6			39.3	35.0	32.1		36.3	31.4	
Progression Factor	1.00	1.00	1.00			1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.3	0.3			2.5	4.3	0.3		7.3	111.3	
Delay (s)	35.0	26.3	24.9			41.8	39.3	32.4		43.6	142.7	
Level of Service	C	C	C			D	D	C		D	F	
Approach Delay (s)		28.5					36.5				117.8	
Approach LOS		C					D				F	

Intersection Summary			
HCM Average Control Delay	76.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM
12: Grand Avenue & Harrison Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	629	129	350	846	42	11	1314	1058	2	620	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.92		1.00	0.93		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	
Satd. Flow (prot)	3433	3539	1484	3433	3539	1460		5082	1466		4986	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		0.94	
Satd. Flow (perm)	3433	3539	1484	3433	3539	1460		4735	1466		4669	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.93	0.92	0.92	0.92	0.92	0.92	0.96	0.92
Adj. Flow (vph)	145	684	140	357	910	46	12	1428	1150	2	646	65
RTOR Reduction (vph)	0	0	46	0	0	27	0	0	251	0	12	0
Lane Group Flow (vph)	145	684	94	357	910	19	0	1440	899	0	701	0
Confl. Peds. (#/hr)	31		31	48		48	42		42	34		34
Confl. Bikes (#/hr)			22			15			22			20
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		
Protected Phases	1	6		5	2			4			4	
Permitted Phases			6			2	4		4	4		
Actuated Green, G (s)	8.6	35.0	35.0	14.0	41.4	41.4		36.0	36.0		36.0	
Effective Green, g (s)	8.6	35.0	35.0	14.0	41.4	41.4		36.0	36.0		36.0	
Actuated g/C Ratio	0.09	0.35	0.35	0.14	0.41	0.41		0.36	0.36		0.36	
Clearance Time (s)	4.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	295	1239	519	481	1465	604		1705	528		1681	
v/s Ratio Prot	0.04	0.19		c0.10	c0.26							
v/s Ratio Perm			0.06			0.01		0.30	c0.61		0.15	
v/c Ratio	0.49	0.55	0.18	0.74	0.62	0.03		0.84	1.70		0.42	
Uniform Delay, d1	43.6	26.2	22.6	41.3	23.1	17.4		29.4	32.0		24.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.5	1.8	0.8	5.4	2.0	0.1		5.3	324.3		0.8	
Delay (s)	44.1	28.0	23.3	46.6	25.1	17.5		34.8	356.3		24.9	
Level of Service	D	C	C	D	C	B		C	F		C	
Approach Delay (s)		29.7			30.7			177.5			24.9	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM Average Control Delay	97.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	122.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM
24: 20th Street & Harrison Street — Kaiser Center Transportation Study

Movement	EBL2	EBL	EBR	NBL2	NBL	NBT	SBT	SBR	SBR2	SEL	SER	SER2
Lane Configurations												
Volume (vph)	7	389	103	97	26	828	188	268	51	0	128	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.94				0.95	0.91	0.91	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00				1.00	1.00	1.00	1.00		1.00	0.98
Flpb, ped/bikes	0.48	1.00				1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.97				1.00	0.94	0.85	0.85		0.85	0.85
Flt Protected	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (prot)	841	4894				3517	3186	1441	1583		1583	1554
Flt Permitted	0.95	0.96				0.99	1.00	1.00	1.00		1.00	1.00
Satd. Flow (perm)	841	4894				3517	3186	1441	1583		1583	1554
Peak-hour factor, PHF	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	7	423	112	105	28	900	204	291	55	0	135	58
RTOR Reduction (vph)	0	72	0	0	0	0	0	0	32	0	0	44
Lane Group Flow (vph)	7	463	0	0	0	1033	341	154	23	0	135	14
Confl. Peds. (#/hr)	22								74			
Confl. Bikes (#/hr)						7			8			7
Turn Type	Prot			Split	Split			custom	custom		custom	custom
Protected Phases	5	1		8	8	8	2	6	6			
Permitted Phases		1						6			9	2
Actuated Green, G (s)	0.8	13.1				16.0	17.2	29.5	29.5		7.7	17.2
Effective Green, g (s)	0.8	13.1				16.0	17.2	29.5	29.5		7.7	17.2
Actuated g/C Ratio	0.01	0.19				0.23	0.25	0.42	0.42		0.11	0.25
Clearance Time (s)	4.0	4.0				4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	2.0				2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)	10	916				804	783	607	667		174	382
v/s Ratio Prot	0.01	c0.09				c0.29	c0.11	0.11	0.01			
v/s Ratio Perm											c0.09	0.01
v/c Ratio	0.70	0.51				1.28	0.44	0.25	0.03		0.78	0.04
Uniform Delay, d1	34.5	25.5				27.0	22.3	13.1	11.9		30.3	20.1
Progression Factor	1.00	1.00				1.00	1.41	1.63	2.67		1.00	1.00
Incremental Delay, d2	120.0	2.0				137.6	0.1	1.0	0.1		17.7	0.0
Delay (s)	154.5	27.5				164.6	31.6	22.3	31.8		48.0	20.1
Level of Service	F	C				F	C	C	C		D	C
Approach Delay (s)		29.2				164.6	29.0			39.6		
Approach LOS		C				F	C			D		

Intersection Summary			
HCM Average Control Delay	90.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM
42: I-880 NB On-ramp & Jackson Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	7	369	56	351	352	0	0	216	1638
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Lane Util. Factor				1.00	1.00	1.00		1.00			1.00	1.00
Frpb, ped/bikes				1.00	1.00	0.93		1.00			1.00	0.98
Flpb, ped/bikes				0.98	1.00	1.00		1.00			1.00	1.00
Frt				1.00	1.00	0.85		1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00		0.98			1.00	1.00
Satd. Flow (prot)				1726	1863	1471		1817			1863	1559
Flt Permitted				0.95	1.00	1.00		0.72			1.00	1.00
Satd. Flow (perm)				1726	1863	1471		1350			1863	1559
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.98
Adj. Flow (vph)	0	0	0	8	401	61	382	383	0	0	235	1671
RTOR Reduction (vph)	0	0	0	0	0	46	0	0	0	0	0	41
Lane Group Flow (vph)	0	0	0	8	401	15	0	765	0	0	235	1630
Confl. Peds. (#/hr)	4		4	20		20	1		1	6		6
Confl. Bikes (#/hr)			10			7						
Turn Type				Perm		Perm	Perm					Perm
Protected Phases					1			2			2	
Permitted Phases				1		1	2					2
Actuated Green, G (s)				14.4	14.4	14.4		34.6			34.6	34.6
Effective Green, g (s)				14.4	14.4	14.4		34.6			34.6	34.6
Actuated g/C Ratio				0.24	0.24	0.24		0.58			0.58	0.58
Clearance Time (s)				5.5	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)				3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)				414	447	353		779			1074	899
v/s Ratio Prot					c0.22						0.13	
v/s Ratio Perm				0.00		0.01		0.57				c1.05
v/c Ratio				0.02	0.90	0.04		0.98			0.22	1.81
Uniform Delay, d1				17.4	22.1	17.5		12.4			6.2	12.7
Progression Factor				1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2				0.0	20.2	0.0		28.2			0.5	370.3
Delay (s)				17.4	42.2	17.6		40.6			6.6	383.0
Level of Service				B	D	B		D			A	F
Approach Delay (s)		0.0			38.6			40.6			336.6	
Approach LOS		A			D			D			F	

Intersection Summary			
HCM Average Control Delay	219.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	173.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM

44: 5th St. & Oak St. — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	291	590	83	0	0	0	0	534	74	1	69	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5			3.5	
Lane Util. Factor		0.91						1.00			1.00	
Frpb, ped/bikes		1.00						1.00			1.00	
Flpb, ped/bikes		1.00						1.00			1.00	
Frt		0.99						0.98			1.00	
Flt Protected		0.99						1.00			1.00	
Satd. Flow (prot)		4920						1832			1862	
Flt Permitted		0.99						1.00			0.84	
Satd. Flow (perm)		1000						1300			1300	
Peak-hour factor, PHF	0.92	0.93	0.92	0.25	0.25	0.25	0.25	0.92	0.92	0.92	0.92	0.25
Adj. Flow (vph)	316	634	90	0	0	0	0	580	80	1	75	0
RTOR Reduction (vph)	0	25	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	1016	0	0	0	0	0	649	0	0	76	0
Confl. Peds. (#/hr)	9		9	38		38				2		2
Confl. Bikes (#/hr)			11			4						2
Turn Type	Perm									Perm		
Protected Phases		1						2			2	
Permitted Phases	1									2		
Actuated Green, G (s)		22.5						15.5			15.5	
Effective Green, g (s)		22.5						15.5			15.5	
Actuated g/C Ratio		0.50						0.34			0.34	
Clearance Time (s)		3.5						3.5			3.5	
Lane Grp Cap (vph)		500						631			448	
v/s Ratio Prot								c0.35				
v/s Ratio Perm		c1.02									0.06	
v/c Ratio		2.03						1.03			0.17	
Uniform Delay, d1		11.2						14.8			10.3	
Progression Factor		1.00						1.00			0.08	
Incremental Delay, d2		470.9						43.3			0.8	
Delay (s)		482.2						58.0			1.5	
Level of Service		F						E			A	
Approach Delay (s)		482.2			0.0			58.0			1.5	
Approach LOS		F			A			E			A	

Intersection Summary			
HCM Average Control Delay	304.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM

45: El Embarcadero (WB) & Grand Avenue — Kaiser Center Transportation Study

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1199	862	149	847
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1583	3314		1770	3539
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1583	3314		1770	3539
Peak-hour factor, PHF	0.92	0.92	0.94	0.92	0.92	0.92
Adj. Flow (vph)	209	185	1276	937	162	921
RTOR Reduction (vph)	0	152	136	0	0	0
Lane Group Flow (vph)	209	33	2077	0	162	921
Turn Type		Perm			Prot	
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	16.0	16.0	39.9		22.1	66.0
Effective Green, g (s)	16.0	16.0	39.9		22.1	66.0
Actuated g/C Ratio	0.18	0.18	0.44		0.25	0.73
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	315	281	1469		435	2595
v/s Ratio Prot	c0.12		c0.63		0.09	c0.26
v/s Ratio Perm		0.02				
v/c Ratio	0.66	0.12	1.41		0.37	0.35
Uniform Delay, d1	34.5	31.1	25.0		28.2	4.3
Progression Factor	1.00	1.00	1.00		0.66	0.46
Incremental Delay, d2	5.2	0.2	190.2		1.9	0.3
Delay (s)	39.7	31.3	215.3		20.3	2.3
Level of Service	D	C	F		C	A
Approach Delay (s)	35.7		215.3			5.0
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	134.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM

47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	703	490	1062	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4962			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4962			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.96	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	329	1480	154	0	614	764	533	1154	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	52	0	0	0
Lane Group Flow (vph)	0	0	0	1952	0	0	614	712	533	1154	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	308	580	2005	
v/s Ratio Prot				c0.39			0.17		c0.30	0.33	
v/s Ratio Perm								c0.45			
v/c Ratio				1.18			0.89	2.31	0.92	0.58	
Uniform Delay, d1				30.0			35.3	36.2	29.1	12.5	
Progression Factor				1.00			1.48	1.55	1.00	1.00	
Incremental Delay, d2				87.6			1.9	591.8	19.6	0.4	
Delay (s)				117.6			54.1	648.0	48.7	12.9	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			117.6			383.3			24.2	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	159.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term + I PM

48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1198	609	169	346	550	102	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3138	1441		3192				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3138	1441		3192				1770	3539
Peak-hour factor, PHF	0.92	0.94	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	450	1274	662	184	376	598	111	358	26	264
RTOR Reduction (vph)	0	0	16	0	9	0	0	0	0	0
Lane Group Flow (vph)	405	1511	638	0	1076	0	0	0	384	264
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	976	448		1312				236	2084
v/s Ratio Prot	0.25	c0.48	0.44		c0.34				c0.22	0.07
v/s Ratio Perm										
v/c Ratio	0.81	1.55	1.42		1.06dr				1.63	0.13
Uniform Delay, d1	28.5	31.0	31.0		23.5				39.0	8.2
Progression Factor	0.65	0.66	0.65		1.00				1.00	1.00
Incremental Delay, d2	1.3	247.1	192.2		5.8				300.8	0.1
Delay (s)	19.9	267.7	212.2		29.4				339.8	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		214.5			29.4					204.7
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	166.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

Near-Term (2015) plus Project (Phase I and II) Conditions

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                     Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):     13.0       Worst Case Level Of Service: E[ 45.4]
********************************************************************************
Street Name:          Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:       North Bound      South Bound      East Bound       West Bound
Movement:      L  -  T  -  R   L  -  T  -  R   L  -  T  -  R   L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:         0  0  0  0  0   0  0  3  0  0   0  0  0  0  1   0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0    0     0     0 1270     0     0    0   517     0    0     0
Growth Adj:   1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:     0    0     0     0 1270     0     0    0   517     0    0     0
Added Vol:       0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:     0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:     0    0     0     0 1270     0     0    0   517     0    0     0
User Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:      0    0     0     0 1380     0     0    0   556     0    0     0
Reduct Vol:      0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:     0    0     0     0 1380     0     0    0   556     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   460  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   605  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   605  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  0.92  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  11.7  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  45.4 xxxxx xxxx xxxxx
LOS by Move:     *    *     *     *    *     *     *    *     E     *    *     *
Movement:      LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:      *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx            xxxxxx              45.4            xxxxxx
ApproachLOS:          *                 *                 E                 *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************
```

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Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	26	364	58	553	182	1873
v/c Ratio	0.06	0.72	0.13	0.80	0.20	2.21
Control Delay	11.7	23.9	5.1	23.0	8.0	565.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	23.9	5.1	23.0	8.0	565.0
Queue Length 50th (ft)	5	80	0	116	26	~836
Queue Length 95th (ft)	17	#158	18	#275	54	#1066
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	492	694	901	848
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.65	0.12	0.80	0.20	2.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1282	382	154
v/c Ratio	1.31	0.59	0.28
Control Delay	162.0	15.5	11.5
Queue Delay	0.0	0.0	0.0
Total Delay	162.0	15.5	11.5
Queue Length 50th (ft)	~161	70	43
Queue Length 95th (ft)	#237	137	m75
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	982	644	551
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.31	0.59	0.28

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWT	NWR	NET
Lane Group Flow (vph)	2855	137	937
v/c Ratio	1.18	0.17	0.46
Control Delay	109.4	3.6	17.4
Queue Delay	106.0	0.0	0.1
Total Delay	215.5	3.6	17.5
Queue Length 50th (ft)	~637	4	122
Queue Length 95th (ft)	#732	31	158
Internal Link Dist (ft)	378		334
Turn Bay Length (ft)			
Base Capacity (vph)	2415	817	2036
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	403	0	238
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.42	0.17	0.52

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	585	596	1434	970
v/c Ratio	1.21	1.20	0.67	2.72
Control Delay	137.5	131.3	9.7	801.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	137.5	131.3	9.7	801.1
Queue Length 50th (ft)	~270	~272	154	~617
Queue Length 95th (ft)	#455	#458	215	#819
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	482	497	2153	356
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.21	1.20	0.67	2.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	236	452	131	74	196	224	489	1460	239	689
v/c Ratio	0.66	0.44	0.28	0.43	0.63	0.51	0.87	1.34	1.11	0.77
Control Delay	46.2	28.9	26.7	45.4	43.6	8.6	53.6	186.4	131.8	37.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.2	28.9	26.7	45.4	43.6	8.6	53.6	186.4	131.8	37.0
Queue Length 50th (ft)	125	113	55	40	105	0	140	~577	~156	187
Queue Length 95th (ft)	#284	165	107	81	161	56	#222	#714	#301	253
Internal Link Dist (ft)		1001			87			632		676
Turn Bay Length (ft)	70						90		70	
Base Capacity (vph)	355	1028	467	216	559	619	572	1092	216	897
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.44	0.28	0.34	0.35	0.36	0.85	1.34	1.11	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	228	445	149	70	717	125	228	600	145	884
v/c Ratio	0.78	0.60	0.21	0.20	1.15	0.21	1.59	0.44	0.57	0.62
Control Delay	35.9	25.3	4.2	20.0	121.3	13.3	317.7	13.5	31.1	16.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.9	25.3	4.2	20.0	121.3	13.3	317.7	13.5	31.1	16.5
Queue Length 50th (ft)	67	190	0	24	~487	9	~180	77	60	135
Queue Length 95th (ft)	#177	302	37	m45	m#695	m41	m#290	m97	127	197
Internal Link Dist (ft)		468			962			1466		318
Turn Bay Length (ft)				150			70		80	
Base Capacity (vph)	311	746	711	438	623	599	143	1361	254	1427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.60	0.21	0.16	1.15	0.21	1.59	0.44	0.57	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	154	692	143	381	910	46	1637	1227	741
v/c Ratio	0.51	0.56	0.26	0.77	0.62	0.07	0.96	1.58	0.44
Control Delay	49.0	29.1	15.3	52.2	26.0	6.2	46.0	286.2	24.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.0	29.1	15.3	52.2	26.0	6.2	46.0	286.2	24.7
Queue Length 50th (ft)	48	190	36	120	236	0	369	~956	126
Queue Length 95th (ft)	78	252	84	170	318	23	#478	#1214	163
Internal Link Dist (ft)		526			509		546		632
Turn Bay Length (ft)	240			230					
Base Capacity (vph)	549	1225	554	549	1456	626	1706	778	1689
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.56	0.26	0.69	0.63	0.07	0.96	1.58	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

24: 20th Street & Harrison Street

Lane Group	EBL2	EBL	NBT	SBT	SBR	SBR2	SER	SER2
Lane Group Flow (vph)	15	564	1040	346	157	55	168	115
v/c Ratio	0.15	0.48	1.30	0.54	0.24	0.07	0.93	0.29
Control Delay	34.9	21.3	168.9	39.3	21.6	11.7	85.8	7.5
Queue Delay	0.0	0.0	539.3	3.1	1.7	0.0	0.0	0.0
Total Delay	34.9	21.3	708.2	42.5	23.3	11.7	85.8	7.5
Queue Length 50th (ft)	6	63	~308	86	59	0	73	0
Queue Length 95th (ft)	24	93	#423	129	117	m30	#182	38
Internal Link Dist (ft)		450	601	103				
Turn Bay Length (ft)	100	100			90	90	75	75
Base Capacity (vph)	101	1183	803	637	667	762	181	402
Starvation Cap Reductn	0	0	0	193	367	0	0	0
Spillback Cap Reductn	0	22	614	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.49	5.50	0.78	0.52	0.07	0.93	0.29

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	8	401	61	765	235	1682
v/c Ratio	0.02	0.90	0.15	0.98	0.22	1.79
Control Delay	17.6	49.1	7.0	44.3	6.8	376.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	49.1	7.0	44.3	6.8	376.7
Queue Length 50th (ft)	2	140	0	240	37	~948
Queue Length 95th (ft)	11	#284	24	#480	66	#1192
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	417	450	402	779	1075	941
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.89	0.15	0.98	0.22	1.79

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

44: 5th St. & Oak St.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1069	660	76
v/c Ratio	2.04	1.03	0.17
Control Delay	492.1	62.2	1.6
Queue Delay	0.0	0.0	0.0
Total Delay	492.1	62.2	1.6
Queue Length 50th (ft)	~171	~172	1
Queue Length 95th (ft)	#242	#354	m2
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	524	643	448
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	2.04	1.03	0.17

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

45: El Embarcadero (WB) & Grand Avenue

Lane Group	NWL	NWR	NET	SWL	SWT
Lane Group Flow (vph)	209	185	2298	162	946
v/c Ratio	0.66	0.43	1.43	0.37	0.36
Control Delay	44.0	7.7	220.7	21.3	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	7.7	220.7	21.3	2.5
Queue Length 50th (ft)	112	0	~906	41	23
Queue Length 95th (ft)	169	50	#1085	m88	m93
Internal Link Dist (ft)	560		322		429
Turn Bay Length (ft)	150			150	
Base Capacity (vph)	511	589	1605	435	2594
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.41	0.31	1.43	0.37	0.36

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1963	614	805	533	1179
v/c Ratio	1.18	0.89	2.24	0.92	0.58
Control Delay	116.3	54.2	583.9	52.7	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	116.3	54.2	583.9	52.7	13.8
Queue Length 50th (ft)	~479	191	~728	289	210
Queue Length 95th (ft)	#574	m151	m#508	#485	269
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	688	359	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.18	0.89	2.24	0.92	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	405	1539	667	1129	384	264
v/c Ratio	0.81	1.57	1.44	1.11dr	1.63	0.13
Control Delay	21.6	280.1	221.4	31.3	329.8	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.6	280.1	221.4	31.3	329.8	8.4
Queue Length 50th (ft)	182	~723	~556	293	~318	32
Queue Length 95th (ft)	m123	m#483	m#359	#389	#491	49
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	979	463	1324	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	1.57	1.44	0.85	1.63	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Cumulative (2030) plus Project (Phase I and II) Conditions

```
MITIG8 - AM               Wed Aug 26, 2009 12:17:34                Page 1-1
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
********************************************************************************
Intersection #1 Harrison Street / Stanley Place / I-580 EB Off-Ramp
********************************************************************************
Average Delay (sec/veh):     36.0       Worst Case Level Of Service: F[123.7]
********************************************************************************
Street Name:          Harrison Street          Stanley Place / I-580 EB Off-Ramp
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Yield Sign       Yield Sign
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  3  0  0    0  0  0  0  1    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0     0     0 1463     0     0    0   607     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0    0     0     0 1463     0     0    0   607     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0    0     0     0 1463     0     0    0   607     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 0.92  1.00  1.00 1.00  0.93  1.00 1.00  1.00
PHF Volume:     0    0     0     0 1590     0     0    0   653     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0    0     0     0 1590     0     0    0   653     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.2 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   530  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   553  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   553  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  1.18  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  23.1  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx 123.7 xxxxx xxxx xxxxx
LOS by Move:    *    *     *     *    *     *     *    *     F     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:     *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:     xxxxxx           xxxxxx             123.7            xxxxxx
ApproachLOS:        *                *                 F                *
********************************************************************************
Note: Queue reported is the number of cars per lane.
********************************************************************************


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```


Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	388	394	1297	633
v/c Ratio	0.86	0.85	0.58	1.59
Control Delay	38.4	37.0	8.0	301.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	38.4	37.0	8.0	301.7
Queue Length 50th (ft)	113	115	131	~354
Queue Length 95th (ft)	#250	#250	182	#530
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	494	507	2246	398
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.79	0.78	0.58	1.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	90	153	203	125	217	186	566	786	177	1787
v/c Ratio	0.43	0.24	0.70	0.64	0.66	0.44	0.80	0.58	0.70	1.61
Control Delay	43.2	30.8	44.7	53.2	43.4	8.1	44.1	25.4	53.2	302.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.2	30.8	44.7	53.2	43.4	8.1	44.1	25.4	53.2	302.5
Queue Length 50th (ft)	48	39	102	68	116	0	152	194	94	~827
Queue Length 95th (ft)	95	61	162	#126	174	50	#263	267	#210	#982
Internal Link Dist (ft)		998			87			632		676
Turn Bay Length (ft)							90		70	
Base Capacity (vph)	208	904	397	216	580	594	710	1350	257	1113
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.17	0.51	0.58	0.37	0.31	0.80	0.58	0.69	1.61

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	128	282	110	920	907	149	1477	428	1880
v/c Ratio	0.46	0.24	0.22	1.68	0.61	0.22	3.84dl	0.55	1.43
Control Delay	48.8	25.1	25.4	341.4	25.3	6.1	117.2	5.2	224.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	25.1	25.4	341.4	25.3	6.1	117.2	5.2	224.0
Queue Length 50th (ft)	40	68	49	~443	232	9	~413	0	~593
Queue Length 95th (ft)	69	101	93	#565	312	49	#508	65	#691
Internal Link Dist (ft)		526			2242		546		632
Turn Bay Length (ft)	240			230					
Base Capacity (vph)	549	1168	489	549	1482	693	1260	785	1318
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.24	0.22	1.68	0.61	0.22	1.17	0.55	1.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	29	418	66	636	209	2153
v/c Ratio	0.06	0.79	0.14	0.95	0.24	2.66
Control Delay	11.7	28.2	4.9	42.6	8.4	766.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	28.2	4.9	42.6	8.4	766.6
Queue Length 50th (ft)	5	96	0	149	30	~1016
Queue Length 95th (ft)	18	#210	19	#333	61	#1255
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	521	559	497	666	878	809
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.75	0.13	0.95	0.24	2.66

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

44: 5th St. & Oak St.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1474	438	176
v/c Ratio	1.50	0.68	0.32
Control Delay	248.6	18.5	11.2
Queue Delay	0.0	0.0	0.0
Total Delay	248.6	18.5	11.2
Queue Length 50th (ft)	~203	85	50
Queue Length 95th (ft)	#282	#177	m67
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	982	644	551
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.50	0.68	0.32

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

47: MacArthur Blvd (EB) & Grand Avenue

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1990	527	300	407	1734
v/c Ratio	1.26dl	0.90	0.77	0.63	0.85
Control Delay	116.0	63.7	34.7	32.7	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	116.0	63.7	34.7	32.7	24.0
Queue Length 50th (ft)	~572	186	95	224	485
Queue Length 95th (ft)	#668	#283	#224	329	598
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1700	584	390	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.17	0.90	0.77	0.63	0.85

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

48: MacArthur Blvd (EB) & Lakeshore Drive

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	284	822	360	802	857	561
v/c Ratio	0.58	0.87	0.70	0.89	1.58	0.26
Control Delay	26.1	32.0	18.5	50.2	298.4	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.1	32.0	18.5	50.2	298.4	10.0
Queue Length 50th (ft)	137	263	107	274	~842	87
Queue Length 95th (ft)	m157	m272	m85	#384	#1079	116
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	969	524	902	542	2170
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.85	0.69	0.89	1.58	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

49: Santa Clara Avenue & Oakland Avenue

Lane Group	NWT	NWR	NET
Lane Group Flow (vph)	3343	162	1106
v/c Ratio	1.38	0.20	0.89dl
Control Delay	198.5	4.4	18.4
Queue Delay	195.8	0.0	0.2
Total Delay	394.4	4.4	18.6
Queue Length 50th (ft)	~826	9	151
Queue Length 95th (ft)	#919	41	193
Internal Link Dist (ft)	378		334
Turn Bay Length (ft)			
Base Capacity (vph)	2415	818	2036
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	578	0	238
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.82	0.20	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

50: MacArthur Blvd (WB) & Harrison Street

Lane Group	NWL	NWT	SWT
Lane Group Flow (vph)	942	2909	1613
v/c Ratio	1.08	1.07	1.41
Control Delay	61.0	54.1	213.5
Queue Delay	190.7	215.2	0.0
Total Delay	251.7	269.3	213.5
Queue Length 50th (ft)	~455	~462	~583
Queue Length 95th (ft)	m309	m306	#718
Internal Link Dist (ft)		191	1680
Turn Bay Length (ft)			
Base Capacity (vph)	876	2731	1148
Starvation Cap Reductn	252	852	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.51	1.55	1.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

2: Oakland Avenue & I-580 Off-ramp

Lane Group	SEL2	SET	NET	NER
Lane Group Flow (vph)	741	754	1792	1049
v/c Ratio	1.50	1.48	0.86	2.95
Control Delay	257.8	248.0	15.6	899.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	257.8	248.0	15.6	899.7
Queue Length 50th (ft)	~418	~423	232	~678
Queue Length 95th (ft)	#621	#627	331	#886
Internal Link Dist (ft)		880	451	
Turn Bay Length (ft)				
Base Capacity (vph)	495	511	2153	356
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.50	1.48	0.83	2.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

3: 27th Street & Harrison Street

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	268	516	192	86	224	255	552	1577	277	827
v/c Ratio	0.81	0.51	0.42	0.48	0.67	0.52	0.97	1.44	1.28	0.93
Control Delay	58.6	30.2	30.0	46.6	43.6	8.1	68.7	232.6	192.6	50.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.6	30.2	30.0	46.6	43.6	8.1	68.7	232.6	192.6	50.2
Queue Length 50th (ft)	147	134	88	47	120	0	162	~653	~202	237
Queue Length 95th (ft)	#349	189	156	92	179	57	#264	#790	#355	#354
Internal Link Dist (ft)		1001			87			632		676
Turn Bay Length (ft)	70						90		70	
Base Capacity (vph)	330	1015	460	216	559	641	572	1092	216	891
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.51	0.42	0.40	0.40	0.40	0.97	1.44	1.28	0.93

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	260	505	170	79	798	142	259	692	167	1024
v/c Ratio	0.85	0.68	0.24	0.26	1.31	0.24	2.62	0.51	0.78	0.72
Control Delay	45.2	28.3	4.2	20.3	181.8	14.3	769.0	14.0	49.9	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	28.3	4.2	20.3	181.8	14.3	769.0	14.0	49.9	19.4
Queue Length 50th (ft)	86	226	0	27	~582	13	~241	91	76	177
Queue Length 95th (ft)	#222	#369	40	m46	m#729	m45	m#354	m109	#189	252
Internal Link Dist (ft)		468			962			1466		318
Turn Bay Length (ft)				150			70		80	
Base Capacity (vph)	311	741	720	391	611	589	99	1360	215	1427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.84	0.68	0.24	0.20	1.31	0.24	2.62	0.51	0.78	0.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	426	795	180	429	1042	57	1710	1541	1017
v/c Ratio	0.82	0.66	0.34	0.83	0.84	0.11	1.01	2.00	0.62
Control Delay	55.2	31.7	21.2	55.5	38.0	20.2	56.9	474.3	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.2	31.7	21.2	55.5	38.0	20.2	56.9	474.3	26.0
Queue Length 50th (ft)	136	228	65	137	323	20	~402	~1396	176
Queue Length 95th (ft)	#201	296	123	#203	#422	49	#517	#1660	224
Internal Link Dist (ft)		526			509		546		632
Turn Bay Length (ft)	240			230					
Base Capacity (vph)	549	1199	530	549	1236	515	1693	770	1634
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.66	0.34	0.78	0.84	0.11	1.01	2.00	0.62

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	1064	129	1867	1374
v/c Ratio	0.81	0.48	1.34	0.58
Control Delay	26.6	18.6	185.8	22.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	26.6	18.6	185.8	22.0
Queue Length 50th (ft)	225	34	~666	162
Queue Length 95th (ft)	286	70	#825	211
Internal Link Dist (ft)	280		400	546
Turn Bay Length (ft)	200	160		
Base Capacity (vph)	1450	289	1390	2371
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.73	0.45	1.34	0.58

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL2	EBL	NBT	SBT	SBR	SBR2	SER	SER2
Lane Group Flow (vph)	14	687	1492	452	208	124	166	212
v/c Ratio	0.14	0.58	1.87	0.71	0.31	0.16	0.92	0.44
Control Delay	34.6	23.2	418.8	45.3	23.8	11.8	83.4	7.3
Queue Delay	0.0	0.0	282.2	25.9	3.6	0.8	0.0	0.0
Total Delay	34.6	23.3	701.0	71.2	27.5	12.6	83.4	7.3
Queue Length 50th (ft)	6	81	~527	115	85	0	72	0
Queue Length 95th (ft)	22	115	#653	#165	160	m54	#179	51
Internal Link Dist (ft)		450	601	103				
Turn Bay Length (ft)	100	100			90	90	50	50
Base Capacity (vph)	101	1185	798	633	667	800	181	480
Starvation Cap Reductn	0	0	0	189	368	462	0	0
Spillback Cap Reductn	0	24	705	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.59	16.04	1.02	0.70	0.37	0.92	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

32: 14th Street & Lakeside Dr.

Lane Group	EBT	WBT	WBR	NBT	NBR
Lane Group Flow (vph)	1243	516	317	1067	53
v/c Ratio	1.40	0.49	0.60	0.58	0.07
Control Delay	209.7	19.1	16.3	11.0	6.7
Queue Delay	0.0	0.0	0.0	3.5	0.0
Total Delay	209.7	19.1	16.3	14.5	6.7
Queue Length 50th (ft)	~327	79	56	124	8
Queue Length 95th (ft)	#442	120	130	174	21
Internal Link Dist (ft)	299	570		197	
Turn Bay Length (ft)					
Base Capacity (vph)	888	1062	525	1852	813
Starvation Cap Reductn	0	0	0	670	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.40	0.49	0.60	0.90	0.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

40: 7th St. & Oak St.

Lane Group	EBT	NBT
Lane Group Flow (vph)	1798	2406
v/c Ratio	0.70	1.93dr
Control Delay	9.4	158.0
Queue Delay	0.0	24.4
Total Delay	9.4	182.4
Queue Length 50th (ft)	88	~321
Queue Length 95th (ft)	m91	m#412
Internal Link Dist (ft)	276	196
Turn Bay Length (ft)		
Base Capacity (vph)	2553	1857
Starvation Cap Reductn	0	75
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.70	1.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

42: I-880 NB On-ramp & Jackson Street

Lane Group	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	9	467	72	891	273	1955
v/c Ratio	0.02	1.04	0.18	1.18	0.25	2.12
Control Delay	17.6	79.4	6.7	111.2	7.1	523.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.6	79.4	6.7	111.2	7.1	523.4
Queue Length 50th (ft)	2	~188	0	~399	43	~1179
Queue Length 95th (ft)	12	#345	26	#596	77	#1429
Internal Link Dist (ft)		298		747	581	
Turn Bay Length (ft)						
Base Capacity (vph)	417	450	410	757	1071	924
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.02	1.04	0.18	1.18	0.25	2.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

44: 5th St. & Oak St.

Lane Group	EBT	NBT	SBT
Lane Group Flow (vph)	1237	769	89
v/c Ratio	2.36	1.20	0.20
Control Delay	634.7	122.8	1.7
Queue Delay	14.4	18.6	0.0
Total Delay	649.1	141.4	1.7
Queue Length 50th (ft)	~208	~255	1
Queue Length 95th (ft)	#282	#429	m2
Internal Link Dist (ft)	310	104	207
Turn Bay Length (ft)			
Base Capacity (vph)	524	643	448
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	7	22	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	2.39	1.24	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NWR	NET	SWL	SWT
Lane Group Flow (vph)	225	198	2604	232	1267
v/c Ratio	0.68	0.43	1.70	0.50	0.49
Control Delay	44.0	7.4	339.9	23.2	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.3
Total Delay	44.0	7.4	339.9	23.2	5.5
Queue Length 50th (ft)	120	0	~1139	66	64
Queue Length 95th (ft)	179	51	#1281	m139	m195
Internal Link Dist (ft)	560		322		429
Turn Bay Length (ft)	150			150	
Base Capacity (vph)	511	598	1532	462	2562
Starvation Cap Reductn	0	0	0	0	611
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.44	0.33	1.70	0.50	0.65

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	3100	661	936	802	1266
v/c Ratio	1.86	0.96	2.89	1.38	0.63
Control Delay	412.1	58.6	870.5	210.6	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	412.1	58.6	870.5	210.6	14.6
Queue Length 50th (ft)	~969	213	~950	~612	234
Queue Length 95th (ft)	#1061	m140	m#557	#833	300
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1668	688	324	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.86	0.96	2.89	1.38	0.63

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	479	2459	1052	1685	653	334
v/c Ratio	0.96	2.48	2.30	1.91dr	2.77	0.16
Control Delay	27.5	685.6	602.5	166.1	825.8	8.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.5	685.6	602.5	166.1	825.8	8.6
Queue Length 50th (ft)	236	~1359	~1069	~654	~639	41
Queue Length 95th (ft)	m84	m#551	m#416	#793	#847	61
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	990	458	1298	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.96	2.48	2.30	1.30	2.77	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

APPENDIX G.8

Collision Summary Sheets

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Location: Harrison St / Stanley Pl
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 2

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
3074212	3/2/07	08:51	25	North	Hit Object	Fixed Object	South	Ran Off Road			Unsafe Speed	0	0
3237011	6/15/07	18:30	48	West	Sideswipe	Parked Motor Vehicle	West	Parked	West	Making Right Turn	Improper Turning	0	0

Total Number of Collisions: 2

Settings Used For Query

Parameter	Setting
Street Name	HARRISON ST
Cross Street	STANLEY PL
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

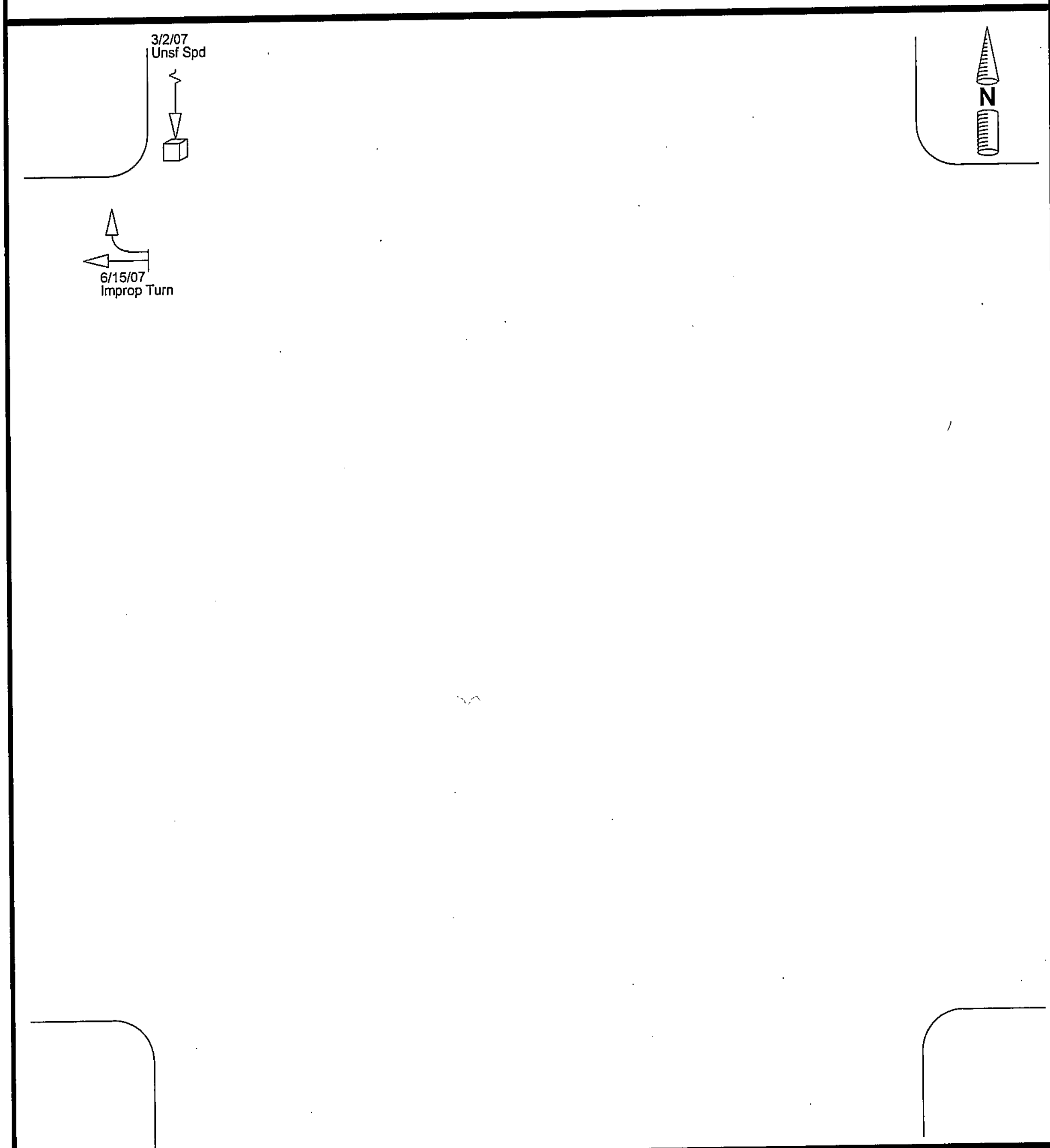
Collision Diagram

Horizontal Street: STANLEY PL

Vertical Street: HARRISON ST

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

2 Property Damage Only
0 Injury Collisions
0 Fatal Collisions
2 Total Collisions

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	HARRISON ST
Cross Street	STANLEY PL
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Oakland Avenue / Perry Place
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1200773	1/7/04	15:30	0	In Int.	Broadside	Other Motor Veh icle	North	Proceeding Stra ight	East	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1248805	1/30/04	16:36	100	South	Rear-End	Other Motor Veh icle	North	Proceeding Stra ight	North	Stopped in Road	Unsafe Speed	0	0
1517020	7/11/04	13:15	0	In Int.	Sideswipe	Other Motor Veh icle	East	Making Left Tur n	East	Making Left Tur n	Improper Turning	0	0
1999451	5/4/05	09:40	27	South	Rear-End	Other Motor Veh icle	North	Proceeding Stra ight	North	Stopped in Road	Unsafe Speed	0	0
2834308	10/5/06	07:10	0	In Int.	Broadside	Other Motor Veh icle	North	Proceeding Stra ight	East	Proceeding Stra ight	Traffic Signals an d Signs	0	0
2903700	11/15/06	18:00	0	In Int.	Sideswipe	Other Motor Veh icle	East	Proceeding Stra ight	North	Making Left Tur n	Improper Turning	0	0
2988939	1/3/07	19:30	0	In Int.	Hit Object	Fixed Object	North	Ran Off Road			Improper Turning	0	0
3115732	2/25/07	10:50	55	South	Rear-End	Other Motor Veh icle	North	Proceeding Stra ight	North	Stopped in Road	Unsafe Speed	0	0

Total Number of Collisions: 8

City of Oakland
Transportation Services Division

Traffic Collision History Report

Location: Harrison Street / 27th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1046002	10/3/03	14:30	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	North	Making Left Turn	Improper Turning	0	0
1060881	10/15/03	18:30	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Unknown	0	0
1097604	10/31/03	17:00	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Making Left Turn	Improper Turning	0	0
1132411	11/12/03	17:12	0	In Int.	Head-On	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	2	0
1149390	11/27/03	23:00	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
1158322	12/1/03	15:00	0	In Int.	Hit Object	Fixed Object	South	Making Right Turn			Improper Turning	0	0
1145710	12/3/03	20:19	0	In Int.	Head-On	Other Motor Vehicle	South	Proceeding Straight	North	Making Left Turn	Other Hazardous Movement	2	0
1145750	12/4/03	10:45	0	In Int.	Sideswipe	Other Motor Vehicle	North	Changing Lanes	West	Making Left Turn	Improper Turning	0	0
1173795	12/13/03	09:45	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
1173845	12/17/03	08:33	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
1221913	1/12/04	06:46	0	In Int.	Head-On	Other Motor Vehicle	North	Making Left Turn	South	Proceeding Straight	Traffic Signals and Signs	0	0
1248610	1/13/04	17:44	0	In Int.	Broadside	Other Motor Veh	East	Proceeding Stra	North	Proceeding Stra	Traffic Signals an	0	0

						icle		ight		ight	d Signs		
1291052	2/10/04	05:55	150	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Parked	Improper Turning	0	0
1383751	4/12/04	16:50	0	In Int.	Hit Object	Fixed Object	East	Making Right Turn			Improper Turning	0	0
1517024	7/11/04	14:36	0	In Int.	Broadside	Motor Vehicle on Other Roadway	West	Making Left Turn	South	Proceeding Straight	Traffic Signals and Signs	0	0
1883768	11/14/04	13:00	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	South	Making Left Turn	Improper Turning	0	0
1821604	12/29/04	18:00	0	In Int.	Broadside	Other Motor Vehicle	North	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
2094580	6/20/05	11:46	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Making Right Turn	Other	0	0
2144795	7/25/05	15:30	0	In Int.	Vehicle - Pedestrian	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Other	1	0
2187871	8/19/05	07:30	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Making Left Turn	Improper Turning	0	0
2484611	1/19/06	08:00	130	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	1	0
2585853	4/20/06	05:40	0	In Int.	Head-On	Other Motor Vehicle	North	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	0	0
2693292	6/26/06	13:00	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
2844261	10/17/06	19:51	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
2942472	12/8/06	23:00	25	East	Rear-End	Other Motor Vehicle	East	Backing	East	Proceeding Straight	Unsafe Starting or Backing	0	0
2968574	12/27/06	18:50	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
2989635	1/9/07	13:12	30	North	Sideswipe	Other Motor Vehicle	South	Changing Lanes	Not Stated	Proceeding Straight	Unsafe Lane Change	0	0

3098866	3/12/07	06:07	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3092822	3/18/07	10:11	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	2	0

Total Number of Collisions: 29

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Broadway / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1687966	10/7/04	08:25	0	In Int.	Other	Bicycle	East	Proceeding Straight	North	Proceeding Straight	Wrong Side of Road	0	0
1821627	12/20/04	12:00	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Making Right Turn	Unsafe Speed	0	0
2122641	7/1/05	14:45	20	North	Sideswipe	Other Motor Vehicle	South	Making Right Turn	South	Stopped in Road	Improper Turning	0	0
2205392	8/26/05	12:00	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
2241168	9/9/05	08:30	30	North	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Making Right Turn	Traffic Signals and Signs	0	0
2361620	10/20/05	18:15	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2348692	11/28/05	17:57	0	In Int.	Vehicle - Pedestrian	Pedestrian	East	Making Left Turn	West	Other	Ped R/W Violation	1	0
2474880	1/27/06	19:50	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
2515780	2/28/06	11:18	0	In Int.	Head-On	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	1	0
2521738	3/4/06	15:50	0	In Int.	Broadside	Other Motor Vehicle	North	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
2515857	3/5/06	19:30	0	In Int.	Vehicle - Pedestrian	Pedestrian	East	Making Left Turn	North	Proceeding Straight	Ped R/W Violation	0	0
2985773	1/11/07	18:06	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Left Turn	East	Proceeding Straight	Auto R/W Violation	0	0
3045750	1/27/07	06:37	6	South	Hit Object	Fixed Object	South	Other Unsafe Turning			Unsafe Speed	0	0
3092597	2/23/07	02:06	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0

City of Oakland

Transportation Services Division

Traffic Collision History Report

Location: Broadway / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 14

Settings Used For Query

Parameter	Setting
Street Name	Broadway
Cross Street	27th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Telegraph Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1831302	12/2/04	11:20	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Proceeding Straight	Unsafe Speed	0	0
1831336	12/11/04	06:57	0	In Int.	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	Not Stated	Making Left Turn	Pedestrian Violation	1	0
1982840	4/13/05	05:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2179059	8/3/05	08:03	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2342288	10/20/05	11:40	9	West	Broadside	Bicycle	East	Proceeding Straight	South	Proceeding Straight	Other Hazardous Movement	1	0
2304455	10/23/05		40	East	Sideswipe	Parked Motor Vehicle	East	Proceeding Straight	Not Stated	Parked	Wrong Side of Road	0	0
2342395	10/25/05	16:00	10	West	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
2386981	12/15/05	14:40	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
2403381	12/27/05	09:30	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	West	Making Left Turn	Other Hazardous Movement	0	0
2407359	1/3/06	22:45	0	In Int.	Not Stated	Non-Collision	West	Making Right Turn	South	Making Right Turn	Improper Turning	0	0
2458150	1/25/06	06:15	0	In Int.	Broadside	Bicycle	West	Proceeding Straight	South	Making Right Turn	Traffic Signals and Signs	0	0
2555890	3/19/06	18:55	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Unknown	0	0
2844352	10/12/06	20:54	0	In Int.	Sideswipe	Other Motor Vehicle	North	Changing Lanes	North	Proceeding Straight	Improper Turning	0	0
2922096	12/4/06	10:48	17	South	Broadside	Other Motor Vehicle	East	Making Right Turn	North	Stopped in Road	Improper Turning	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Telegraph Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2946032	12/16/06	01:51	0	In Int.	Broadside	Other Motor Vehicle	West	Not Stated	South	Proceeding Straight	Traffic Signals and Signs	0	0
3321511	8/1/07	10:53	20	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0

Total Number of Collisions: 16

Settings Used For Query

Parameter	Setting
Street Name	Telegraph Avenue
Cross Street	27th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1708879	10/14/04	13:05	14	North	Broadside	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Improper Turning	0	0
1834061	12/30/04	15:49	0	In Int.	Head-On	Other Motor Vehicle	Not Stated	Proceeding Straight	Not Stated	Making Left Turn	Traffic Signals and Signs	1	0
1997496	4/19/05	18:00	0	In Int.	Other	Bicycle	West	Proceeding Straight	North	Making Right Turn	Improper Turning	0	0
2044284	5/4/05	15:50	0	In Int.	Broadside	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Improper Turning	0	0
2044356	5/17/05	16:18	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	South	Making Left Turn	Improper Turning	0	0
2059288	5/24/05	07:15	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2058927	5/25/05	11:18	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	2	0
2061576	6/2/05	09:15	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
2085069	6/10/05	17:45	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	South	Proceeding Straight	Improper Turning	1	0
2094429	6/24/05	06:50	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Making Left Turn	Improper Turning	1	0
2158397	7/11/05	07:35	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Making Left Turn	Traffic Signals and Signs	1	0
2187878	7/13/05	16:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2225771	9/5/05	16:40	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	2	0
2257348	9/29/05	16:15	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2304405	9/30/05	18:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0
2342344	10/24/05	09:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2348632	11/13/05	13:00	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Making Left Turn	Traffic Signals and Signs	2	0
2388230	12/1/05	17:50	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0
2394365	12/5/05	15:36	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0
2390572	12/20/05	16:45	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	2	0
2407327	1/2/06	13:55	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
2422608	1/5/06	16:57	0	In Int.	Not Stated	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2515820	3/4/06	11:40	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2523369	3/11/06	12:36	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
2555859	3/24/06	17:57	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Other	2	0
2615468	4/29/06	18:25	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Making Left Turn	Traffic Signals and Signs	0	0
2632398	5/6/06	10:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2639614	5/23/06	18:06	0	In Int.	Head-On	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2844396	10/17/06	17:05	5	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
2855408	10/24/06	17:37	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2870549	10/27/06	17:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Making Right Turn	Unknown	1	0
2906730	11/16/06	09:33	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2914037	11/19/06	19:25	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	East	Making Left Turn	Traffic Signals and Signs	0	0
2903732	11/21/06	15:59	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
2942560	11/28/06	17:50	0	In Int.	Overturned	Not Stated	East	Proceeding Straight	South	Making Left Turn	Traffic Signals and Signs	0	0
2922053	12/2/06	21:33	0	In Int.	Broadside	Other Motor Vehicle	South	Other Unsafe Turning	Not Stated	Parked	Improper Turning	1	0
3054064	12/19/06	07:04	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
3056560	2/12/07	10:45	10	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
3078694	3/10/07	09:37	0	In Int.	Hit Object	Fixed Object	South	Other Unsafe Turning			Unsafe Speed	0	0
3296863	7/29/07	17:51	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
3359543	8/30/07	09:00	10	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Northgate Avenue / 27th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 41

Settings Used For Query

Parameter	Setting
Street Name	Northgate Avenue
Cross Street	27th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Location: W Grand Av / Northgate Av
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2586573	4/12/06	10:22	20	Not Stated	Rear-End	Other Motor Vehicle	Not Stated	Stopped in Road	Not Stated	Slowing/Stopping	Unsafe Speed	1	0
2901247	10/30/06	13:35	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Unsafe Speed	1	0
3184262	5/1/07	13:45	50	West	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Changing Lanes	Unsafe Lane Change	0	0
3210728	6/5/07	09:00	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Making U Turn	Improper Turning	0	0
3245802	6/29/07	13:03	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	West	Making U Turn	Auto R/W Violation	1	0
3472139	8/30/07	18:10	0	In Int.	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Making Left Turn	Improper Turning	0	0

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

Location: W Grand Av / Northgate Av
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 6

Settings Used For Query

Parameter	Setting
Street Name	W GRAND AV
Cross Street	NORTHGATE AV
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

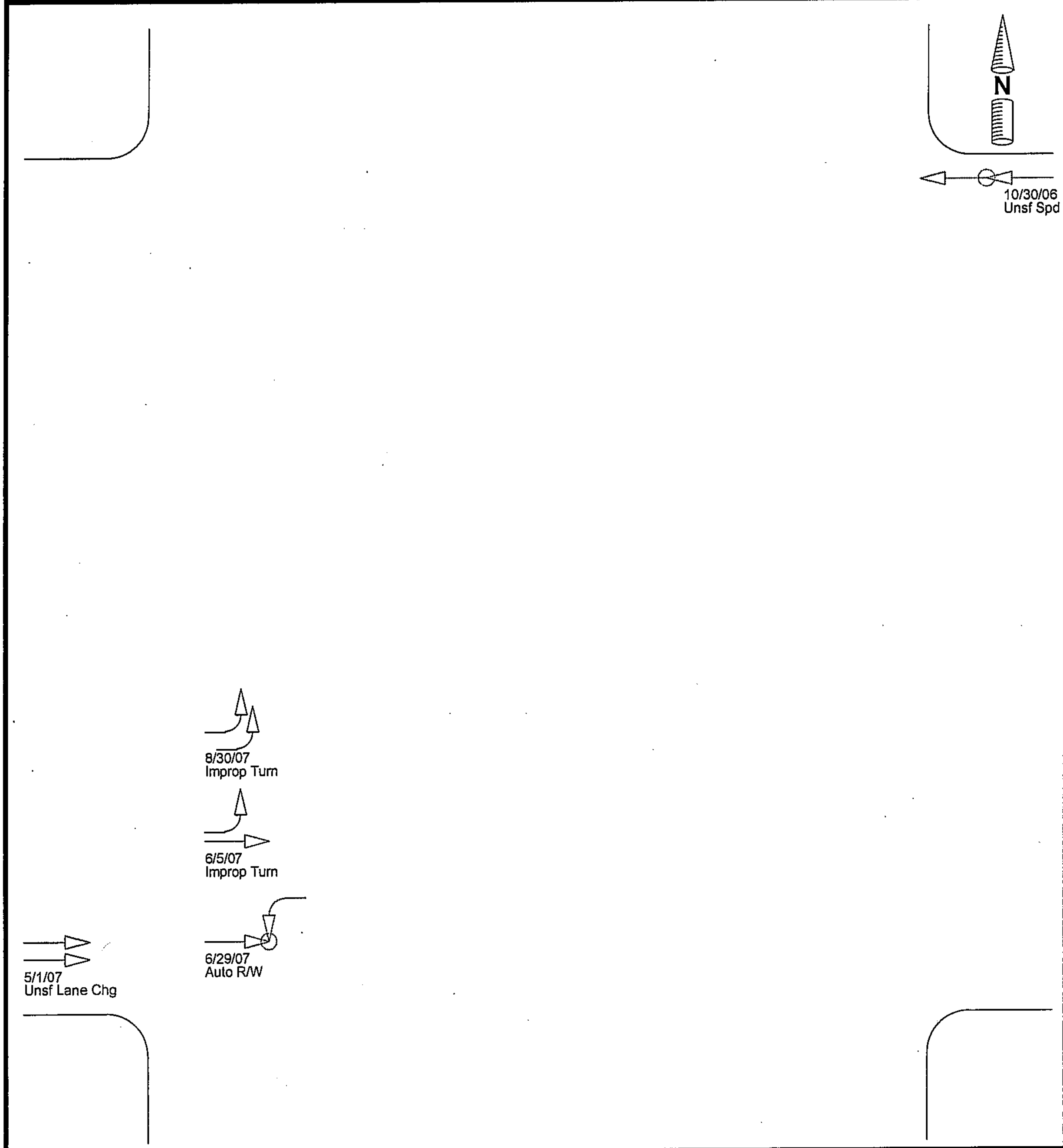
Collision Diagram

Horizontal Street: W GRAND AV

Vertical Street: NORTHGATE AV

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009

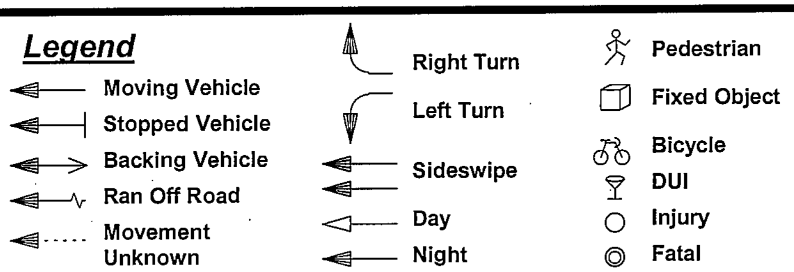


Number of Collisions

3 Property Damage Only
3 Injury Collisions
0 Fatal Collisions
6 Total Collisions

Collisions Not Plotted: 1

Legend



Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	W GRAND AV
Cross Street	NORTHGATE AV
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Telegraph Avenue / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1893002	12/17/04	10:02	0	In Int.	Broadside	Pedestrian	West	Making U Turn	South	Proceeding Straight	Ped R/W Violation	0	0
1821607	12/20/04	18:30	0	In Int.	Head-On	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
1987251	4/9/05	19:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1999474	4/28/05	00:37	0	In Int.	Head-On	Fixed Object	South	Making Left Turn			Improper Turning	1	0
2059291	5/26/05	08:45	0	In Int.	Head-On	Other Motor Vehicle	West	Making Left Turn	East	Proceeding Straight	Auto R/W Violation	2	0
2119813	6/29/05	11:35	0	In Int.	Head-On	Fixed Object	East	Making Right Turn			Improper Turning	0	0
2152405	7/6/05	12:45	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	0	0
2342325	10/29/05		0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	East	Proceeding Straight	Driving Under Influence	0	0
2342084	10/29/05	00:55	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	East	Proceeding Straight	Driving Under Influence	0	0
2386985	12/14/05	02:20	20	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
2396842	12/22/05	06:45	3	North	Vehicle - Pedestrian	Pedestrian	West	Other	North	Proceeding Straight	Pedestrian Violation	1	0
2508528	2/13/06	18:41	0	In Int.	Not Stated	Bicycle	South	Stopped in Road	North	Stopped in Road	Unknown	1	0
2548597	3/25/06	01:40	0	In Int.	Head-On	Other Motor Vehicle	North	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	0	0
2563239	4/4/06	22:25	2	East	Hit Object	Fixed Object	East	Proceeding Straight			Improper Turning	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Telegraph Avenue / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2683080	6/3/06	02:10	30	East	Not Stated	Bicycle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	1	0
2703707	6/25/06	12:17	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	3	0
3109029	3/26/07	00:23	0	In Int.	Broadside	Other Motor Vehicle	West	Making Left Turn	East	Proceeding Straight	Auto R/W Violation	0	0
3282982	7/13/07	14:48	0	In Int.	Broadside	Other Motor Vehicle	West	Making Left Turn	East	Proceeding Straight	Auto R/W Violation	0	0
3283192	7/20/07	09:03	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
3481255	9/9/07	18:04	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0

Traffic Collision History Report

Location: Telegraph Avenue / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 20

Settings Used For Query

Parameter	Setting
Street Name	Telegraph Avenue
Cross Street	Grand Avenue
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Broadway / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1735155	11/5/04	06:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Auto R/W Violation	0	0
2059374	5/28/05	15:10	0	In Int.	Broadside	Not Stated	North	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	1	0
2186169	8/17/05	18:10	0	In Int.	Broadside	Bicycle	West	Making Left Turn	East	Proceeding Straight	Auto R/W Violation	1	0
2265819	10/8/05	16:50	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0
2496680	2/27/06	12:35	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Following Too Closely	0	0
2555915	3/25/06	02:00	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2806372	9/20/06	20:20	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Driving Under Influence	0	0
2965252	12/16/06	21:50	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
3067040	2/26/07	19:30	0	In Int.	Head-On	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
3071252	3/3/07	22:35	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	4	0
3283022	7/17/07	11:05	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
3346820	8/24/07	19:47	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	3	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Broadway / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 12

Settings Used For Query

Parameter	Setting
Street Name	Broadway
Cross Street	Grand Avenue
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Webster Street / Grand Avenue
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1393190	4/19/04	13:03	0	In Int.	Broadside	Other Motor Veh icle	East	Proceeding Stra ight	South	Proceeding Stra ight	Traffic Signals an d Signs	1	0
1399293	5/6/04	11:00	30	West	Sideswipe	Other Motor Veh icle	South	Making Left Tur n	South	Parked	Improper Turning	0	0
1472103	5/23/04	09:59	0	In Int.	Broadside	Other Motor Veh icle	East	Proceeding Stra ight	South	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1649206	8/24/04	18:26	0	In Int.	Head-On	Other Motor Veh icle	East	Making Left Tur n	West	Proceeding Stra ight	Auto R/W Violation	0	0
2181236	8/16/05	16:03	0	In Int.	Sideswipe	Other Motor Veh icle	East	Making Right Tu rn	East	Proceeding Stra ight	Improper Turning	0	0

Total Number of Collisions: 5

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Harrison Street / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1639671	10/4/04	20:07	0	In Int.	Head-On	Other Motor Vehicle	South	Proceeding Straight	North	Making Left Turn	Other	0	0
1687802	10/5/04	14:45	100	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	1	0
2329314	11/2/05	12:45	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
2586664	4/9/06	10:00	30	South	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
2605543	4/26/06	20:25	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Improper Turning	0	0
2682938	6/6/06	13:09	30	West	Sideswipe	Bicycle	East	Changing Lanes	East	Slowing/Stoppi ng	Improper Turning	1	0
2870510	10/28/06	23:15	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	2	0
3075980	2/23/07	07:38	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Left Turn	South	Proceeding Straight	Traffic Signals and Signs	0	0
3108962	3/23/07	08:51	18	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Unsafe Speed	1	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Harrison Street / Grand Avenue
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 9

Settings Used For Query

Parameter	Setting
Street Name	Harrison Street
Cross Street	Grand Avenue
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008

Location: Harrison Street / 21st Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1288143	1/9/04	15:27	51	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Making Right Turn	Unknown	0	0
1214704	1/9/04	17:25	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Making Left Turn	Traffic Signals and Signs	0	0
1417465	5/6/04	13:59	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	East	Making Left Turn	Traffic Signals and Signs	0	0
2567432	4/6/06	08:00	0	In Int.	Sideswipe	Other Motor Vehicle	South	Changing Lanes	South	Proceeding Straight	Improper Turning	0	0
2632256	5/22/06	18:15	15	North	Hit Object	Other Object	West	Proceeding Straight			Other	0	0
2922144	12/3/06	02:26	12	South	Rear-End	Other Motor Vehicle	North	Stopped in Road	North	Stopped in Road	Unsafe Speed	0	0
2926200	12/4/06	11:58	0	In Int.	Head-On	Other Motor Vehicle	South	Proceeding Straight	East	Making Left Turn	Wrong Side of Road	0	0

Total Number of Collisions: 7

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Webster Street / 21st Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1339052	2/13/04	11:08	40	North	Sideswipe	Parked Motor Ve hicle	South	Proceeding Stra ight	South	Parked	Improper Turning	0	0
2111291	7/1/05	02:25	15	West	Other	Non-Collision	East	Stopped in Road	Not Stat ed	Other	Other Than Driver or Ped	1	0
2181244	8/17/05	12:00	30	North	Sideswipe	Other Motor Veh icle	South	Changing Lanes	South	Proceeding Stra ight	Improper Turning	0	0

Total Number of Collisions: 3

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Franklin Street / 21st Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1200735	12/27/03	02:40	21	West	Head-On	Fixed Object	North	Making Left Turn			Driving Under Influence	1	0
1708844	11/3/04	10:38	0	In Int.	Broadside	Other Motor Vehicle	North	Changing Lanes	North	Proceeding Straight	Improper Turning	0	0
2012204	4/29/05	16:50	10	South	Broadside	Other Motor Vehicle	North	Making Right Turn	North	Proceeding Straight	Improper Turning	0	0
2569721	3/29/06	13:15	0	In Int.	Sideswipe	Other Motor Vehicle	North	Changing Lanes	Not Stated	Making Left Turn	Improper Turning	0	0
2871827	10/30/06	23:50	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	4	0
2993522	1/3/07	14:45	14	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Slowing/Stopping	Unsafe Speed	0	0

Total Number of Collisions: 6

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Broadway / 21st Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1143484	11/19/03	14:00	0	In Int.	Head-On	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	2	0
1517045	7/8/04	12:10	12	East	Hit Object	Fixed Object	East	Ran Off Road			Improper Turning	0	0
1783587	12/22/04	11:30	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2179115	8/2/05	21:20	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
2241269	9/15/05	13:24	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2422564	1/4/06	17:15	0	In Int.	Vehicle - Pedestrian	Pedestrian	East	Not Stated	North	Proceeding Straight	Pedestrian Violation	1	0
2615487	4/27/06	08:44	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	3	0
2683005	6/1/06	07:13	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	2	0

Total Number of Collisions: 8

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Telegraph Avenue / 20th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1063970	10/20/03	16:00	10	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Following Too Closely	0	0
1262697	2/1/04	00:15	35	North	Broadside	Other Motor Vehicle	East	Making Left Turn	North	Proceeding Straight	Improper Turning	1	0
1597213	7/14/04	20:30	25	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Following Too Closely	0	0
1821635	12/20/04	14:00	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Improper Turning	0	0
2458102	1/25/06	15:40	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2508495	2/9/06	08:15	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
2584174	4/16/06	20:15	50	North	Sideswipe	Other Motor Vehicle	South	Other Unsafe Turning	South	Proceeding Straight	Improper Turning	0	0
2687172	6/19/06	11:31	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Unknown	0	0
2879876	11/3/06	11:42	0	In Int.	Not Stated	Not Stated	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	1	0
3011336	1/25/07	16:40	36	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Making Right Turn	Unsafe Speed	0	0
3077772	3/13/07	14:35	6	East	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	North	Not Stated	Ped R/W Violation	0	0
3332483	8/22/07	13:48	0	In Int.	Sideswipe	Other Motor Vehicle	West	Backing	North	Stopped in Road	Unsafe Starting or Backing	0	0

Total Number of Collisions: 12

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

Location: Broadway / 20th St
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2409511	1/6/06	12:23	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	West	Making Left Turn	Auto R/W Violation	2	0
2993585	1/3/07	11:49	0	In Int.	Broadside	Other Motor Vehicle	West	Stopped in Road	North	Proceeding Straight	Auto R/W Violation	0	0
3071244	2/18/07	02:40	38	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Driving Under Influence	0	0
3145303	4/24/07	16:38	20	West	Broadside	Other Motor Vehicle	West	Proceeding Straight	East	Making Left Turn	Improper Turning	0	0
3448744	10/23/07	09:15	0	In Int.	Sideswipe	Parked Motor Vehicle	North	Parked	North	Proceeding Straight	Improper Turning	0	0
3596676	1/28/08	23:39	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

Location: Broadway / 20th St
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 6

Settings Used For Query

Parameter	Setting
Street Name	BROADWAY
Cross Street	20TH ST
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

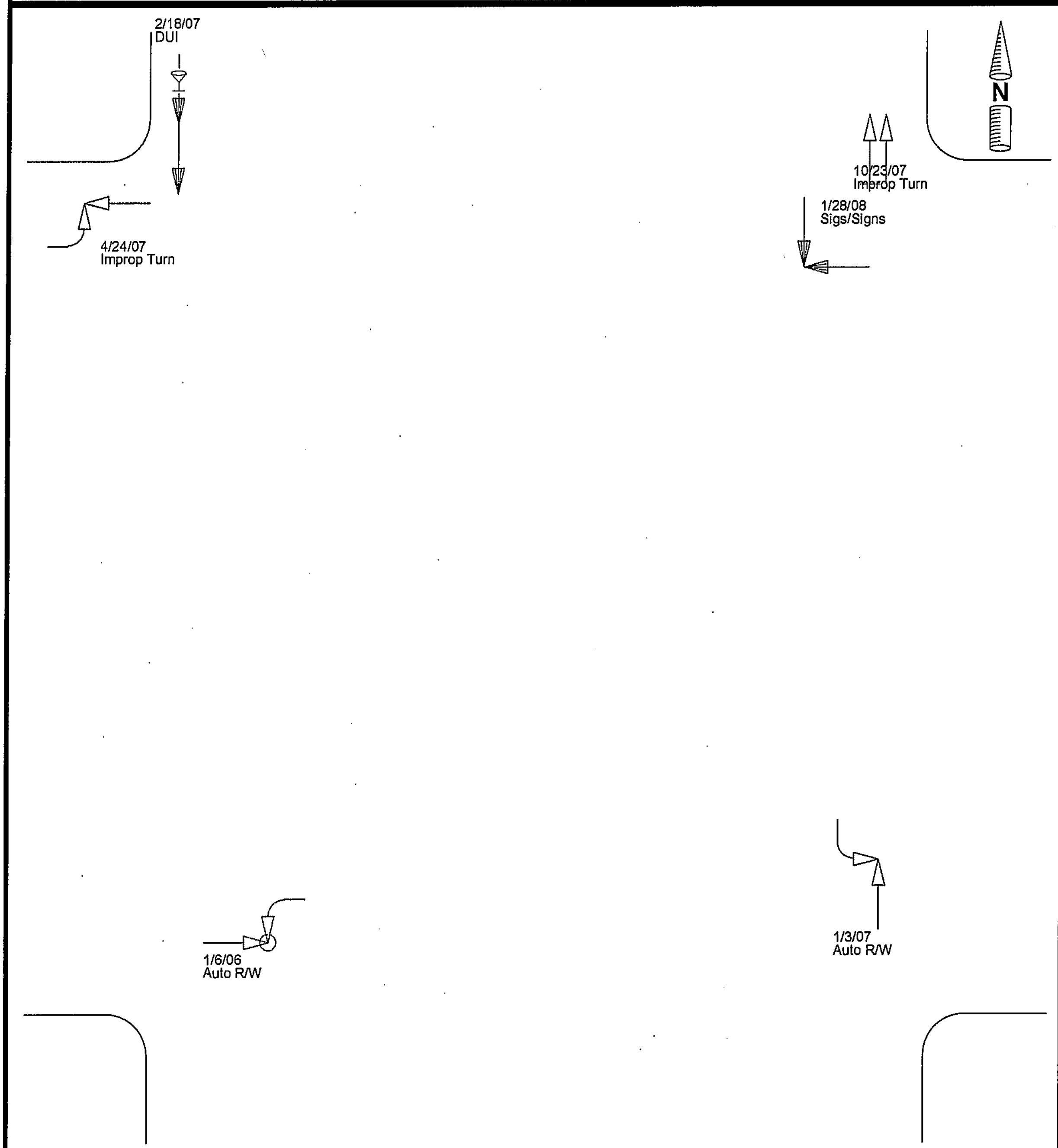
Collision Diagram

Horizontal Street: 20TH ST

Vertical Street: BROADWAY

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

5 Property Damage Only
1 Injury Collisions
0 Fatal Collisions
6 Total Collisions

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	BROADWAY
Cross Street	20TH ST
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008

Location: Franklin Street / 20th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1294180	2/27/04	15:05	0	In Int.	Sideswipe	Other Motor Veh icle	West	Making Right Tu rn	West	Stopped in Road	Improper Turning	0	0
1294232	2/28/04	12:00	0	In Int.	Sideswipe	Other Motor Veh icle	North	Making Left Tur n	North	Proceeding Stra ight	Improper Turning	0	0
1373049	4/9/04	15:40	50	South	Broadside	Other Motor Veh icle	North	Entering Traffi c	North	Making Right Tu rn	Unknown	0	0
1517755	6/13/04	16:50	0	In Int.	Broadside	Not Stated	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1648933	8/28/04	09:55	0	In Int.	Sideswipe	Other Motor Veh icle	North	Proceeding Stra ight	North	Proceeding Stra ight	Improper Turning	0	0
1649190	9/11/04	10:50	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1695286	10/26/04	13:45	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Other	0	0
1777486	12/13/04	15:17	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	0	0
2682975	6/1/06	15:10	0	In Int.	Sideswipe	Other Motor Veh icle	West	Making Right Tu rn	West	Making Right Tu rn	Unknown	0	0
2835916	10/12/06	15:41	0	In Int.	Sideswipe	Other Motor Veh icle	North	Making Left Tur n	North	Proceeding Stra ight	Auto R/W Violation	0	0
2906766	11/16/06	19:22	0	In Int.	Broadside	Bicycle	East	Other Unsafe Tu rning	North	Proceeding Stra ight	Traffic Signals an d Signs	1	0
3388784	9/20/07	08:15	0	In Int.	Broadside	Motor Vehicle o n Other Roadway	West	Proceeding Stra ight	North	Proceeding Stra ight	Other	1	0

Total Number of Collisions: 12

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008
Page 1

Location: Webster Street / 20th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1072812	10/21/03	10:05	0	In Int.	Broadside	Other Motor Veh icle	East	Stopped in Road	South	Proceeding Stra ight	Traffic Signals an d Signs	0	0
2538166	3/17/06	08:25	15	North	Sideswipe	Other Motor Veh icle	South	Making Right Tu rn	South	Proceeding Stra ight	Improper Turning	0	0

Total Number of Collisions: 2

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Harrison Street / 20th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1752223	11/22/04	08:00	0	In Int.	Sideswipe	Parked Motor Vehicle	East	Proceeding Straight	East	Parked	Improper Turning	0	0
2012227	5/1/05	06:23	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Other	1	0
2202154	8/22/05	11:15	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	East	Proceeding Straight	Other Hazardous Movement	1	0
2632288	5/18/06	17:00	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Following Too Closely	0	0
3297003	7/25/07	09:45	10	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Harrison Street / 20th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 5

Settings Used For Query

Parameter	Setting
Street Name	Harrison Street
Cross Street	20th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009
Page 1

Location: Harrison St / Lakeside Dr (1)
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 8

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2632288	5/18/06	17:00	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Following Too Closely	0	0
2687144	6/19/06	12:29	15	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Unsafe Speed	0	0
3240692	6/21/07	09:00	50	West	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Improper Turning	0	0
3297003	7/25/07	09:45	10	North	Rear-End	Other Motor Vehicle	South	Stopped in Road	South	Proceeding Straight	Unsafe Speed	0	0
3472387	10/22/07	16:27	15	South	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3451104	10/30/07	15:19	30	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	3	0
3472256	11/17/07	11:10	10	North	Rear-End	Other Motor Vehicle	South	Backing	South	Stopped in Road	Unsafe Starting or Backing	0	0
3795441	6/24/08	13:33	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

Location: Harrison St / Lakeside Dr (1)
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 8

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 8

Settings Used For Query

Parameter	Setting
Street Name	HARRISON ST
Cross Street	LAKESIDE DR (1)
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

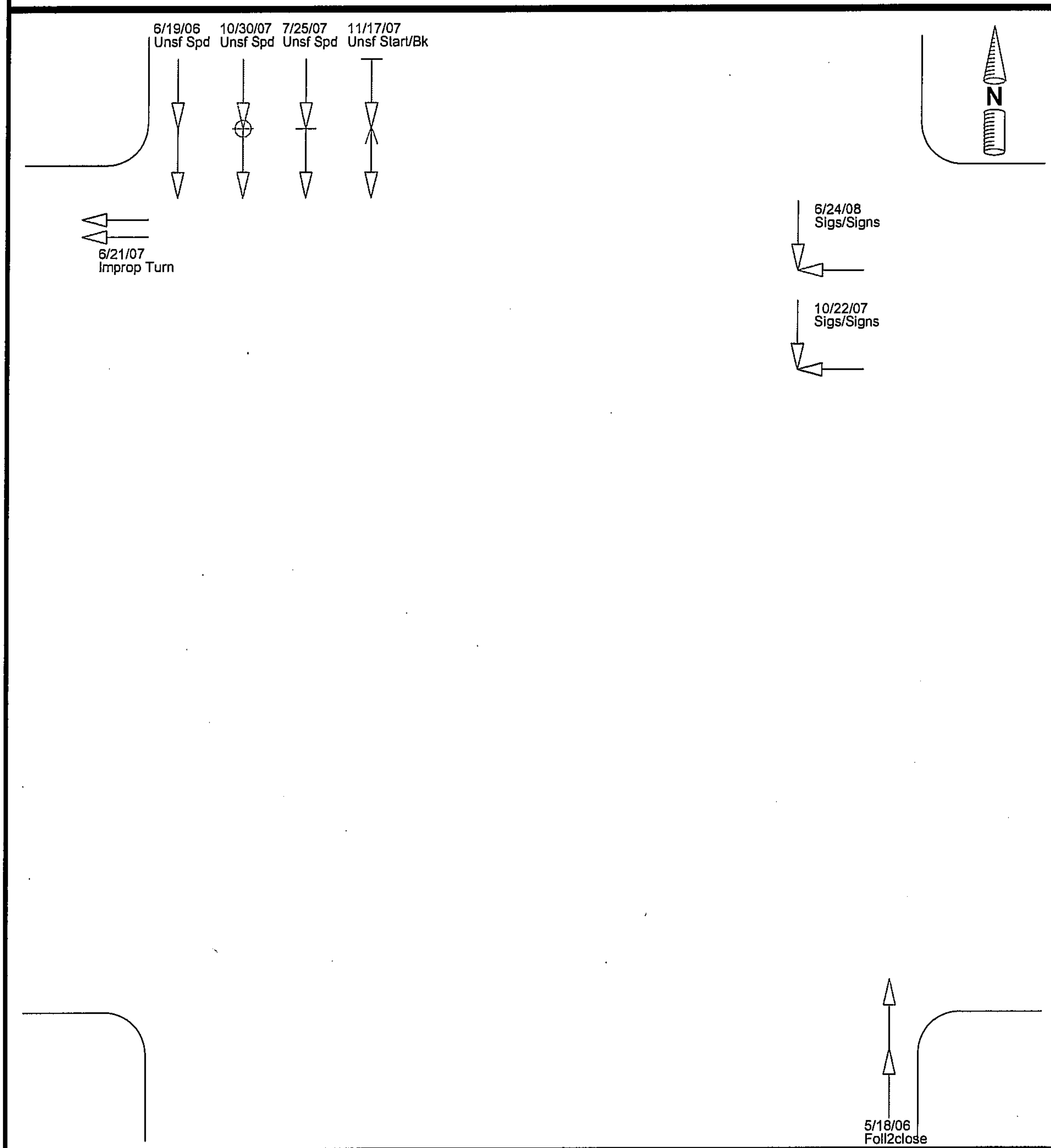
Collision Diagram

Horizontal Street: LAKESIDE DR (1)

Vertical Street: HARRISON ST

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

7 Property Damage Only
1 Injury Collisions
0 Fatal Collisions
8 Total Collisions

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	HARRISON ST
Cross Street	LAKESIDE DR (1)
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Location: Harrison St / Lakeside Dr (4)
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2567432	4/6/06	08:00	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Changing Lanes	Improper Turning	0	0
2632256	5/22/06	18:15	15	North	Hit Object	Other Object	West	Proceeding Straight			Other	0	0
2922144	12/3/06	02:26	12	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
2926200	12/4/06	11:58	0	In Int.	Head-On	Other Motor Vehicle	East	Making Left Turn	South	Proceeding Straight	Wrong Side of Road	0	0
3236458	6/20/07	23:19	10	South	Rear-End	Other Motor Vehicle	North	Stopped in Road	North	Proceeding Straight	Unsafe Speed	0	0
3430124	10/13/07	01:35	0	In Int.	Rear-End	Other Motor Vehicle	East	Stopped in Road	East	Proceeding Straight	Unsafe Speed	0	0

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

Location: Harrison St / Lakeside Dr (4)
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 6

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 6

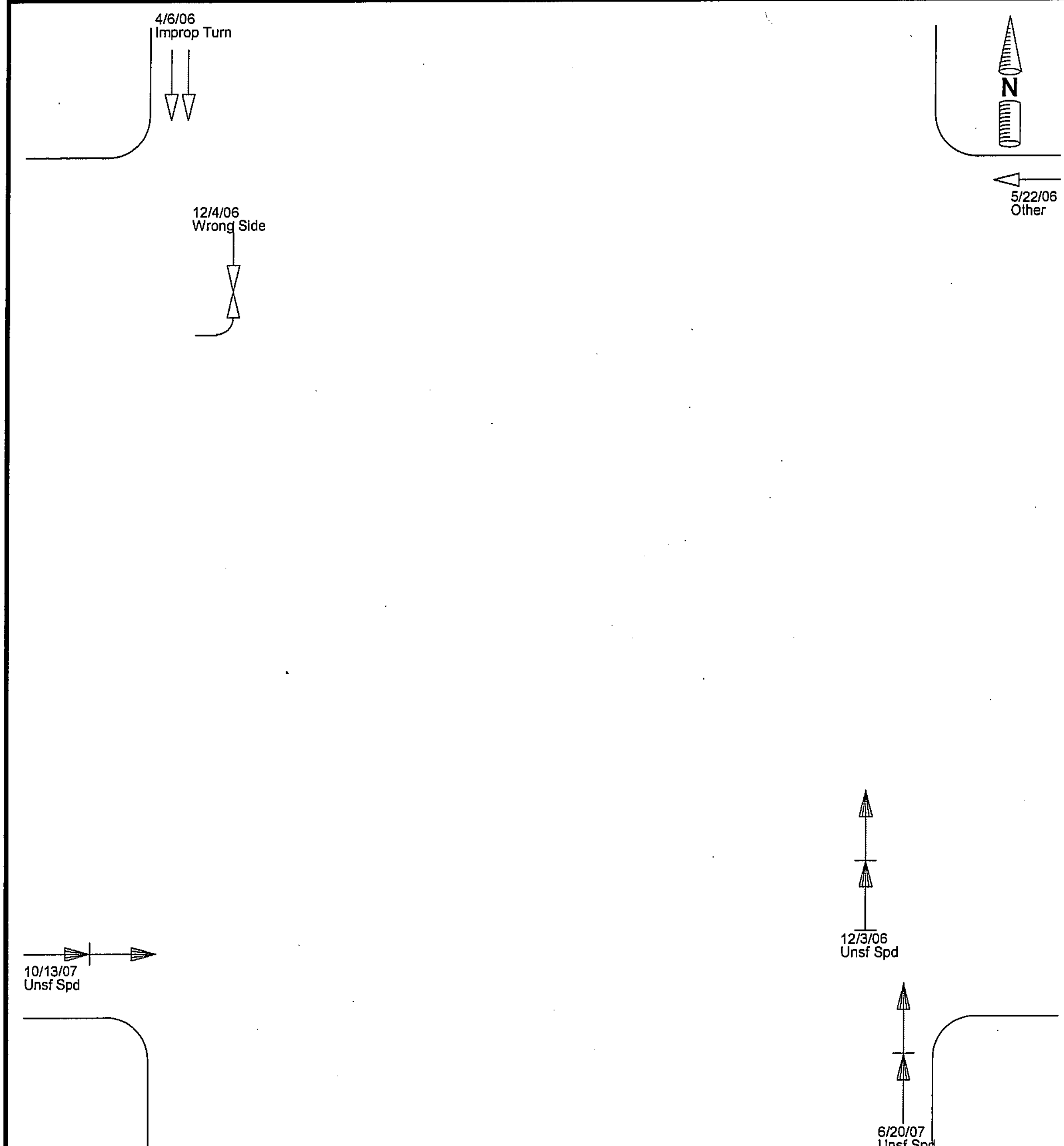
Settings Used For Query

Parameter	Setting
Street Name	HARRISON ST
Cross Street	LAKESIDE DR (4)
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

Collision Diagram

Horizontal Street: HARRISON ST — From: 1/1/2006 To: 12/31/2008

Vertical Street: LAKESIDE DR (4) — Date Prepared: 8/27/2009



Number of Collisions

6 Property Damage Only
0 Injury Collisions
0 Fatal Collisions
6 Total Collisions

Legend

Moving Vehicle
Stopped Vehicle
Backing Vehicle
Ran Off Road
Movement Unknown
Right Turn
Left Turn
Sideswipe
Day
Night
Pedestrian
Fixed Object
Bicycle
DUI
Injury
Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	HARRISON ST
Cross Street	LAKESIDE DR (4)
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008

Location: Lakeside Drive / 20th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1447122	6/5/04	19:00	1	South	Sideswipe	Other Motor Veh icle	North	Making Right Tu rn	North	Stopped in Road	Improper Turning	0	0
1546029	7/29/04	11:00	40	North	Rear-End	Other Motor Veh icle	South	Stopped in Road	South	Stopped in Road	Unsafe Speed	0	0
2687144	6/19/06	12:29	15	North	Rear-End	Other Motor Veh icle	South	Proceeding Stra ight	South	Proceeding Stra ight	Unsafe Speed	0	0

Total Number of Collisions: 3

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/29/2008

Location: Brush Street / 18th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0548257	12/8/02	11:00	0	In Int.	Not Stated	Other Motor Vehicle	West	Making Left Turn	South	Proceeding Straight	Unknown	0	0
0659880	2/3/03	14:25	10	North	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Other	0	0
0688743	2/8/03	10:10	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Unknown	0	0
0696320	2/24/03	16:49	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	1	0
0688448	2/28/03	20:21	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Making Left Turn	Traffic Signals and Signs	0	0
1046135	9/29/03	08:40	15	South	Hit Object	Fixed Object	South	Not Stated			Unknown	1	0
1058994	10/7/03	16:15	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Auto R/W Violation	1	0
1063211	10/16/03	16:26	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1097697	10/30/03	17:45	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	1	0
1097694	11/2/03	11:28	0	In Int.	Broadside	Motor Vehicle on Other	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1132356	11/8/03	23:10	0	In Int.	Broadside	Pedestrian	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1305667	3/2/04	12:25	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1355821	3/12/04	08:45	22	South	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Hazardous Parking	1	0
1372983	4/7/04	10:59	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0
1390251	4/13/04	14:01	24	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Brush Street / 18th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1528240	5/13/04	15:40	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1446900	5/29/04	23:45	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1466381	6/7/04	08:22	50	North	Sideswipe	Other Motor Vehicle	South	Changing Lanes	South	Proceeding Straight	Improper Turning	0	0
1541997	7/18/04	12:25	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
1652761	9/23/04	16:45	0	In Int.	Vehicle - Pedestrian	Pedestrian	South	Making Left Turn	West	Other	Ped R/W Violation	1	0
1795615	12/9/04	14:55	11	West	Vehicle - Pedestrian	Pedestrian	West	Proceeding Straight	North	Proceeding Straight	Ped R/W Violation	1	0
1987220	4/9/05	10:53	20	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Unsafe Speed	1	0
2012200	4/29/05	17:05	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2014611	5/8/05	10:54	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0
2058903	5/25/05	11:00	0	In Int.	Sideswipe	Other Motor Vehicle	South	Changing Lanes	South	Proceeding Straight	Improper Turning	0	0
2070723	6/6/05	13:25	0	In Int.	Broadside	Non-Collision	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	3	0
2101260	6/17/05	11:55	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2241154	9/17/05	10:30	0	In Int.	Sideswipe	Other Motor Vehicle	South	Changing Lanes	South	Slowing/Stoppi ng	Improper Turning	0	0
2279151	9/24/05	14:21	10	West	Broadside	Not Stated	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2388202	12/2/05	10:20	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Brush Street / 18th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2484603	1/27/06	19:45	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
2651068	5/13/06	13:32	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2687186	6/18/06	14:45	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2946019	12/15/06	16:30	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
2985814	12/17/06	02:30	0	In Int.	Hit Object	Fixed Object	South	Proceeding Straight			Unsafe Speed	0	0
2985805	1/11/07	13:58	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
3011385	1/23/07	15:32	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
3109001	3/19/07	11:00	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	South	Proceeding Straight	Improper Turning	1	0
3346879	8/25/07	09:23	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	0	0
3359577	8/30/07	14:08	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
3353224	9/18/07	14:45	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0

Traffic Collision History Report

Location: Brush Street / 18th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 41

Settings Used For Query

Parameter	Setting
Street Name	Brush Street
Cross Street	18th Street
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Castro Street / 17th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0461031	10/10/02	16:10	0	In Int.	Broadside	Bicycle	West	Proceeding Straight	East	Making Left Turn	Wrong Side of Road	1	0
0558332	12/21/02	15:30	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
0776458	1/18/03	20:30	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Unknown	0	0
0620514	1/21/03	18:25	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	North	Making Right Turn	Unsafe Lane Change	0	0
0665304	2/18/03	10:20	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	East	Making Left Turn	Unknown	0	0
0688451	2/27/03	17:30	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
0840658	5/22/03	14:35	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Unknown	0	0
1094254	9/18/03	21:42	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1149365	11/19/03	07:10	0	In Int.	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Making Left Turn	Unknown	1	0
1191533	12/19/03	14:25	0	In Int.	Broadside	Other Motor Vehicle	North	Entering Traffic	West	Proceeding Straight	Auto R/W Violation	0	0
1201017	1/1/04	14:30	20	South	Sideswipe	Other Motor Vehicle	North	Making Right Turn	North	Proceeding Straight	Improper Turning	0	0
1377814	3/22/04	07:00	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1383265	4/3/04	00:00	0	In Int.	Broadside	Other Motor Vehicle	East	Making Right Turn	North	Not Stated	Traffic Signals and Signs	1	0
1472121	4/3/04	23:46	0	In Int.	Broadside	Other Motor Vehicle	East	Making Right Turn	North	Proceeding Straight	Traffic Signals and Signs	1	0
1389348	4/21/04	22:45	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Other Hazardous Movement	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Castro Street / 17th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1389426	4/22/04	14:50	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
1525801	5/3/04	11:15	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Unknown	3	0
1624837	9/13/04	08:50	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	East	Proceeding Straight	Improper Turning	0	0
1688050	10/10/04	06:20	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
1810578	12/26/04	12:00	20	West	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Improper Turning	0	0
2043887	5/11/05	17:50	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	North	Making Left Turn	Improper Turning	0	0
2077705	6/13/05	07:30	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2077738	6/14/05	23:30	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2342227	10/17/05	12:46	0	In Int.	Sideswipe	Motor Vehicle on Other	North	Proceeding Straight	East	Proceeding Straight	Unknown	1	0
2348295	11/11/05	07:32	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Proceeding Straight	Unknown	0	0
2388223	12/3/05	10:54	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
2489901	2/1/06	11:30	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2567375	4/6/06	13:44	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2687164	6/18/06	21:47	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2845868	10/14/06	00:40	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Castro Street / 17th Street
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2856514	10/21/06	14:12	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
3298902	8/1/07	07:35	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0

Total Number of Collisions: 32

Settings Used For Query

Parameter	Setting
Street Name	Castro Street
Cross Street	17th Street
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008

Location: Castro Street / 12th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1056682	10/9/03	18:20	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Making Right Turn	Improper Turning	0	0
1093232	10/27/03	11:29	50	South	Rear-End	Other Motor Vehicle	South	Backing	North	Stopped in Road	Unsafe Starting or Backing	0	0
1097616	10/31/03	15:22	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Making Right Turn	Unknown	0	0
1191612	12/20/03	20:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Other Hazardous Movement	0	0
1191597	12/20/03	21:30	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	North	Making Right Turn	Improper Turning	0	0
1221905	1/6/04	16:45	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1248691	1/12/04	12:00	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Other Hazardous Movement	0	0
1291767	2/14/04	14:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Other	0	0
1388292	3/22/04	08:05	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Improper Turning	0	0
1381098	3/29/04	16:00	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Other Hazardous Movement	0	0
1472171	5/16/04	01:00	0	In Int.	Sideswipe	Other Motor Vehicle	West	Ran Off Road	West	Ran Off Road	Unknown	0	0

1510616	6/18/04	11:30	0	In Int.	Broadside	Other Motor Veh icle	North	Proceeding Stra ight	East	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1647766	7/16/04	14:36	0	In Int.	Sideswipe	Other Motor Veh icle	West	Making Right Tu rn	West	Making Right Tu rn	Improper Turning	0	0
1590951	8/18/04	17:55	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	2	0
1714577	11/6/04	09:00	0	In Int.	Sideswipe	Other Motor Veh icle	West	Proceeding Stra ight	West	Making Right Tu rn	Improper Turning	0	0
1714881	11/9/04	14:32	0	In Int.	Sideswipe	Other Motor Veh icle	West	Proceeding Stra ight	West	Making Right Tu rn	Improper Turning	0	0
2043903	5/10/05	10:10	21	North	Sideswipe	Other Motor Veh icle	North	Changing Lanes	North	Proceeding Stra ight	Unsafe Lane Change	0	0
2059414	5/30/05	19:45	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	0	0
2178977	8/4/05	17:30	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	West	Making Right Tu rn	Improper Turning	0	0
2178965	8/5/05	22:30	0	In Int.	Broadside	Other Motor Veh icle	North	Proceeding Stra ight	West	Proceeding Stra ight	Traffic Signals an d Signs	1	0
2209408	8/31/05	16:45	0	In Int.	Sideswipe	Other Motor Veh icle	West	Proceeding Stra ight	West	Making Right Tu rn	Other Hazardous Mo vement	0	0
2257345	9/30/05	15:00	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	0	0
2361607	11/28/05	13:13	0	In Int.	Sideswipe	Other Motor Veh icle	West	Proceeding Stra ight	West	Making Right Tu rn	Other Hazardous Mo vement	0	0
2467634	2/3/06	09:50	0	In Int.	Sideswipe	Other Motor Veh icle	Not Stated	Proceeding Stra ight	West	Proceeding Stra ight	Improper Turning	0	0
2683950	5/31/06	09:35	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	0	0
2687209	6/21/06	07:09	0	In Int.	Broadside	Motor Vehicle o n Other Roadway	North	Proceeding Stra ight	West	Proceeding Stra ight	Traffic Signals an d Signs	1	0
2703663	6/30/06	00:05	0	In Int.	Broadside	Other Motor Veh icle	North	Proceeding Stra ight	West	Proceeding Stra ight	Other Improper Dri ving	0	0

2971258	12/16/06	15:00	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Making Right Turn	Unsafe Lane Change	0	0
3010361	1/14/07	20:50	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
3011300	1/19/07	23:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
3092866	3/8/07	11:10	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Auto R/W Violation	0	0
3255844	7/3/07	16:40	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Improper Turning	0	0
3283201	7/20/07	10:59	27	West	Broadside	Other Motor Vehicle	West	Making Right Turn	North	Proceeding Straight	Auto R/W Violation	0	0
3283205	7/20/07	14:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Improper Turning	0	0
3325130	7/28/07	17:10	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Making Right Turn	Improper Turning	0	0

Total Number of Collisions: 35

City of Oakland
Transportation Services Division

Traffic Collision History Report

Location: Brush Street / 11th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1058399	10/4/03	07:48	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
1145720	11/18/03	09:25	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	South	Making Left Turn	Other Hazardous Movement	0	0
1356274	4/4/04	15:00	0	In Int.	Broadside	Other Motor Vehicle	Not Stated	Proceeding Straight	South	Making Left Turn	Improper Turning	0	0
1597234	7/6/04	10:05	25	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Starting or Backing	0	0
1524963	7/13/04	19:57	0	In Int.	Hit Object	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Other Hazardous Movement	0	0
1624841	9/13/04	08:00	0	In Int.	Broadside	Not Stated	Not Stated	Proceeding Straight	East	Making Left Turn	Improper Turning	0	0
2205435	8/27/05	10:15	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	South	Making Left Turn	Improper Turning	0	0
2585836	4/20/06	10:23	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Making Left Turn	Improper Turning	0	0
2671941	6/10/06	12:58	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Starting or Backing	1	0
2688941	6/22/06	17:15	15	East	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Making Left Turn	Improper Turning	0	0
3317290	8/13/07	10:06	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0

Total Number of Collisions: 11

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Oak Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2005149	5/8/05	01:10	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
2070731	6/6/05	14:22	0	In Int.	Broadside	Other Motor Vehicle	West	Making Left Turn	East	Proceeding Straight	Other Hazardous Movement	1	0
2329313	11/5/05	17:21	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2537563	3/19/06	22:25	86	West	Rear-End	Parked Motor Vehicle	East	Proceeding Straight	East	Parked	Improper Turning	0	0
2830483	10/8/06	09:40	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	2	0

City of Oakland

Transportation Services Division

Traffic Collision History Report

Location: Oak Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 5

Settings Used For Query

Parameter	Setting
Street Name	Oak Street
Cross Street	14th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Madison Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1993668	4/21/05	09:00	0	In Int.	Hit Object	Fixed Object	South	Ran Off Road			Other Than Driver or Ped	1	0
2074444	6/4/05	08:32	0	In Int.	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Making Left Turn	Improper Turning	0	0
2245931	9/23/05	02:15	30	East	Head-On	Fixed Object	West	Ran Off Road			Improper Turning	0	0
2337956	10/31/05		0	In Int.	Not Stated	Other Motor Vehicle	South	Making Left Turn	South	Making Left Turn	Unsafe Lane Change	0	0
2308195	10/31/05		0	In Int.	Sideswipe	Parked Motor Vehicle	East	Proceeding Straight	East	Parked	Unsafe Speed	0	0
2360042	11/27/05	15:30	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Making Left Turn	Other Hazardous Movement	0	0
2632338	5/17/06	13:55	39	East	Sideswipe	Parked Motor Vehicle	West	Proceeding Straight	West	Merging	Improper Turning	0	0
3056526	2/21/07	11:30	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Making Left Turn	Other Hazardous Movement	0	0
3095061	3/22/07	17:15	15	East	Rear-End	Other Motor Vehicle	East	Slowing/Stoppi ng	East	Slowing/Stoppi ng	Unsafe Speed	0	0
3346832	8/25/07	11:29	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Making Right Turn	Improper Turning	0	0
3377718	9/10/07	00:11	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	South	Proceeding Straight	Improper Turning	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Madison Street / 14th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 11

Settings Used For Query

Parameter	Setting
Street Name	Madison Street
Cross Street	14th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

Location: Harrison Street / 14th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1137150	11/6/03	08:25	0	In Int.	Sideswipe	Non-Collision	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
1137103	11/14/03	17:15	0	In Int.	Broadside	Not Stated	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1149370	11/26/03	14:50	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Unsafe Speed	0	0
1173841	12/17/03	20:10	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
1191593	12/20/03	09:30	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1103175	12/31/03	20:25	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1248773	1/20/04	13:20	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1291768	2/16/04	07:55	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0
1735094	11/11/04	13:10	0	In Int.	Broadside	Other Motor Vehicle	East	Backing	South	Proceeding Straight	Unsafe Starting or Backing	0	0
1752910	11/18/04	08:55	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
1767078	12/2/04	17:23	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
1997489	4/20/05	09:00	10	Not Stated	Broadside	Parked Motor Vehicle	North	Proceeding Straight	Not Stated	Parked	Improper Turning	0	0

2059367	5/30/05	15:32	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	2	0
2195034	8/24/05	08:02	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Other	1	0
2329309	11/5/05	15:41	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2467605	2/3/06	09:55	0	In Int.	Head-On	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2467617	2/3/06	18:24	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	1	0
2515604	3/6/06	14:20	10	East	Vehicle - Pedestrian	Pedestrian	East	Making Left Turn	South	Other	Ped R/W Violation	1	0
2591342	4/20/06	12:40	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2835884	10/11/06	00:32	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
2891469	11/11/06	14:40	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	3	0
2946059	12/17/06	10:10	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	3	0
2968528	12/24/06	09:58	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
3302810	7/29/07	21:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3298961	7/30/07	20:08	45	East	Sideswipe	Parked Motor Vehicle	West	Proceeding Straight	West	Parked	Improper Turning	0	0
3322565	8/1/07	20:55	30	South	Sideswipe	Other Motor Vehicle	North	Changing Lanes	North	Proceeding Straight	Unsafe Lane Change	0	0

Total Number of Collisions: 26

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Madison Street / 12th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2059421	5/27/05	11:40	0	In Int.	Broadside	Motor Vehicle on Other	South	Proceeding Straight	West	Making Left Turn	Traffic Signals and Signs	0	0
2057934	5/31/05	08:15	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	2	0
2870504	10/28/06	02:11	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Making Left Turn	Traffic Signals and Signs	1	0
3020396	1/24/07	13:48	20	South	Sideswipe	Parked Motor Vehicle	South	Making Left Turn	South	Parked	Improper Turning	0	0
3056498	2/23/07	12:43	0	In Int.	Vehicle - Pedestrian	Pedestrian	West	Making Left Turn	North	Not Stated	Ped R/W Violation	1	0
3330321	8/23/07	19:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Madison Street / 12th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 6

Settings Used For Query

Parameter	Setting
Street Name	Madison Street
Cross Street	12th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

8/27/2009

Location: Oak St / 12th St
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 17

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2579363	4/12/06	11:27	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2688917	6/15/06	12:11	0	In Int.	Vehicle - Pedestrian	Pedestrian	South	Traveling Wrong Way	East	Not Stated	Other Hazardous Movement	2	0
2693331	6/26/06	22:34	0	In Int.	Overturned	Motor Vehicle on Other	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
3042957	2/18/07	09:00	0	In Int.	Vehicle - Pedestrian	Pedestrian	North	Not Stated	North	Making Left Turn	Ped R/W Violation	1	0
3179786	4/20/07	09:20	6	West	Sideswipe	Other Motor Vehicle	West	Making Left Turn	West	Stopped in Road	Improper Turning	4	0
3467809	11/2/07	16:00	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
3446072	11/13/07	07:07	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
3488152	12/3/07	18:30	0	In Int.	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	North	Making Left Turn	Ped R/W Violation	1	0
3518505	12/14/07	14:45	44	East	Rear-End	Other Motor Vehicle	West	Stopped in Road	West	Proceeding Straight	Unsafe Speed	0	0
3569495	1/6/08	13:58	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
3569455	1/15/08	11:20	0	In Int.	Broadside	Other Motor Vehicle	North	Stopped in Road	West	Stopped in Road	Traffic Signals and Signs	1	0
3603741	1/29/08	17:40	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
3610647	2/26/08	15:35	0	In Int.	Broadside	Other Motor Vehicle	North	Making Left Turn	West	Proceeding Straight	Traffic Signals and Signs	0	0
3657107	3/18/08	07:05	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Traffic Engineering Department
Traffic Collision History Report

Location: Oak St / 12th St
Date Range Reported: 1/1/2006 - 12/31/2008
Total Number of Collisions: 17

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
3716578	4/16/08	08:23	0	In Int.	Broadside	Motor Vehicle on Other	North	Making Left Turn	West	Proceeding Straight	Traffic Signals and Signs	0	0
3737244	5/7/08	10:00	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
3744899	5/23/08	17:51	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0

Total Number of Collisions: 17

Settings Used For Query

Parameter	Setting
Street Name	OAK ST
Cross Street	12TH ST
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

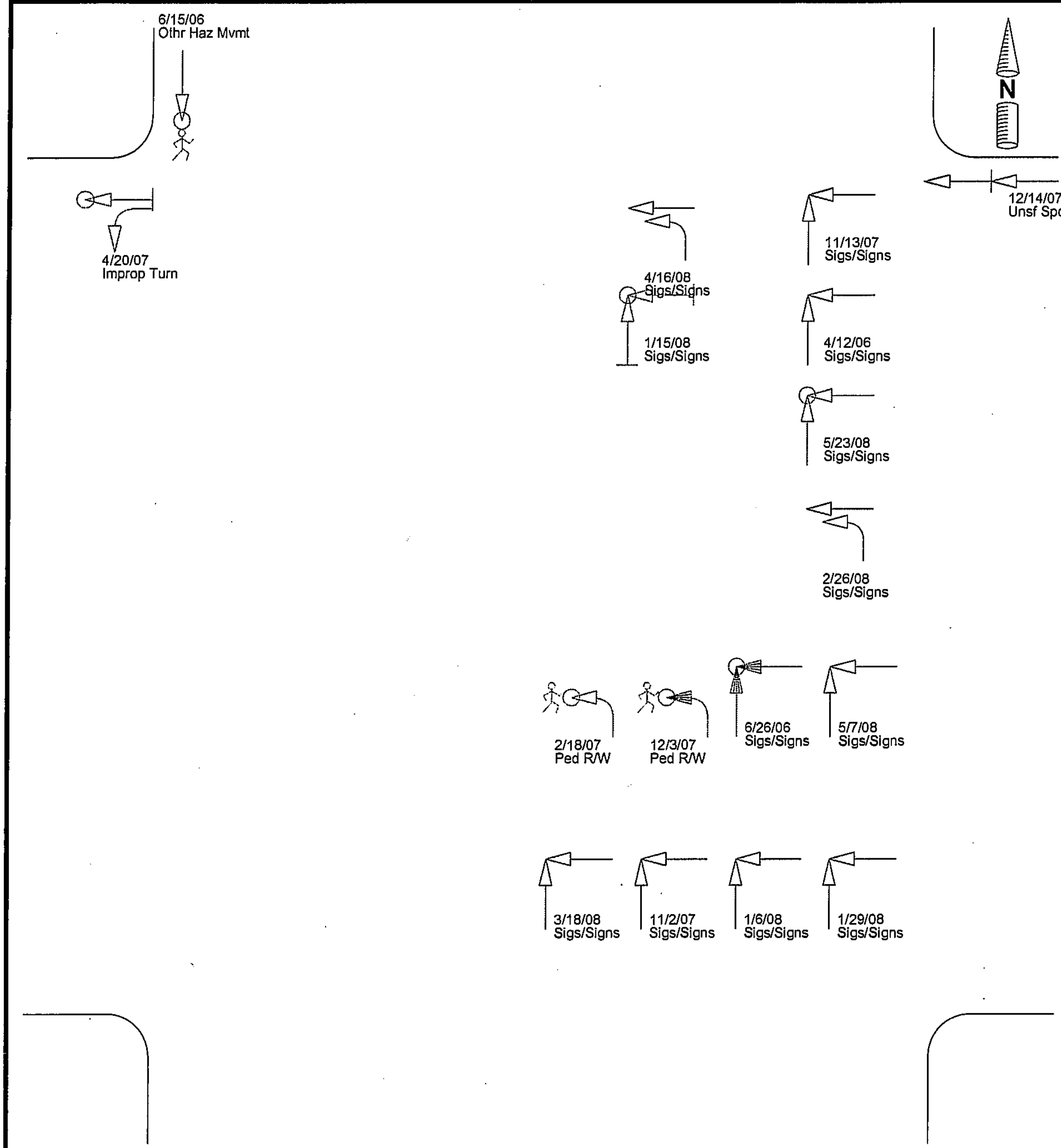
Collision Diagram

Horizontal Street: 12TH ST

Vertical Street: OAK ST

From: 1/1/2006 To: 12/31/2008

Date Prepared: 8/27/2009



Number of Collisions

10 Property Damage Only
7 Injury Collisions
0 Fatal Collisions
17 Total Collisions

Legend

Moving Vehicle
Stopped Vehicle
Backing Vehicle
Ran Off Road
Movement Unknown
Right Turn
Left Turn
Sideswipe
Day
Night
Pedestrian
Fixed Object
Bicycle
DUI
Injury
Fatal

Color Legend - Highest Degree of Injury

Maroon = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	OAK ST
Cross Street	12TH ST
Starting Date	1/1/2006
Ending Date	12/31/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Oak Street / 11th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1735090	11/11/04	23:00	0	In Int.	Sideswipe	Fixed Object	East	Proceeding Straight			Improper Turning	0	0

Total Number of Collisions: 1

Settings Used For Query

Parameter	Setting
Street Name	Oak Street
Cross Street	11th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Madison Street / 11th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2515430	2/26/06	18:41	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2817432	10/2/06	18:45	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	South	Proceeding Straight	Improper Turning	0	0
2871787	10/30/06	19:53	0	In Int.	Broadside	Motor Vehicle on Other	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0

Total Number of Collisions: 3

Settings Used For Query

Parameter	Setting
Street Name	Madison Street
Cross Street	11th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008

Location: Franklin Street / 11th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1590952	8/18/04	16:35	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
1649022	9/9/04	11:10	8	East	Vehicle - Pedestrian	Not Stated	North	Other	East	Proceeding Straight	Traffic Signals and Signs	1	0
1993603	4/14/05	16:55	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Other	0	0
2268629	10/10/05	08:30	20	East	Sideswipe	Other Motor Vehicle	East	Changing Lanes	East	Proceeding Straight	Improper Turning	0	0
2692800	6/27/06	13:45	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2942441	12/12/06	15:25	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0
3373628	9/18/07	03:35	36	North	Head-On	Fixed Object	North	Proceeding Straight			Unsafe Speed	0	0

Total Number of Collisions: 7

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Oak Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1821655	12/29/04	15:55	0	In Int.	Not Stated	Not Stated	East	Making Left Turn	East	Proceeding Straight	Improper Turning	1	0
2122698	7/1/05	23:20	20	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	1	0
2225794	9/2/05	13:10	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2438546	10/15/05	14:45	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
2494133	2/22/06	10:42	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2660526	5/15/06	06:00	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2822896	10/3/06	04:50	0	In Int.	Broadside	Motor Vehicle on Other	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
3002151	1/20/07	10:05	0	In Int.	Sideswipe	Other Motor Vehicle	Not Stated	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Oak Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 8

Settings Used For Query

Parameter	Setting
Street Name	Oak Street
Cross Street	7th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Madison Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1703391	10/29/04	18:25	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2121534	6/23/05	18:09	45	West	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	1	0
2205406	8/28/05	04:03	15	South	Rear-End	Parked Motor Vehicle	South	Proceeding Straight	South	Parked	Improper Turning	0	0
2265787	10/9/05	11:40	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2359984	11/25/05	10:00	0	In Int.	Sideswipe	Other Motor Vehicle	East	Merging	East	Proceeding Straight	Unsafe Speed	0	0
2511822	2/18/06	20:13	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2511801	2/21/06	16:45	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	South	Proceeding Straight	Improper Turning	0	0
2544572	3/22/06	01:14	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	0	0
2703719	6/25/06	11:29	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2985892	1/13/07	14:26	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
3042915	2/3/07	12:53	0	In Int.	Sideswipe	Other Motor Vehicle	East	Changing Lanes	East	Proceeding Straight	Unsafe Lane Change	0	0
3260257	7/7/07	07:40	30	South	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Improper Turning	0	0
3388414	9/22/07	15:49	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	4	0

Location: Madison Street / 7th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 13

Settings Used For Query

Parameter	Setting
Street Name	Madison Street
Cross Street	7th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division

Traffic Collision History Report

8/8/2008

Location: Jackson Street / 6th Street
Date Range Reported: 10/1/2003 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1097681	10/30/03	14:00	0	In Int.	Broadside	Other Motor Veh icle	South	Proceeding Stra ight	West	Proceeding Stra ight	Traffic Signals an d Signs	1	0
1137117	11/15/03	11:29	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	West	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1160662	12/8/03	10:30	0	In Int.	Broadside	Other Motor Veh icle	South	Not Stated	West	Not Stated	Traffic Signals an d Signs	0	0
1173814	12/14/03	17:10	0	In Int.	Head-On	Other Motor Veh icle	West	Making Left Tur n	South	Proceeding Stra ight	Improper Turning	2	0
1103226	12/29/03	19:20	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	South	Proceeding Stra ight	Traffic Signals an d Signs	1	0
1214642	1/7/04	11:34	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	North	Proceeding Stra ight	Traffic Signals an d Signs	1	0
1291020	2/7/04	10:00	0	In Int.	Broadside	Other Motor Veh icle	South	Proceeding Stra ight	West	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1291799	2/15/04	08:30	0	In Int.	Broadside	Other Motor Veh icle	West	Proceeding Stra ight	South	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1417460	5/7/04	11:53	0	In Int.	Head-On	Other Motor Veh icle	West	Proceeding Stra ight	South	Proceeding Stra ight	Traffic Signals an d Signs	0	0
1473896	6/15/04	12:30	75	North	Rear-End	Other Motor Veh icle	South	Proceeding Stra ight	South	Stopped in Road	Unsafe Speed	0	0
1485243	6/17/04	15:45	0	In Int.	Rear-End	Other Motor Veh icle	West	Proceeding Stra ight	South	Proceeding Stra ight	Traffic Signals an d Signs	1	0

1514259	6/25/04	16:45	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1572137	7/27/04	08:40	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1652652	9/22/04	20:55	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1659043	10/3/04	11:45	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1703379	10/28/04	17:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1764700	12/6/04	17:50	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
1987243	4/7/05	13:35	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1997470	4/18/05	21:50	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
1998192	5/2/05	13:25	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2031905	5/19/05	18:20	0	In Int.	Sideswipe	Other Motor Vehicle	West	Slowing/Stopping	North	Proceeding Straight	Traffic Signals and Signs	0	0
2186166	8/18/05	20:05	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2304430	10/2/05	15:42	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2396867	12/26/05	19:00	0	In Int.	Broadside	Motor Vehicle on Other Roadway	West	Proceeding Straight	North	Proceeding Straight	Unknown	0	0
2563542	4/3/06	06:40	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
2687202	6/22/06	12:25	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2845846	10/13/06	01:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0

2845916	10/15/06	14:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	1	0
3009851	1/3/07	22:55	60	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
3026970	1/30/07	13:49	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
3078715	3/10/07	11:25	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0
3092653	3/16/07	18:45	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0

Total Number of Collisions: 32

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Oak Street / Route 880 Wb Offramp
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2409483	1/8/06	16:13	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	North	Making Right Turn	Improper Turning	0	0
2513696	3/8/06	15:55	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Making Right Turn	Other Hazardous Movement	0	0
2674224	5/27/06	23:25	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	West	Entering Traffic	Traffic Signals and Signs	0	0
2871807	10/31/06	19:00	0	In Int.	Broadside	Not Stated	West	Proceeding Straight	North	Proceeding Straight	Unsafe Speed	0	0
3331298	8/17/07	10:45	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	North	Making Right Turn	Unknown	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

6/9/2008

Location: Oak Street / Route 880 Wb Offramp
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 5

Settings Used For Query

Parameter	Setting
Street Name	Oak Street
Cross Street	Route 880 Wb Offramp
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Oak Street / 5th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1757723	11/25/04	00:09	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2074443	5/31/05	12:00	0	In Int.	Not Stated	Other Motor Vehicle	East	Making Left Turn	East	Proceeding Straight	Unknown	0	0
2086245	6/18/05	21:30	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2211417	9/3/05	14:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2241221	9/10/05	09:30	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2342208	10/18/05	09:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2348279	11/11/05	18:30	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2484635	1/30/06	14:02	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2660495	5/13/06	14:15	0	In Int.	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Proceeding Straight	Improper Turning	1	0
2671937	6/10/06	15:28	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
2687233	6/21/06	13:18	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	East	Proceeding Straight	Improper Turning	0	0
2871796	10/23/06	09:14	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2942459	12/1/06	12:40	0	In Int.	Hit Object	Fixed Object	South	Proceeding Straight			Other Hazardous Movement	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Oak Street / 5th Street
Date Range Reported: 10/1/2004 - 9/30/2008

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 13

Settings Used For Query

Parameter	Setting
Street Name	Oak Street
Cross Street	5th Street
Starting Date	10/1/2004
Ending Date	9/30/2008
Intersection	Intersection Related

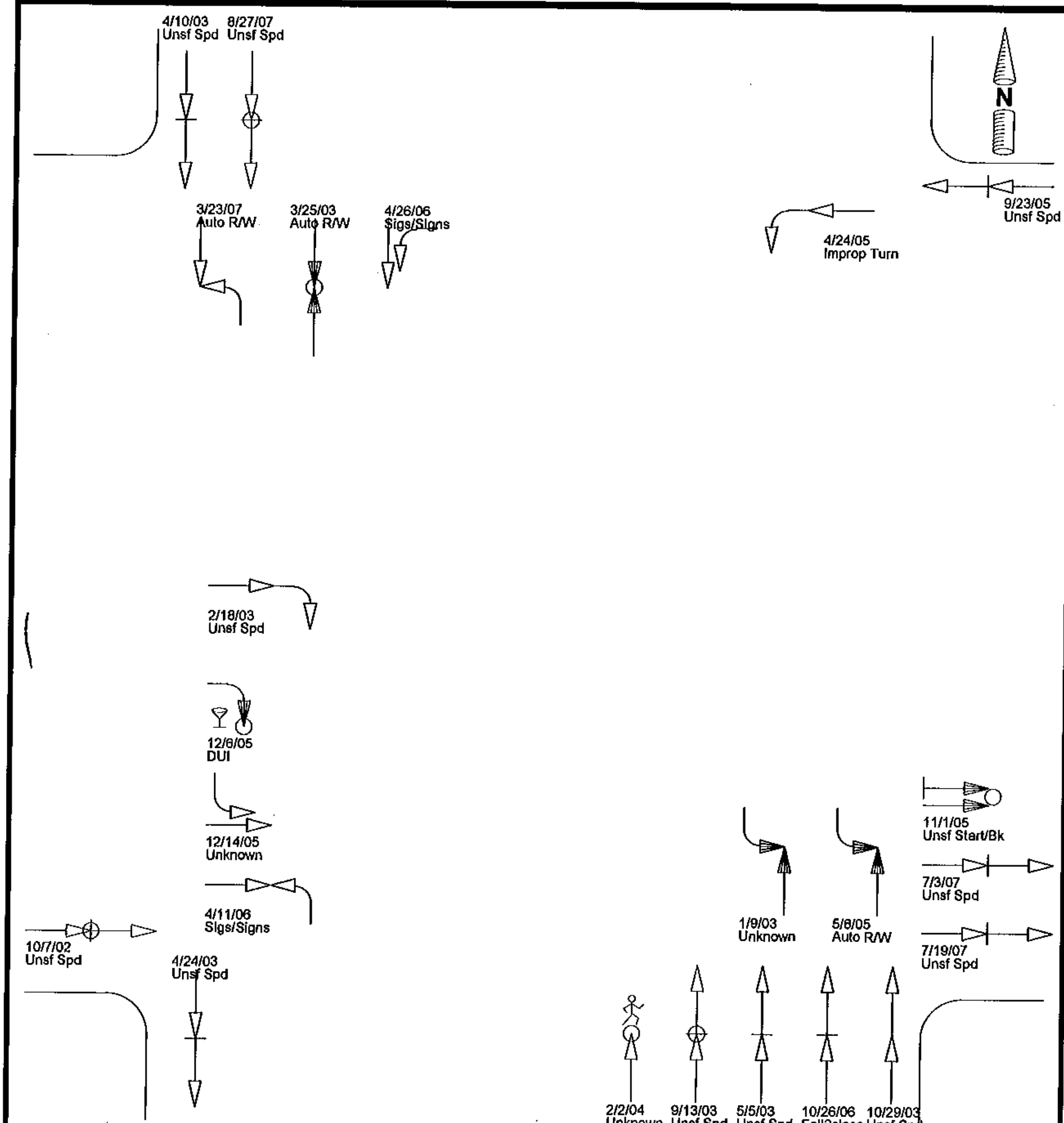
Collision Diagram

Horizontal Street: GRAND AVENUE

Vertical Street: EL EMBARCADERO

From: 10/1/2002 To: 9/30/2007

Date Prepared: 4/22/2009



Number of Collisions

18 Property Damage Only
7 Injury Collisions
0 Fatal Collisions
25 Total Collisions

Collisions Not Plotted: 2

Legend

- Moving Vehicle
- Stopped Vehicle
- Backing Vehicle
- Ran Off Road
- Movement Unknown
- Right Turn
- Left Turn
- Sideswipe
- Day
- Night
- Pedestrian
- Fixed Object
- Bicycle
- DUI
- Injury
- Fatal

Color Legend - Highest Degree of Injury

Medium Blue = Fatal

Purple = Severe Injury

Green = Other Visible Injury

Teal = Complaint of Pain

Dark Blue = Property Damage Only

Settings Used For Query

Parameter	Setting
Street Name	Grand Avenue
Cross Street	El Embarcadero
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Grand Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2308183	11/1/05	20:50	0	In Int.	Sideswipe	Parked Motor Vehicle	East	Proceeding Straight	East	Parked	Unsafe Starting or Backing	1	0
2563245	12/6/05	21:25	0	In Int.	Overturned	Not Stated	East	Making Right Turn			Driving Under Influence	1	0
2394212	12/14/05	10:05	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	East	Proceeding Straight	Unknown	0	0
2577957	4/11/06	13:40	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	North	Making Left Turn	Traffic Signals and Signs	0	0
2605346	4/26/06	14:37	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	West	Making Left Turn	Traffic Signals and Signs	0	0
2864340	10/26/06	17:01	20	Not Stated	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Following Too Closely	0	0
3097379	3/23/07	08:45	0	In Int.	Broadside	Other Motor Vehicle	North	Making Left Turn	South	Proceeding Straight	Auto R/W Violation	0	0
3312631	7/3/07	15:14	40	East	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
3284029	7/19/07	11:10	20	East	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
3359587	8/27/07	11:15	0	In Int.	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	1	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Grand Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 25

Settings Used For Query

Parameter	Setting
Street Name	Grand Avenue
Cross Street	El Embarcadero
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Lakeshore Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0469031	10/16/02	20:02	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	North	Making Left Turn	Unknown	0	0
0953736	8/10/03	08:30	0	In Int.	Head-On	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1018428	9/15/03	18:15	30	West	Vehicle - Pedestrian	Pedestrian	West	Making Right Turn	North	Not Stated	Ped R/W Violation	1	0
1093222	10/23/03	08:25	15	North	Rear-End	Other Motor Vehicle	South	Slowing/Stopping	South	Stopped in Road	Traffic Signals and Signs	0	0
1191901	12/18/03	17:49	0	In Int.	Rear-End	Other Motor Vehicle	South	Stopped in Road	South	Merging	Unknown	0	0
1388316	4/13/04	17:07	0	In Int.	Broadside	Other Motor Vehicle	East	Making Right Turn	South	Proceeding Straight	Auto R/W Violation	0	0
1417473	5/8/04	19:09	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Unknown	0	0
1560835	6/30/04	22:10	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1764704	12/4/04	16:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
1997461	4/18/05	18:51	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Making Left Turn	Unsafe Speed	0	0
2205383	8/28/05	15:15	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2361672	11/22/05	20:10	0	In Int.	Broadside	Motor Vehicle on Other	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
2422669	1/6/06	17:00	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
2479248	1/19/06	07:58	10	West	Rear-End	Other Motor Vehicle	East	Merging	East	Stopped in Road	Unsafe Speed	0	0
2687205	6/21/06	13:45	0	In Int.	Rear-End	Bicycle	North	Making Left Turn	North	Proceeding Straight	Improper Turning	1	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Lakeshore Avenue / El Embarcadero
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
3002138	1/16/07	18:52	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	North	Making Left Turn	Traffic Signals and Signs	0	0
3042882	2/19/07	15:25	15	West	Rear-End	Other Motor Vehicle	East	Making Right Turn	East	Stopped in Road	Unsafe Speed	0	0

Total Number of Collisions: 17

Settings Used For Query

Parameter	Setting
Street Name	Lakeshore Avenue
Cross Street	El Embarcadero
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Grand Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0585056	12/13/02	16:40	120	West	Rear-End	Other Motor Vehicle	East	Slowing/Stopping	East	Stopped in Road	Unsafe Speed	0	0
0651140	2/6/03	14:28	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
0688549	3/9/03	16:05	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	2	0
0769874	4/22/03	22:23	0	In Int.	Not Stated	Other Motor Vehicle	West	Making U Turn	West	Parked	Improper Turning	0	0
0774406	4/30/03	16:15	20	West	Rear-End	Other Motor Vehicle	Not Stated	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
0857369	6/16/03	09:55	10	West	Vehicle - Pedestrian	Pedestrian	North	Proceeding Straight	East	Proceeding Straight	Pedestrian Violation	1	0
1031594	9/26/03	09:45	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
1058359	10/4/03	15:32	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
1060880	10/9/03	15:00	0	In Int.	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Proceeding Straight	Improper Turning	0	0
1137773	11/17/03	11:20	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	North	Making Left Turn	Improper Turning	0	0
1142114	11/18/03	10:00	24	West	Rear-End	Other Motor Vehicle	East	Slowing/Stopping	East	Stopped in Road	Unsafe Speed	1	0
1248198	1/22/04	11:20	20	West	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Starting or Backing	0	0
1283715	2/17/04	16:30	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	East	Proceeding Straight	Improper Turning	0	0
2101185	6/18/05	09:50	50	East	Rear-End	Other Motor Vehicle	East	Proceeding Straight	West	Proceeding Straight	Following Too Closely	0	0
2154092	7/6/05	18:52	5	South	Rear-End	Other Motor Vehicle	North	Making Right Turn	North	Making Right Turn	Unsafe Speed	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Grand Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2225782	9/2/05	11:30	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	1	0
2304317	10/4/05	09:00	100	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Following Too Closely	0	0
2389166	12/7/05	16:00	0	In Int.	Sideswipe	Other Motor Vehicle	East	Making Left Turn	East	Proceeding Straight	Improper Turning	0	0
2466005	1/25/06	22:10	10	South	Vehicle - Pedestrian	Pedestrian	South	Making Right Turn	East	Proceeding Straight	Ped R/W Violation	0	0
2515377	2/23/06	08:30	0	In Int.	Broadside	Other Motor Vehicle	West	Making Left Turn	East	Proceeding Straight	Auto R/W Violation	0	0
2623750	4/22/06	12:29	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Proceeding Straight	Unsafe Speed	0	0
2914072	11/20/06	18:06	30	West	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Making Left Turn	Other	0	0
2917439	11/28/06	22:52	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
3039517	2/8/07	22:44	10	North	Hit Object	Fixed Object	Not Stated	Other Unsafe Turning			Unsafe Speed	0	0
3296983	7/26/07	14:40	20	West	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Improper Turning	0	0
3370269	9/14/07	14:10	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Improper Turning	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Grand Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 26

Settings Used For Query

Parameter	Setting
Street Name	Grand Avenue
Cross Street	Macarthur Boulevard
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Lakeshore Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1262684	2/5/04	14:35	0	In Int.	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
1311623	3/6/04	13:45	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
1570183	4/9/04	19:59	25	East	Sideswipe	Other Motor Vehicle	East	Making Right Turn	North	Proceeding Straight	Auto R/W Violation	0	0
1389965	4/20/04	21:50	40	West	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Proceeding Straight	Improper Turning	0	0
1419707	4/29/04	08:05	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Making Left Turn	Traffic Signals and Signs	1	0
1421638	4/30/04	14:00	0	In Int.	Rear-End	Other Motor Vehicle	North	Making Left Turn	North	Stopped in Road	Other	2	0
1364225	5/5/04	07:50	0	In Int.	Broadside	Other Motor Vehicle	East	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	1	0
1472083	5/21/04	11:50	0	In Int.	Sideswipe	Other Motor Vehicle	North	Changing Lanes	North	Proceeding Straight	Unsafe Lane Change	0	0
1570210	8/12/04	16:55	0	In Int.	Sideswipe	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Unknown	0	0
1649217	8/23/04	08:30	0	In Int.	Sideswipe	Parked Motor Vehicle	North	Changing Lanes	Not Stated	Parked	Improper Turning	0	0
1648944	8/24/04	10:29	20	North	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Proceeding Straight	Improper Turning	0	0
1831397	11/26/04	14:05	0	In Int.	Broadside	Other Motor Vehicle	North	Not Stated	East	Not Stated	Traffic Signals and Signs	0	0
1777509	12/14/04	20:53	0	In Int.	Head-On	Bicycle	North	Making Right Turn	South	Proceeding Straight	Ped R/W Violation	0	0
2012191	4/30/05	19:30	6	North	Sideswipe	Other Motor Vehicle	North	Making Left Turn	North	Making Left Turn	Unknown	0	0
2059427	5/28/05	07:45	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Lakeshore Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2119696	7/8/05	21:30	10	South	Other	Other Motor Vehicle	Not Stated	Backing	North	Stopped in Road	Improper Turning	0	0
2213443	9/4/05	01:00	15	West	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
2265791	10/9/05	16:23	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0
2304454	10/15/05	21:00	0	In Int.	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Unsafe Speed	0	0
2392505	12/21/05	14:20	0	In Int.	Broadside	Other Motor Vehicle	South	Making Left Turn	North	Proceeding Straight	Auto R/W Violation	0	0
2444804	1/23/06	19:24	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2532018	2/10/06	12:15	35	East	Sideswipe	Other Motor Vehicle	East	Other Unsafe Turning	East	Proceeding Straight	Improper Turning	0	0
2591325	4/23/06	10:10	45	South	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Slowing/Stopping	Unsafe Starting or Backing	0	0
2626405	5/3/06	07:57	0	In Int.	Head-On	Other Motor Vehicle	East	Making Left Turn	North	Proceeding Straight	Other Hazardous Movement	0	0
2687159	6/7/06	16:00	0	In Int.	Broadside	Other Motor Vehicle	South	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
2687229	6/21/06	17:23	0	In Int.	Vehicle - Pedestrian	Bicycle	North	Making Right Turn	Not Stated	Proceeding Straight	Unknown	0	0
2686689	6/28/06	10:44	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2822939	10/4/06	08:45	0	In Int.	Broadside	Other Motor Vehicle	East	Making U Turn	North	Proceeding Straight	Auto R/W Violation	0	0
2916365	11/19/06	04:29	0	In Int.	Other	Bicycle	Not Stated	Other	Not Stated	Other	Other	1	0
2903684	11/20/06	18:05	20	West	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Auto R/W Violation	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Lakeshore Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2946035	12/15/06	09:32	0	In Int.	Sideswipe	Other Motor Vehicle	East	Proceeding Straight	East	Proceeding Straight	Improper Turning	0	0
2968626	12/27/06	11:48	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Making Right Turn	Unsafe Speed	0	0
2985777	1/4/07	19:15	0	In Int.	Rear-End	Other Motor Vehicle	North	Making Right Turn	East	Stopped in Road	Unsafe Speed	0	0
3033651	2/10/07	21:41	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	East	Proceeding Straight	Traffic Signals and Signs	0	0
3104909	3/26/07	21:40	10	West	Rear-End	Other Motor Vehicle	East	Proceeding Straight	East	Stopped in Road	Following Too Closely	0	0
3250371	7/1/07	15:09	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3325399	8/17/07	08:48	0	In Int.	Other	Other Object	West	Making Left Turn			Improper Turning	0	0
3360079	9/17/07	15:05	0	In Int.	Broadside	Other Motor Vehicle	East	Proceeding Straight	South	Making Left Turn	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Lakeshore Avenue / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 53

Settings Used For Query

Parameter	Setting
Street Name	Lakeshore Avenue
Cross Street	Macarthur Boulevard
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Oakland Avenue / Macarthur Boulevard (W)
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0507369	11/16/02	12:41	0	In Int.	Sideswipe	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
0518883	11/25/02	14:50	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	2	0
0599129	1/8/03	18:51	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	North	Proceeding Straight	Improper Turning	0	0
0657135	1/24/03	23:00	60	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	2	0
0665266	2/16/03	14:45	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
0739652	4/2/03	09:24	0	In Int.	Broadside	Non-Collision	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
0833299	5/4/03	15:11	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
0908748	7/13/03	14:27	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
0937465	8/4/03	16:48	0	In Int.	Broadside	Other Motor Vehicle	West	Making Left Turn	West	Making Left Turn	Improper Turning	0	0
1006758	9/14/03	17:23	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1103128	12/31/03	12:05	50	West	Broadside	Bicycle	East	Entering Traffic	West	Making Right Turn	Other Hazardous Movement	1	0
1393143	4/20/04	18:40	5	Not Stated	Broadside	Other Motor Vehicle	West	Making Left Turn	West	Proceeding Straight	Auto R/W Violation	0	0
1428133	5/13/04	18:50	20	West	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Improper Turning	0	0
1472115	5/14/04	07:59	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1514397	6/28/04	11:11	0	In Int.	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Stopped in Road	Unsafe Speed	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Oakland Avenue / Macarthur Boulevard (W)
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1597194	8/30/04	17:10	0	In Int.	Sideswipe	Other Motor Vehicle	Not Stated	Proceeding Straight	West	Stopped in Road	Traffic Signals and Signs	0	0
1735059	11/9/04	14:39	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1738147	11/15/04	11:55	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1831460	12/18/04	20:15	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Unknown	1	0
1797638	12/22/04	08:50	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1993634	4/26/05	19:26	30	North	Rear-End	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Following Too Closely	0	0
2085053	6/10/05	18:40	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2152423	7/9/05	17:00	0	In Int.	Not Stated	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2158693	7/31/05	18:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2179185	8/13/05	14:45	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
2186176	8/22/05	16:45	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
2304509	10/1/05	12:00	0	In Int.	Broadside	Other Motor Vehicle	West	Making Left Turn	West	Proceeding Straight	Traffic Signals and Signs	0	0
2474941	2/2/06	12:00	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	North	Proceeding Straight	Auto R/W Violation	0	0
2522320	3/10/06	17:35	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
2682949	5/22/06	09:20	21	West	Sideswipe	Other Motor Vehicle	West	Passing Other Vehicle	West	Stopped in Road	Unsafe Lane Change	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Oakland Avenue / Macarthur Boulevard (W)
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2965236	12/22/06	21:10	0	In Int.	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
3283038	7/18/07	12:24	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
3359259	9/7/07	11:04	0	In Int.	Broadside	Other Motor Vehicle	Not Stated	Proceeding Straight	Not Stated	Proceeding Straight	Traffic Signals and Signs	0	0

Total Number of Collisions: 33

Settings Used For Query

Parameter	Setting
Street Name	Oakland Avenue
Cross Street	Macarthur Boulevard (W)
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Oakland Avenue / Santa Clara Avenue
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0947410	8/9/03	15:16	0	In Int.	Not Stated	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	0	0
1132371	11/9/03	15:00	20	East	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Improper Turning	0	0
1114546	11/13/03	12:09	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
1262681	2/5/04	08:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	North	Proceeding Straight	Traffic Signals and Signs	0	0
1510674	6/22/04	18:30	0	In Int.	Broadside	Motor Vehicle on Other	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
2043889	5/11/05	17:35	20	East	Sideswipe	Other Motor Vehicle	West	Changing Lanes	West	Proceeding Straight	Unknown	0	0
2178667	8/4/05	13:30	8	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Unsafe Speed	1	0
2225789	9/2/05	17:40	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Left Turn	West	Proceeding Straight	Unknown	1	0
2268630	10/6/05	06:30	0	In Int.	Sideswipe	Other Motor Vehicle	North	Making Right Turn	West	Proceeding Straight	Improper Turning	0	0
2494109	2/9/06	00:30	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Driving Under Influence	0	0
2523435	3/10/06	14:30	8	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Improper Turning	1	0
2660538	5/15/06	02:20	0	In Int.	Broadside	Other Motor Vehicle	North	Proceeding Straight	West	Proceeding Straight	Traffic Signals and Signs	1	0
2631289	5/21/06	20:30	50	East	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Unsafe Speed	1	0
2926249	11/27/06	12:20	20	East	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Improper Turning	0	0
2926281	12/4/06	14:01	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Improper Turning	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Oakland Avenue / Santa Clara Avenue
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 15

Settings Used For Query

Parameter	Setting
Street Name	Oakland Avenue
Cross Street	Santa Clara Avenue
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Harrison Street / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
0490854	10/29/02	18:04	123	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Following Too Closely	0	0
0519694	11/25/02	12:30	50	West	Sideswipe	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	0	0
0610619	1/7/03	09:05	20	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Slowing/Stoppi ng	Unsafe Speed	0	0
0857425	6/16/03	07:40	0	In Int.	Sideswipe	Other Motor Vehicle	West	Changing Lanes	West	Proceeding Straight	Improper Tuming	0	0
0989019	9/2/03	10:15	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1424851	5/11/04	14:40	25	West	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Following Too Closely	0	0
1735183	11/11/04	11:23	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1831382	11/24/04	08:30	0	In Int.	Broadside	Non-Collision	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1831389	11/24/04	09:32	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	1	0
1795651	12/19/04	02:50	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1795719	12/26/04	18:30	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
1821663	12/30/04	09:11	15	West	Broadside	Other Motor Vehicle	West	Making Right Turn	West	Proceeding Straight	Other	1	0
2241143	9/23/05	20:15	15	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
2397429	12/14/05	23:15	0	In Int.	Sideswipe	Other Motor Vehicle	West	Making Right Tum	West	Proceeding Straight	Improper Turning	0	0
2409496	1/5/06	09:00	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Harrison Street / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
2489893	2/7/06	09:50	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2586660	4/15/06	01:30	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	West	Proceeding Straight	Improper Turning	0	0
2605519	4/25/06	09:26	0	In Int.	Sideswipe	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
2980878	12/24/06	10:33	15	East	Rear-End	Other Motor Vehicle	West	Proceeding Straight	West	Stopped in Road	Unsafe Speed	0	0
3009894	1/27/07	10:33	6	North	Rear-End	Other Motor Vehicle	South	Proceeding Straight	South	Stopped in Road	Unsafe Speed	0	0
3063617	2/26/07	13:17	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3063607	2/28/07	09:31	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3348936	7/14/07	18:15	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0
3308994	7/20/07	09:40	0	In Int.	Broadside	Other Motor Vehicle	West	Proceeding Straight	South	Proceeding Straight	Traffic Signals and Signs	0	0

City of Oakland
Transportation Services Division
Traffic Collision History Report

Location: Harrison Street / Macarthur Boulevard
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 24

Settings Used For Query

Parameter	Setting
Street Name	Harrison Street
Cross Street	Macarthur Boulevard
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009

Location: Harrison Street / Santa Clara Avenue
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil
1831362	11/23/04	21:30	0	In Int.	Hit Object	Fixed Object	West	Changing Lanes			Improper Turning	0	0

Total Number of Collisions: 1

Settings Used For Query

Parameter	Setting
Street Name	Harrison Street
Cross Street	Santa Clara Avenue
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

City of Oakland
Transportation Services Division
Traffic Collision History Report

4/22/2009
Page 1

Location: Oakland Avenue / Monte Vista Avenue
Date Range Reported: 10/1/2002 - 9/30/2007

Report No.	Date	Time	Dist.	Dir.	Type of Collision	Motor Veh. Involved With	Direct. of Travel 1	Movement Prec. Coll. 1	Direct. of Travel 2	Movement Prec. Coll. 2	PCF	Inj.	Kil

Total Number of Collisions: 0

Settings Used For Query

Parameter	Setting
Street Name	Oakland Avenue
Cross Street	Monte Vista Avenue
Starting Date	10/1/2002
Ending Date	9/30/2007
Intersection	Intersection Related

APPENDIX G.9

Roadway LOS Calculations

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	Existing					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	E	3,081	0.91	D	2,478	0.73
		SB	1,700	2	3,400	B	1,575	0.46	C	2,347	0.69
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,070	0.38	B	3,164	0.40
		WB	2,000	4	8,000	B	3,720	0.47	B	3,426	0.43
	I-880 East of Oak Street	EB	2,000	4	8,000	C	4,968	0.62	D	5,737	0.72
		WB	2,000	4	8,000	C	5,606	0.70	C	5,075	0.63
	I-980 North of 27th Street	NB	2,000	3	6,000	A	1,611	0.27	C	3,609	0.60
		SB	2,000	3	6,000	D	4,679	0.78	B	1,858	0.31
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	A	513	0.29	B	876	0.49
		SB	900	2	1,800	A	438	0.24	B	597	0.33
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	A	464	0.26	B	678	0.38
		SB	900	2	1,800	B	661	0.37	B	565	0.31
	Grand between San Pablo and Telegraph	EB	900	2	1,800	C	1,054	0.59	B	719	0.40
		WB	900	2	1,800	B	672	0.37	B	862	0.48
	Grand between Broadway and Harrison St.	EB	900	2	1,800	B	682	0.38	B	762	0.42
		WB	900	2	1,800	B	644	0.36	B	783	0.44
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	B	751	0.42	E	1,700	0.94
		WB	900	2	1,800	E	1,531	0.85	C	968	0.54
	Harrison between I-580 and 27th St.	NB	900	2	1,800	C	1,189	0.66	E	1,536	0.85
		SB	900	2	1,800	C	1,041	0.58	B	686	0.38
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	A	784	0.29	B	1,236	0.46
		SB	900	3	2,700	B	899	0.33	A	556	0.21
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	A	475	0.26	B	745	0.41
		SB	900	2	1,800	A	444	0.25	A	286	0.16

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	Existing + Project					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	E	3,086	0.91	D	2,479	0.73
		SB	1,700	2	3,400	B	1,577	0.46	C	2,363	0.70
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,164	0.40	B	3,181	0.40
		WB	2,000	4	8,000	B	3,733	0.47	B	3,512	0.44
	I-880 East of Oak Street	EB	2,000	4	8,000	C	4,983	0.62	D	5,831	0.73
		WB	2,000	4	8,000	D	5,710	0.71	C	5,095	0.64
	I-980 North of 27th Street	NB	2,000	3	6,000	A	1,647	0.27	C	3,842	0.64
		SB	2,000	3	6,000	D	4,832	0.81	B	1,885	0.31
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	B	553	0.31	C	1,029	0.57
		SB	900	2	1,800	A	503	0.28	B	611	0.34
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	A	470	0.26	B	712	0.40
		SB	900	2	1,800	B	675	0.38	B	573	0.32
	Grand between San Pablo and Telegraph	EB	900	2	1,800	C	1,181	0.66	B	726	0.40
		WB	900	2	1,800	B	685	0.38	C	945	0.53
	Grand between Broadway and Harrison St.	EB	900	2	1,800	B	851	0.47	B	782	0.43
		WB	900	2	1,800	B	660	0.37	B	785	0.44
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	B	755	0.42	F	1,841	1.02
		WB	900	2	1,800	E	1,759	0.98	C	1,015	0.56
	Harrison between I-580 and 27th St.	NB	900	2	1,800	C	1,247	0.69	F	1,808	1.00
		SB	900	2	1,800	D	1,278	0.71	B	726	0.40
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	B	857	0.32	C	1,590	0.59
		SB	900	3	2,700	B	1,155	0.43	A	599	0.22
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	A	497	0.28	B	755	0.42
		SB	900	2	1,800	A	459	0.26	A	286	0.16

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2015					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	E	3,386	1.00	D	2,906	0.85
		SB	1,700	2	3,400	C	2,108	0.62	D	2,950	0.87
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,303	0.41	B	3,234	0.40
		WB	2,000	4	8,000	B	3,939	0.49	B	3,610	0.45
	I-880 East of Oak Street	EB	2,000	4	8,000	D	5,705	0.71	D	6,401	0.80
		WB	2,000	4	8,000	D	6,312	0.79	D	5,727	0.72
	I-980 North of 27th Street	NB	2,000	3	6,000	B	1,821	0.30	C	3,973	0.66
		SB	2,000	3	6,000	D	5,280	0.88	B	2,208	0.37
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	B	606	0.34	C	1,042	0.58
		SB	900	2	1,800	A	517	0.29	B	710	0.39
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	B	576	0.32	B	879	0.49
		SB	900	2	1,800	B	779	0.43	B	672	0.37
	Grand between Telegraph and San Pablo	EB	900	2	1,800	C	1,241	0.69	B	841	0.47
		WB	900	2	1,800	B	791	0.44	C	1,011	0.56
	Grand between Broadway and Harrison St.	EB	900	2	1,800	B	803	0.45	B	891	0.49
		WB	900	2	1,800	B	758	0.42	C	917	0.51
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	B	807	0.45	F	1,998	1.11
		WB	900	2	1,800	D	1,455	0.81	C	1,014	0.56
	Harrison between I-580 and 27th St.	NB	900	2	1,800	D	1,453	0.81	F	1,939	1.08
		SB	900	2	1,800	C	1,225	0.68	B	821	0.46
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	B	922	0.34	B	1,326	0.49
		SB	900	3	2,700	B	1,057	0.39	A	666	0.25
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	B	559	0.31	C	947	0.53
		SB	900	2	1,800	B	570	0.32	A	342	0.19

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2030					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	F	4,084	1.20	F	3,885	1.14
		SB	1,700	2	3,400	E	3,327	0.98	F	4,329	1.27
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,835	0.48	B	3,394	0.42
		WB	2,000	4	8,000	C	4,441	0.56	C	4,031	0.50
	I-880 East of Oak Street	EB	2,000	4	8,000	E	7,390	0.92	E	7,920	0.99
		WB	2,000	4	8,000	E	7,925	0.99	E	7,217	0.90
	I-980 North of 27th Street	NB	2,000	3	6,000	B	2,300	0.38	D	4,806	0.80
		SB	2,000	3	6,000	F	6,653	1.11	C	3,009	0.50
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	B	699	0.39	C	1,207	0.67
		SB	900	2	1,800	B	595	0.33	B	823	0.46
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	B	688	0.38	C	1,080	0.60
		SB	900	2	1,800	B	897	0.50	B	779	0.43
	Grand between Telegraph and San Pablo	EB	900	2	1,800	D	1,427	0.79	C	962	0.53
		WB	900	2	1,800	C	910	0.51	C	1,160	0.64
	Grand between Broadway and Harrison St.	EB	900	2	1,800	C	924	0.51	D	1,269	0.71
		WB	900	2	1,800	D	1,393	0.77	C	1,199	0.67
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	C	936	0.52	F	2,284	1.27
		WB	900	2	1,800	E	1,782	0.99	D	1,326	0.74
	Harrison between I-580 and 27th St.	NB	900	2	1,800	E	1,718	0.95	F	2,342	1.30
		SB	900	2	1,800	E	1,571	0.87	C	987	0.55
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	B	1,276	0.47	C	1,650	0.61
		SB	900	3	2,700	C	1,361	0.50	B	924	0.34
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	B	643	0.36	D	1,362	0.76
		SB	900	2	1,800	B	720	0.40	A	399	0.22

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2015 + Phase 1					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	E	3,389	1.00	D	2,907	0.86
		SB	1,700	2	3,400	C	2,109	0.62	D	2,958	0.87
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,344	0.42	B	3,241	0.41
		WB	2,000	4	8,000	B	3,944	0.49	B	3,646	0.46
	I-880 East of Oak Street	EB	2,000	4	8,000	D	5,711	0.71	D	6,441	0.81
		WB	2,000	4	8,000	D	6,357	0.79	D	5,735	0.72
	I-980 North of 27th Street	NB	2,000	3	6,000	B	1,836	0.31	C	4,070	0.68
		SB	2,000	3	6,000	D	5,333	0.89	B	2,218	0.37
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	B	617	0.34	C	1,114	0.62
		SB	900	2	1,800	B	551	0.31	B	717	0.40
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	B	578	0.32	B	890	0.49
		SB	900	2	1,800	B	779	0.43	B	674	0.37
	Grand between Telegraph and San Pablo	EB	900	2	1,800	D	1,300	0.72	B	844	0.47
		WB	900	2	1,800	B	796	0.44	C	1,046	0.58
	Grand between Broadway and Harrison St.	EB	900	2	1,800	B	877	0.49	B	891	0.49
		WB	900	2	1,800	B	758	0.42	C	917	0.51
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	B	807	0.45	F	2,060	1.14
		WB	900	2	1,800	E	1,584	0.88	C	1,038	0.58
	Harrison between I-580 and 27th St.	NB	900	2	1,800	D	1,480	0.82	F	2,054	1.14
		SB	900	2	1,800	D	1,301	0.72	B	835	0.46
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	B	957	0.35	C	1,490	0.55
		SB	900	3	2,700	B	1,144	0.42	A	682	0.25
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	B	569	0.32	C	952	0.53
		SB	900	2	1,800	B	570	0.32	A	351	0.20

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2015 + Project					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	E	3,391	1.00	D	2,909	0.86
		SB	1,700	2	3,400	C	2,110	0.62	D	2,951	0.87
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,397	0.42	B	3,251	0.41
		WB	2,000	4	8,000	B	3,952	0.49	B	3,696	0.46
	I-880 East of Oak Street	EB	2,000	4	8,000	D	5,720	0.72	D	6,495	0.81
		WB	2,000	4	8,000	D	6,416	0.80	D	5,747	0.72
	I-980 North of 27th Street	NB	2,000	3	6,000	B	1,857	0.31	C	4,206	0.70
		SB	2,000	3	6,000	E	5,433	0.91	B	2,235	0.37
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	B	646	0.36	C	1,195	0.66
		SB	900	2	1,800	B	582	0.32	B	724	0.40
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	B	582	0.32	C	913	0.51
		SB	900	2	1,800	B	793	0.44	B	680	0.38
	Grand between Telegraph and San Pablo	EB	900	2	1,800	D	1,368	0.76	B	848	0.47
		WB	900	2	1,800	B	804	0.45	C	1,094	0.61
	Grand between Broadway and Harrison St.	EB	900	2	1,800	C	972	0.54	C	911	0.51
		WB	900	2	1,800	B	774	0.43	C	919	0.51
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	B	811	0.45	F	2,139	1.19
		WB	900	2	1,800	E	1,683	0.93	C	1,061	0.59
	Harrison between I-580 and 27th St.	NB	900	2	1,800	D	1,511	0.84	F	2,211	1.23
		SB	900	2	1,800	D	1,462	0.81	B	861	0.48
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	B	995	0.37	C	1,680	0.62
		SB	900	3	2,700	B	1,313	0.49	A	709	0.26
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	B	581	0.32	C	958	0.53
		SB	900	2	1,800	B	585	0.33	A	360	0.20

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2030 + Project					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
CMP	SR 260 (Posey/Webster Tubes) between Alameda city limits and I-880	NB	1,700	2	3,400	F	4,089	1.20	F	3,888	1.14
		SB	1,700	2	3,400	E	3,329	0.98	F	4,330	1.27
	I-880 West of I-980 / Market Street	EB	2,000	4	8,000	B	3,929	0.49	B	3,411	0.43
		WB	2,000	4	8,000	C	4,454	0.56	C	4,117	0.51
	I-880 East of Oak Street	EB	2,000	4	8,000	E	7,405	0.93	F	8,014	1.00
		WB	2,000	4	8,000	F	8,029	1.00	E	7,237	0.90
	I-980 North of 27th Street	NB	2,000	3	6,000	B	2,336	0.39	D	5,039	0.84
		SB	2,000	3	6,000	F	6,806	1.13	C	3,036	0.51
Other MTS	Broadway between 19th St. and Grand Ave.	NB	900	2	1,800	B	739	0.41	D	1,360	0.76
		SB	900	2	1,800	B	660	0.37	B	837	0.46
	Telegraph between 20th St. and 27th St.	NB	900	2	1,800	B	694	0.39	C	1,114	0.62
		SB	900	2	1,800	C	911	0.51	B	787	0.44
	Grand between Telegraph and San Pablo	EB	900	2	1,800	E	1,554	0.86	C	969	0.54
		WB	900	2	1,800	C	923	0.51	C	1,243	0.69
	Grand between Broadway and Harrison St.	EB	900	2	1,800	C	1,093	0.61	D	1,289	0.72
		WB	900	2	1,800	D	1,409	0.78	C	1,201	0.67
	Grand between Harrison St. and El Embarcadero	EB	900	2	1,800	C	940	0.52	F	2,425	1.35
		WB	900	2	1,800	F	2,010	1.12	D	1,373	0.76
	Harrison between I-580 and 27th St.	NB	900	2	1,800	E	1,776	0.99	F	2,614	1.45
		SB	900	2	1,800	F	1,808	1.00	C	1,027	0.57
	Harrison between 27th St. and Grand Ave.	NB	900	3	2,700	B	1,349	0.50	D	2,004	0.74
		SB	900	3	2,700	C	1,617	0.60	B	967	0.36
	Harrison between 20th St. and 14th St.	NB	900	2	1,800	B	665	0.37	D	1,373	0.76
		SB	900	2	1,800	B	735	0.41	A	417	0.23

APPENDIX G.10

Supplemental Analysis of Planned Transportation Improvements

Supplementary Analyses of Planned Transportation Improvements

This section summarizes the supplementary analyses of future-year traffic operations at the study intersections and on the study roadway segments assuming the planned AC Transit Bus Rapid Transit (BRT) project and Franklin-Webster bike lanes are completed. The final sections briefly discuss other planned improvements which may affect transportation facilities analyzed as part of this EIR. No supplementary analyses have been conducted for these additional planned improvements, which include the Harrison Street / Oakland Avenue Community Transportation Plan, Broadway Retail Corridor Specific Plan, and I-880 Broadway / Jackson Street Interchange.

It should be noted that none of these improvements are fully funded and approved, and the analysis results presented here only to inform decision makers and the public.

AC Transit East Bay BRT Project

AC Transit has proposed converting the existing 1R-International Rapid into a full BRT service. The 1R currently operates with some BRT features, such as widely-spaced stops at key destinations and transfer points, vehicles designed for easy boarding and alighting, real-time schedules, and transit signal priority. However, AC Transit plans on implementing additional features for the service in the near future, including bus-only median and side-running transitways and stations along the line, completing BRT treatments for a corridor stretching from Berkeley through Downtown Oakland to San Leandro via Telegraph Avenue and International Boulevard.

In the vicinity of the Project, these improvements would generally require the removal of one through lane in each direction along Telegraph Avenue, narrowing the roadway to one vehicular lane in each direction. Buses would run in a protected median, with left turn pockets for autos provided at key intersections. Along Broadway, no travel lanes would be removed and buses would operate in mixed flow. Along 11th and 12th Streets in Downtown Oakland, the BRT service would operate in a side-running configuration, removing one lane of through traffic and eliminating some parking to allow for bulbouts at stations.

Although the BRT is expected to be in service in 2015, the project is only partially funded and not yet approved. As a result, implementation has not been assumed under Near-Term (2015) and Cumulative (2030) analysis scenarios as presented in this Environmental Impact Report (EIR). However, supplementary analysis is provided below for Near-Term (2015) and Cumulative (2030) analysis scenarios assuming the proposed BRT is in service, at study intersections located along the BRT corridor.

It should be noted that the supplementary analysis presented here conservatively assumes the following effects to be negligible:

- Reduction in traffic volumes along the BRT corridor as a result of drivers switching to other parallel corridors due to reduced roadway capacity;

- Reduction in traffic volumes along the BRT corridor and parallel corridors as a result of drivers opting to make trips to other destinations outside of the area or deciding not to make a trip at all; and,

- Reduction in traffic volumes along the BRT corridor as a result of drivers switching to other modes, primarily the new BRT service.

Although the BRT Draft Environmental Impact Statement / Environmental Impact Report (DEIS / DEIR) provide basic screenline volume changes for the BRT corridor and adjacent parallel arterials, the actual volume changes as a result of the BRT are dependent on a multitude of factors including but not limited to roadway and intersection configurations and BRT service characteristics. As a result, the BRT's net effect on trip-making characteristics and driver behavior along the corridor is difficult to estimate at the microscopic level of intersections. In addition, the BRT DEIS / DEIR did not analyze all intersections being analyzed in this EIR.

Given the above considerations, no changes to volumes were assumed after implementation of the BRT. This is a conservative assumption, as it is expected that the BRT would result in decreased volumes along Telegraph Avenue (and a corresponding increase in volumes along most parallel arterials in the corridor).

Intersection Operations

Table 1 summarizes intersection LOS results for Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions. **Table 2** summarizes intersection LOS results for Near-Term (2015) plus Project (Phase I and II) Conditions. **Table 3** summarizes intersection LOS results for Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and II) Conditions.

Based on the intersection analysis results, the Project would result in significant impacts at Intersection #5 (Telegraph Avenue / 27th Street) under all Project scenarios. Under Near-Term (2015) plus Project (Phase I) Conditions and Near-Term (2015) plus Project (Phase I and II) Conditions, the Project would cause an increase in intersection average delay above the two (2) second threshold. Under Cumulative (2030) plus Project (Phase I and II) Conditions, the Project would cause an increase an v/c ratio above the three (3) percent threshold.

Without the BRT, a Project impact was identified at this intersection for Cumulative (2030) plus Project (Phase I and II) Conditions only; no Project impact was identified under Near-Term (2015) plus Project (Phase I) Conditions or Near-Term (2015) plus Project (Phase I and II) Conditions. As a result, assuming construction and implementation of the BRT, the Project would result in two additional impacts.

Average delay at some intersections would decrease under Project scenarios due to the Project adding traffic to movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

TABLE 1
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE – WITH BRT

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Outside Downtown										
5	Telegraph Ave. / 27th St.	Signal	C	22.8	**F**	**100.3**	C	23.4	**F**	**110.4**
Within Downtown										
9	Telegraph Ave. / West Grand Ave.	Signal	C	31.3	D	39.5	C	32.2	D	45.9
20	Telegraph Ave. / 20th St.	Signal	B	14.7	B	18.6	B	15.5	B	19.0
21	Broadway / 20th St.	Signal	B	14.2	B	19.3	B	14.4	B	19.6
35	Madison St. / 12th St.	Signal	B	11.5	A	8.6	B	11.5	A	8.8
36	Oak St. / 12th St.	Signal	B	14.5	B	13.6	B	14.6	B	13.6
38	Madison St. / 11th St.	Signal	B	11.6	A	9.6	B	11.5	A	9.5
39	Franklin St. / 11th St.	Signal	B	14.4	B	14.5	B	14.3	B	14.5

[a] The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.
SOURCE: AECOM, 2009.

TABLE 2
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE – WITH BRT

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I and II) Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Outside Downtown										
5	Telegraph Ave. / 27th St.	Signal	C	22.8	**F**	**100.3**	C	24.2	**F**	**>120.0**
Within Downtown										
9	Telegraph Ave. / West Grand Ave.	Signal	C	31.3	D	39.5	C	34.1	E	55.7
20	Telegraph Ave. / 20th St.	Signal	B	14.7	B	18.6	B	16.0	B	19.9
21	Broadway / 20th St.	Signal	B	14.2	B	19.3	B	14.6	C	20.1
35	Madison St. / 12th St.	Signal	B	11.5	A	8.6	B	11.5	A	9.0
36	Oak St. / 12th St.	Signal	B	14.5	B	13.6	B	14.6	B	13.6
38	Madison St. / 11th St.	Signal	B	11.6	A	9.6	B	11.4	A	9.4
39	Franklin St. / 11th St.	Signal	B	14.4	B	14.5	B	14.0	B	14.5

[a] The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.
SOURCE: AECOM, 2009.

TABLE 3
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE – WITH BRT

			Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and II) Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Outside Downtown										
5	Telegraph Ave. / 27th St.	Signal	C	29.0	**F**	**>120.0**	C	31.6	**F**	**>120.0**
Within Downtown										
9	Telegraph Ave. / West Grand Ave.	Signal	D	37.9	E	59.2	D	46.8	E	78.7
20	Telegraph Ave. / 20th St.	Signal	B	18.3	D	38.0	B	19.7	D	41.2
21	Broadway / 20th St.	Signal	B	15.1	C	34.0	B	15.5	D	35.9
35	Madison St. / 12th St.	Signal	C	25.3	B	10.9	C	25.6	B	11.2
36	Oak St. / 12th St.	Signal	B	16.1	B	16.3	B	16.2	B	16.3
38	Madison St. / 11th St.	Signal	B	10.8	B	11.2	B	10.8	B	11.1
39	Franklin St. / 11th St.	Signal	B	14.5	B	14.0	B	14.2	B	14.0

[a] The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

Roadway Segment Operations

As the BRT would also result in the elimination of one travel lane in each direction along Telegraph Avenue, the roadway analysis results were recalculated for Telegraph Avenue between 20th Street and 27th Street. The results of that analysis are summarized in **Table 4** for Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions, **Table 5** for Near-Term (2015) plus Project (Phase I and II) Conditions, and **Table 6** for Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and II) Conditions.

Based on the roadway analysis results, the Project would result in a significant impact on Segment #6 (Telegraph Avenue from 20th Street to 27th Street) in the PM peak hour northbound direction under Near-Term (2015) plus Project (Phase I and II) Conditions and in the AM peak hour southbound and PM peak hour northbound directions under Cumulative (2030) plus Project (Phase I and II) Conditions. Under Near-Term (2015) plus Project (Phase I and II) Conditions, the Project causes the segment to degrade from LOS E to LOS F. Under Cumulative (2030) plus Project (Phase I and II) Conditions, the Project causes the segment to degrade from LOS E to LOS F in the AM peak hour causes an increase in v/c ratio above the three (3) percent threshold in the PM peak hour. These would represent new Project impacts, as no impacts were identified on this segment without the BRT.

TABLE 4
NEAR-TERM (2015) PLUS PROJECT (PHASE I) ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

					Near-Term (2015) without Project Conditions						Near-Term (2015) plus Project (Phase I) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Cap. (veh/h)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	1	900	C	576	0.64	E	879	0.98	C	578	0.64	E	890	0.99
		SB	1	900	E	779	0.87	D	672	0.75	E	779	0.87	D	674	0.75

Bold indicates segments operating at LOS F.

SOURCE: AECOM, 2009.

TABLE 5
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND II) ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

					Near-Term (2015) without Project Conditions						Near-Term (2015) plus Project (Phase I and II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Cap. (veh/h)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	1	900	C	576	0.64	E	879	0.98	C	582	0.65	**F**	**913**	**1.01**
		SB	1	900	E	779	0.87	D	672	0.75	E	793	0.88	D	680	0.76

Bold indicates segments operating at LOS F.

SOURCE: AECOM, 2009.

TABLE 6
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND II) ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

					Cumulative (2030) without Project Conditions						Cumulative (2030) plus Project (Phase I and II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Cap. (veh/h)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	1	900	D	688	0.76	**F**	**1,080**	**1.20**	D	694	0.77	**F**	**1,114**	**1.24**
		SB	1	900	E	897	1.00	E	779	0.87	**F**	**911**	**1.01**	E	787	0.87

Bold indicates segments operating at LOS F.

SOURCE: AECOM, 2009.

Franklin / Webster Bikeway Project

Currently in the design stage, the Franklin / Webster Bikeway project would install bike lanes on Franklin Street and Webster Street between Broadway and 14th Street. Installation of the bike lanes would generally require removal of one through lane along both Franklin Street and Webster Street.

Table 7 summarizes intersection LOS results for Near-Term (2015) without Project Conditions and Near-Term (2015) plus Project (Phase I) Conditions. **Table 8** summarizes intersection LOS results for Near-Term (2015) plus Project (Phase I and II) Conditions. **Table 9** summarizes intersection LOS results for Cumulative (2030) without Project Conditions and Cumulative (2030) plus Project (Phase I and II) Conditions.

As shown in **Table 7**, **Table 8**, and **Table 9**, all intersections would operate at acceptable conditions, as there is sufficient capacity on these streets and the Project would not result in any significant impacts.

Average delay at some intersections would decrease under Project scenarios due to the Project adding traffic to movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

TABLE 7
NEAR-TERM (2015) PLUS PROJECT (PHASE I) INTERSECTION LEVELS OF SERVICE – WITH BIKEWAY

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
17	Webster St. / 21st St.	Signal	B	13.7	B	19.1	B	14.5	B	19.1
18	Franklin St. / 21st St.	Signal	B	10.4	B	11.8	B	10.1	B	11.6
22	Franklin St. / 20th St.	Signal	B	11.7	B	15.0	B	14.1	B	14.7
23	Webster St. / 20th St.	Signal	C	25.1	C	23.8	C	22.6	C	23.7

[a] The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

TABLE 8
NEAR-TERM (2015) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE – WITH BIKEWAY

			Near-Term (2015) without Project Conditions				Near-Term (2015) plus Project (Phase I and II) Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
17	Webster St. / 21st St.	Signal	B	13.7	B	19.1	B	15.3	B	19.1
18	Franklin St. / 21st St.	Signal	B	10.4	B	11.8	B	10.0	B	11.6
22	Franklin St. / 20th St.	Signal	B	11.7	B	15.0	B	14.8	B	14.8
23	Webster St. / 20th St.	Signal	C	25.1	C	23.8	C	21.8	C	24.1

[a] The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

TABLE 9
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) INTERSECTION LEVELS OF SERVICE – WITH BIKEWAY

			Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project (Phase I and II) Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Within Downtown										
17	Webster St. / 21st St.	Signal	B	14.7	B	19.9	B	16.1	B	19.8
18	Franklin St. / 21st St.	Signal	B	10.4	B	12.0	B	10.3	B	11.9
22	Franklin St. / 20th St.	Signal	B	11.7	B	14.9	B	14.5	B	14.6
23	Webster St. / 20th St.	Signal	C	24.6	C	25.9	C	21.7	C	26.1

SOURCE: AECOM, 2009.

Other Planned Transportation Improvements

In addition to the above improvements for which a separate supplementary analysis was conducted, other transportation improvements in various stages of planning are discussed below.

Harrison Street / Oakland Avenue Community Transportation Plan (CTP)

This planning effort proposes a series of multi-modal improvements to the Harrison Street / Oakland Avenue Corridor. Included are pedestrian improvements (bulbouts, sidewalk, improved crossings), bicycle improvements, and transit improvements (bus bulbouts, bus stop relocations), as well as possible roadway closures and road diets. These improvements could affect study intersections in this EIR located along the corridor, including the following intersections:

- Intersection #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp;
- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps;
- Intersection #3: Harrison Street / 27th Street / 24th Street; and,
- Intersection #12: Harrison Street / Grand Avenue.

Because a finalized design is not yet approved or funded and the Notice of Preparation (NOP) for the CTP was released after the NOP for this EIR, potential effects as a result of the Harrison-Oakland CTP were not assumed under Near-Term (2015) and Cumulative (2030) scenarios. As a result, any mitigation measures proposed at intersections where the CTP is proposing changes may ultimately be deemed in conflict with the goals of the CTP and therefore infeasible.

Broadway Retail Corridor Specific Plan

This planning effort will outline the details for rezoning and redevelopment of the Broadway Auto Row along Broadway between 23rd Street and 29th Street. Currently occupied primarily by car dealerships and surface parking, the plan proposes to transform this stretch of Broadway into a mixed-use corridor with residential units above ground-floor retail uses. The plan would likely result in substantial changes to traffic volumes and circulation, as well as intersection, roadway, pedestrian, and transit facilities in the area. Possible transportation-related improvements being considered are improved pedestrian and bicycle facilities to improve access to transit stops and stations and enhance circulation within the area by non-auto modes. Opportunities to redesign existing transit services or implement new services such as special shuttles will also be considered and the possibility of improvements to bus stops such as shelters, information, and signage will also be evaluated. These improvements could affect the following study intersections in this EIR:

- Intersection #4: Broadway / 27th Street; and,
- Intersection #10: Broadway / Grand Avenue.

Because a finalized plan has not yet approved or funded, potential effects as a result of the Broadway Retail Corridor Specific Plan were not assumed under Near-Term (2015) and Cumulative (2030) scenarios.

I-880 Broadway / Jackson Street Interchange

A Caltrans Project Study Report (PSR) is currently being prepared by the Alameda County Transportation Improvement Authority (ACTIA) and the City of Alameda, improving traffic operations and circulation in the area around the I-880 Broadway / Jackson Street Interchange. Although the project is not yet fully funded, it could include any of the following elements:

- Construction of a new I-880 southbound off-ramp at Martin Luther King, Jr. Way, relieving traffic using the southbound off-ramp at Broadway;
- Reconstruction of the I-880 northbound off-ramp at Broadway to allow vehicles to directly access the Webster Tube ;
- Improvements to the existing Traffic Operations System (TOS) at the Posey / Webster Tubes, I-880, and I-980; and,

- Improvements along 6th Street leading to a new I-880 northbound on-ramp at Market Street.

These elements would affect circulation patterns in the area and could affect the following study intersection in this EIR:

- Intersection #42: Jackson Street / 6th Street / I-880 NB Ramp.

Caltrans have submitted its comments on the Draft PSR to ACTIA, with the final PSR set for completion by late 2009. Since the project is not fully funded nor approved and it is currently unclear how the various improvements would affect operations at study intersections in this EIR located in the vicinity of the interchange, this improvement project was not assumed under Near-Term (2015) and Cumulative (2030) scenarios.

HCM Signalized Intersection Capacity Analysis — Near-Term AM
5: 27th Street & Telegraph Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	343	354	134	43	244	107	81	360	22	46	327	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1546	1762	1863	1520	1763	1842		1765	1770	
Flt Permitted	0.43	1.00	1.00	0.53	1.00	1.00	0.18	1.00		0.29	1.00	
Satd. Flow (perm)	809	1863	1546	976	1863	1520	336	1842		540	1770	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	373	385	146	47	265	116	84	391	24	50	355	145
RTOR Reduction (vph)	0	0	76	0	0	72	0	3	0	0	19	0
Lane Group Flow (vph)	373	385	70	47	265	44	84	412	0	50	481	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	49.0	40.7	40.7	36.4	32.6	32.6	27.0	27.0		27.0	27.0	
Effective Green, g (s)	49.0	40.7	40.7	36.4	32.6	32.6	27.0	27.0		27.0	27.0	
Actuated g/C Ratio	0.58	0.48	0.48	0.43	0.38	0.38	0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	601	892	740	453	715	583	107	585		172	562	
v/s Ratio Prot	c0.09	0.21		0.00	0.14			0.22			c0.27	
v/s Ratio Perm	c0.27		0.05	0.04		0.03	0.25			0.09		
v/c Ratio	0.62	0.43	0.09	0.10	0.37	0.08	0.79	0.70		0.29	0.86	
Uniform Delay, d1	10.6	14.6	12.1	14.3	18.8	16.6	26.4	25.5		21.8	27.2	
Progression Factor	1.00	1.00	1.00	0.72	0.66	0.31	1.02	1.01		1.00	1.00	
Incremental Delay, d2	1.4	1.5	0.3	0.0	1.5	0.3	27.1	3.0		0.3	11.7	
Delay (s)	12.0	16.1	12.3	10.3	13.8	5.4	54.0	28.7		22.1	38.9	
Level of Service	B	B	B	B	B	A	D	C		C	D	
Approach Delay (s)		13.8			11.2			33.0			37.4	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term AM
9: West Grand Avenue & Telegraph Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	776	357	68	419	65	201	256	31	86	354	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1764	3427	1553	1768	3341		1770	1826		1757	1805	
Flt Permitted	0.32	1.00	1.00	0.16	1.00		0.95	1.00		0.58	1.00	
Satd. Flow (perm)	599	3427	1553	304	3341		1770	1826		1064	1805	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	808	388	74	455	71	218	269	34	93	385	84
RTOR Reduction (vph)	0	0	276	0	14	0	0	5	0	0	9	0
Lane Group Flow (vph)	117	808	112	74	512	0	218	298	0	93	460	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.5	24.5	24.5	24.5	24.5		12.3	50.0		33.2	33.2	
Effective Green, g (s)	24.5	24.5	24.5	24.5	24.5		12.3	50.0		33.2	33.2	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29		0.14	0.59		0.39	0.39	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	173	988	448	88	963		256	1074		416	705	
v/s Ratio Prot		0.24			0.15		c0.12	0.16			c0.25	
v/s Ratio Perm	0.20		0.07	c0.24						0.09		
v/c Ratio	0.68	0.82	0.25	0.84	0.53		0.85	0.28		0.22	0.65	
Uniform Delay, d1	26.7	28.2	23.2	28.4	25.4		35.5	8.6		17.3	21.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.94	1.03	
Incremental Delay, d2	19.2	7.5	1.3	59.2	2.1		22.1	0.6		1.1	4.1	
Delay (s)	46.0	35.7	24.5	87.6	27.5		57.6	9.3		17.3	25.9	
Level of Service	D	D	C	F	C		E	A		B	C	
Approach Delay (s)		33.3			34.9			29.5			24.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term AM
20: 20th Street & Telegraph Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	77	20	12	196	99	34	458	24	158	163	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1759	1789			1855	1537	1758	1845		1769	1774	
Flt Permitted	0.51	1.00			0.98	1.00	0.61	1.00		0.30	1.00	
Satd. Flow (perm)	953	1789			1824	1537	1128	1845		553	1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	84	22	13	209	108	37	467	26	172	177	63
RTOR Reduction (vph)	0	17	0	0	0	85	0	3	0	0	16	0
Lane Group Flow (vph)	21	89	0	0	222	23	37	490	0	172	224	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.7	12.7			12.7	12.7	27.4	27.4		38.3	38.3	
Effective Green, g (s)	12.7	12.7			12.7	12.7	27.4	27.4		38.3	38.3	
Actuated g/C Ratio	0.21	0.21			0.21	0.21	0.46	0.46		0.64	0.64	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	379			386	325	515	843		483	1132	
v/s Ratio Prot		0.05						c0.27		c0.04	0.13	
v/s Ratio Perm	0.02				c0.12	0.01	0.03			0.19		
v/c Ratio	0.10	0.23			0.58	0.07	0.07	0.58		0.36	0.20	
Uniform Delay, d1	19.1	19.6			21.2	18.9	9.2	12.1		5.9	4.5	
Progression Factor	1.00	1.00			1.01	1.36	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.3			1.9	0.1	0.3	2.9		0.5	0.4	
Delay (s)	19.3	19.9			23.4	25.9	9.4	15.0		6.4	4.9	
Level of Service	B	B			C	C	A	B		A	A	
Approach Delay (s)		19.8			24.2			14.6			5.5	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term AM
21: 20th Street & Broadway — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	152	61	48	154	111	60	478	68	63	413	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.93	1.00	0.95			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.93	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.94			0.98			0.99	
Flt Protected		1.00	1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)		1855	1473	1639	1657			3412			4981	
Flt Permitted		0.98	1.00	0.65	1.00			0.86			0.80	
Satd. Flow (perm)		1827	1473	1114	1657			2958			4009	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	165	66	52	167	121	65	514	74	68	449	28
RTOR Reduction (vph)	0	0	42	0	44	0	0	17	0	0	10	0
Lane Group Flow (vph)	0	174	24	52	244	0	0	636	0	0	535	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		670	540	408	608			1483			1203	
v/s Ratio Prot					c0.15			c0.05				
v/s Ratio Perm		0.10	0.02	0.05				c0.16			0.13	
v/c Ratio		0.26	0.04	0.13	0.40			0.43			0.44	
Uniform Delay, d1		13.3	12.2	12.6	14.1			10.1			17.0	
Progression Factor		0.88	0.89	1.00	1.00			1.00			1.00	
Incremental Delay, d2		0.9	0.2	0.6	2.0			0.9			1.2	
Delay (s)		12.6	11.0	13.3	16.1			11.0			18.2	
Level of Service		B	B	B	B			B			B	
Approach Delay (s)		12.2			15.7			11.0			18.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term AM
35: 12th St. & Madison Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑						↑↑↱	
Volume (vph)	0	0	0	415	1502	0	0	0	0	0	372	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4993						4912	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4993						4912	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	451	1548	0	0	0	0	0	380	83
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	1911	0	0	0	0	0	460	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2164						2169	
v/s Ratio Prot											c0.09	
v/s Ratio Perm					0.38							
v/c Ratio					0.88						0.21	
Uniform Delay, d1					15.6						10.3	
Progression Factor					0.48						1.00	
Incremental Delay, d2					4.3						0.2	
Delay (s)					11.8						10.5	
Level of Service					B						B	
Approach Delay (s)		0.0			11.8			0.0			10.5	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term AM
36: 12th St. & Oak St.
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑	↱		↰↑↑↑				
Volume (vph)	0	0	0	0	1684	78	324	786	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.93		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1467		6163				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1467		6163				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1736	85	348	854	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	10	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1736	75	0	1199	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	731		2116				
v/s Ratio Prot					c0.34							
v/s Ratio Perm						0.05		0.19				
v/c Ratio					0.69	0.10		0.57				
Uniform Delay, d1					11.5	8.0		16.1				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					1.5	0.3		1.1				
Delay (s)					13.0	8.2		17.2				
Level of Service					B	A		B				
Approach Delay (s)		0.0			12.8			17.2			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term AM
38: 11th Street & Madison Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱								↰↑↑	
Volume (vph)	0	398	142	0	0	0	0	0	0	26	772	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.95								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1503								5074	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1503								5074	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	433	154	0	0	0	0	0	0	28	813	0
RTOR Reduction (vph)	0	0	50	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	433	104	0	0	0	0	0	0	0	835	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	576								2199	
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.07								0.16	
v/c Ratio		0.22	0.18								0.38	
Uniform Delay, d1		12.5	12.3								11.5	
Progression Factor		0.76	0.71								1.09	
Incremental Delay, d2		0.3	0.7								0.4	
Delay (s)		9.8	9.4								12.9	
Level of Service		A	A								B	
Approach Delay (s)		9.7			0.0			0.0			12.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term AM
39: 11th Street & Franklin Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑						↑↑↑↱				
Volume (vph)	86	402	0	0	0	0	0	328	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		5004						6232				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		5004						6232				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	432	0	0	0	0	0	357	64	0	0	0
RTOR Reduction (vph)	0	78	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	448	0	0	0	0	0	403	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		10.0						43.0				
Effective Green, g (s)		10.0						43.0				
Actuated g/C Ratio		0.17						0.72				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		834						4466				
v/s Ratio Prot								c0.06				
v/s Ratio Perm		0.09										
v/c Ratio		0.54						0.09				
Uniform Delay, d1		22.9						2.6				
Progression Factor		1.03						1.00				
Incremental Delay, d2		0.2						0.0				
Delay (s)		23.9						2.6				
Level of Service		C						A				
Approach Delay (s)		23.9			0.0			2.6			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term PM
5: 27th Street & Telegraph Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	403	136	64	530	114	175	479	46	133	459	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1534	1769	1863	1531	1770	1832		1765	1714	
Flt Permitted	0.12	1.00	1.00	0.36	1.00	1.00	0.12	1.00		0.20	1.00	
Satd. Flow (perm)	226	1863	1534	664	1863	1531	226	1832		363	1714	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	438	148	70	576	124	190	521	50	145	499	380
RTOR Reduction (vph)	0	0	90	0	0	83	0	4	0	0	32	0
Lane Group Flow (vph)	228	438	58	70	576	41	190	567	0	145	847	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.40	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	298	725	597	334	622	512	88	711		141	665	
v/s Ratio Prot	c0.09	0.24		0.01	c0.31			0.31			0.49	
v/s Ratio Perm	0.30		0.04	0.07		0.03	c0.84			0.40		
v/c Ratio	0.77	0.60	0.10	0.21	0.93	0.08	2.16	0.80		1.03	1.27	
Uniform Delay, d1	17.4	20.7	16.5	16.5	27.3	19.4	26.0	23.0		26.0	26.0	
Progression Factor	1.00	1.00	1.00	1.52	1.39	2.65	0.70	0.66		1.00	1.00	
Incremental Delay, d2	10.1	3.7	0.3	0.1	21.2	0.3	550.2	4.6		83.5	134.4	
Delay (s)	27.5	24.4	16.8	25.2	59.1	51.6	568.4	19.9		109.5	160.4	
Level of Service	C	C	B	C	E	D	F	B		F	F	
Approach Delay (s)		23.9			54.8			156.8			153.2	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	100.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	111.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term PM
9: West Grand Avenue & Telegraph Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	677	32	19	810	116	95	531	33	137	429	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1760	3336		1770	1844		1760	1792	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.95	1.00		0.43	1.00	
Satd. Flow (perm)	308	3427	1532	315	3336		1770	1844		801	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	29	736	35	21	880	126	103	577	36	149	452	115
RTOR Reduction (vph)	0	0	25	0	13	0	0	2	0	0	9	0
Lane Group Flow (vph)	29	736	10	21	993	0	103	611	0	149	558	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		8.2	50.3		37.6	37.6	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		8.2	50.3		37.6	37.6	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.10	0.59		0.44	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	90	950		171	1091		354	793	
v/s Ratio Prot		0.21			c0.30		0.06	c0.33			c0.31	
v/s Ratio Perm	0.09		0.01	0.07						0.19		
v/c Ratio	0.33	0.75	0.02	0.23	1.05		0.60	0.56		0.42	0.70	
Uniform Delay, d1	24.0	27.7	21.9	23.3	30.4		36.8	10.6		16.2	19.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.18	1.22	
Incremental Delay, d2	9.7	5.4	0.1	6.0	41.8		4.1	2.1		1.3	1.9	
Delay (s)	33.7	33.1	22.0	29.3	72.2		40.9	12.7		20.5	25.3	
Level of Service	C	C	C	C	E		D	B		C	C	
Approach Delay (s)		32.6			71.3			16.7			24.3	
Approach LOS		C			E			B			C	

Intersection Summary			
HCM Average Control Delay	39.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term PM
20: 20th Street & Telegraph Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	165	30	12	196	193	26	657	27	40	180	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	0.98	1.00		1.00	1.00	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	1798			1855	1526	1735	1847		1770	1764	
Flt Permitted	0.51	1.00			0.98	1.00	0.60	1.00		0.16	1.00	
Satd. Flow (perm)	936	1798			1814	1526	1087	1847		296	1764	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	32	179	33	13	213	210	28	714	29	41	196	70
RTOR Reduction (vph)	0	13	0	0	0	164	0	2	0	0	16	0
Lane Group Flow (vph)	32	199	0	0	226	46	28	741	0	41	250	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	13.1	13.1			13.1	13.1	30.7	30.7		37.9	37.9	
Effective Green, g (s)	13.1	13.1			13.1	13.1	30.7	30.7		37.9	37.9	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.51	0.51		0.63	0.63	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	204	393			396	333	556	945		253	1114	
v/s Ratio Prot		0.11						c0.40		0.01	c0.14	
v/s Ratio Perm	0.03				c0.12	0.03	0.03			0.09		
v/c Ratio	0.16	0.51			0.57	0.14	0.05	0.78		0.16	0.22	
Uniform Delay, d1	19.0	20.6			20.9	18.9	7.3	11.9		7.9	4.7	
Progression Factor	1.00	1.00			1.05	1.67	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.0			1.4	0.1	0.2	6.5		0.3	0.5	
Delay (s)	19.3	21.6			23.4	31.6	7.5	18.4		8.2	5.2	
Level of Service	B	C			C	C	A	B		A	A	
Approach Delay (s)		21.3			27.4			18.0			5.6	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term PM
21: 20th Street & Broadway — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	152	95	61	237	102	109	803	113	44	554	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.90	1.00	0.96			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	0.91	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.95			0.98			0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1842	1430	1617	1709			3413			4988	
Flt Permitted		0.93	1.00	0.62	1.00			0.73			0.81	
Satd. Flow (perm)		1729	1430	1062	1709			2494			4033	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	25	165	103	66	258	111	118	873	119	48	602	42
RTOR Reduction (vph)	0	0	65	0	26	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	190	38	66	343	0	0	1095	0	0	680	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		634	524	389	627			1313			1210	
v/s Ratio Prot					c0.20			c0.10				
v/s Ratio Perm		0.11	0.03	0.06				c0.31			0.17	
v/c Ratio		0.30	0.07	0.17	0.55			0.83			0.56	
Uniform Delay, d1		13.5	12.4	12.8	15.1			13.4			17.7	
Progression Factor		1.15	1.96	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.2	0.3	0.9	3.4			6.3			1.9	
Delay (s)		16.7	24.5	13.8	18.5			19.7			19.6	
Level of Service		B	C	B	B			B			B	
Approach Delay (s)		19.4			17.8			19.7			19.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

35: 12th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	249	941	0	0	0	0	0	697	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4976						5024	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4976						5024	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	271	970	0	0	0	0	0	758	50
RTOR Reduction (vph)	0	0	0	0	53	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	1188	0	0	0	0	0	796	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2156						2219	
v/s Ratio Prot											c0.16	
v/s Ratio Perm					0.24							
v/c Ratio					0.55						0.36	
Uniform Delay, d1					12.7						11.1	
Progression Factor					0.45						1.00	
Incremental Delay, d2					0.9						0.5	
Delay (s)					6.7						11.6	
Level of Service					A						B	
Approach Delay (s)		0.0			6.7			0.0			11.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

36: 12th Street & Oak St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1015	60	178	984	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.94		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1484		6239				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1484		6239				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1068	65	193	1025	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	4	0	28	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1068	61	0	1190	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	740		2142				
v/s Ratio Prot					c0.21							
v/s Ratio Perm						0.04		0.19				
v/c Ratio					0.42	0.08		0.56				
Uniform Delay, d1					9.6	7.9		16.0				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					0.5	0.2		1.0				
Delay (s)					10.1	8.1		17.0				
Level of Service					B	A		B				
Approach Delay (s)		0.0			10.0			17.0			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

38: 11th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	910	194	0	0	0	0	0	0	51	873	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.96								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1527								5066	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1527								5066	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	948	211	0	0	0	0	0	0	55	939	0
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	948	178	0	0	0	0	0	0	0	983	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	585								2195	
v/s Ratio Prot		c0.19										
v/s Ratio Perm			0.12								0.19	
v/c Ratio		0.49	0.30								0.45	
Uniform Delay, d1		14.0	12.9								12.0	
Progression Factor		0.78	0.64								0.58	
Incremental Delay, d2		0.8	1.3								0.6	
Delay (s)		11.8	9.6								7.6	
Level of Service		B	A								A	
Approach Delay (s)		11.4			0.0			0.0			7.6	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

39: 11th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	724	0	0	0	0	0	319	134	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		5070						6032				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		5070						6032				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	26	787	0	0	0	0	0	347	138	0	0	0
RTOR Reduction (vph)	0	7	0	0	0	0	0	22	0	0	0	0
Lane Group Flow (vph)	0	806	0	0	0	0	0	463	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		15.3						37.7				
Effective Green, g (s)		15.3						37.7				
Actuated g/C Ratio		0.26						0.63				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1293						3790				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.16										
v/c Ratio		0.62						0.12				
Uniform Delay, d1		19.8						4.5				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.7						0.1				
Delay (s)		20.5						4.6				
Level of Service		C						A				
Approach Delay (s)		20.5			0.0			4.6			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative AM

5: 27th Street & Telegraph Avenue

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	406	153	50	280	122	94	415	26	53	377	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1546	1764	1863	1519	1764	1842		1766	1771	
Flt Permitted	0.36	1.00	1.00	0.45	1.00	1.00	0.14	1.00		0.25	1.00	
Satd. Flow (perm)	677	1863	1546	840	1863	1519	258	1842		467	1771	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	428	441	166	54	304	133	98	451	28	58	410	167
RTOR Reduction (vph)	0	0	92	0	0	87	0	3	0	0	18	0
Lane Group Flow (vph)	428	441	74	54	304	46	98	476	0	58	559	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	46.2	37.8	37.8	33.0	29.1	29.1	29.8	29.8		29.8	29.8	
Effective Green, g (s)	46.2	37.8	37.8	33.0	29.1	29.1	29.8	29.8		29.8	29.8	
Actuated g/C Ratio	0.54	0.44	0.44	0.39	0.34	0.34	0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	530	828	688	369	638	520	90	646		164	621	
v/s Ratio Prot	c0.12	0.24		0.01	0.16			0.26			0.32	
v/s Ratio Perm	c0.32		0.05	0.05		0.03	c0.38			0.12		
v/c Ratio	0.81	0.53	0.11	0.15	0.48	0.09	1.09	0.74		0.35	0.90	
Uniform Delay, d1	13.2	17.2	13.8	16.5	22.0	18.9	27.6	24.2		20.5	26.2	
Progression Factor	1.00	1.00	1.00	0.71	0.64	0.26	1.02	1.01		1.00	1.00	
Incremental Delay, d2	8.3	2.4	0.3	0.1	2.5	0.3	115.7	3.4		0.5	15.5	
Delay (s)	21.5	19.6	14.1	11.7	16.5	5.3	143.8	27.9		20.9	41.7	
Level of Service	C	B	B	B	B	A	F	C		C	D	
Approach Delay (s)		19.5			13.0			47.6			39.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative AM

9: West Grand Avenue & Telegraph Avenue

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	892	410	79	482	74	232	296	35	99	409	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1765	3427	1553	1768	3343		1770	1828		1757	1805	
Flt Permitted	0.27	1.00	1.00	0.16	1.00		0.95	1.00		0.55	1.00	
Satd. Flow (perm)	499	3427	1553	297	3343		1770	1828		1020	1805	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	929	446	86	524	80	252	312	38	108	445	97
RTOR Reduction (vph)	0	0	314	0	13	0	0	5	0	0	9	0
Lane Group Flow (vph)	136	929	132	86	591	0	252	345	0	108	533	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	25.1	25.1	25.1	25.1	25.1		12.9	49.4		32.0	32.0	
Effective Green, g (s)	25.1	25.1	25.1	25.1	25.1		12.9	49.4		32.0	32.0	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.15	0.58		0.38	0.38	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	147	1012	459	88	987		269	1062		384	680	
v/s Ratio Prot		0.27			0.18		c0.14	0.19			c0.30	
v/s Ratio Perm	0.27		0.08	c0.29						0.11		
v/c Ratio	0.93	0.92	0.29	0.98	0.60		0.94	0.32		0.28	0.78	
Uniform Delay, d1	29.0	29.0	23.1	29.7	25.6		35.6	9.2		18.5	23.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.91	1.01	
Incremental Delay, d2	56.5	14.3	1.6	89.9	2.7		37.4	0.8		1.5	7.3	
Delay (s)	85.6	43.3	24.6	119.5	28.3		73.1	10.0		18.3	30.9	
Level of Service	F	D	C	F	C		E	B		B	C	
Approach Delay (s)		41.6			39.7			36.4			28.8	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative AM

20: 20th Street & Telegraph Avenue

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	92	24	15	234	119	40	547	28	188	194	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1760	1790			1855	1538	1759	1846		1770	1773	
Flt Permitted	0.45	1.00			0.98	1.00	0.58	1.00		0.18	1.00	
Satd. Flow (perm)	842	1790			1821	1538	1081	1846		329	1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	100	26	16	249	129	43	558	30	204	211	76
RTOR Reduction (vph)	0	18	0	0	0	98	0	3	0	0	17	0
Lane Group Flow (vph)	24	108	0	0	265	31	43	585	0	204	270	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	14.3	14.3			14.3	14.3	24.3	24.3		36.7	36.7	
Effective Green, g (s)	14.3	14.3			14.3	14.3	24.3	24.3		36.7	36.7	
Actuated g/C Ratio	0.24	0.24			0.24	0.24	0.40	0.40		0.61	0.61	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	427			434	367	438	748		391	1084	
v/s Ratio Prot		0.06						c0.32		c0.07	0.15	
v/s Ratio Perm	0.03				c0.15	0.02	0.04			0.25		
v/c Ratio	0.12	0.25			0.61	0.08	0.10	0.78		0.52	0.25	
Uniform Delay, d1	17.9	18.5			20.4	17.8	11.1	15.5		8.4	5.3	
Progression Factor	1.00	1.00			1.03	1.53	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3			2.3	0.1	0.4	8.0		1.3	0.6	
Delay (s)	18.2	18.8			23.3	27.2	11.5	23.5		9.7	5.9	
Level of Service	B	B			C	C	B	C		A	A	
Approach Delay (s)		18.7			24.6			22.7			7.5	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative AM

21: 20th Street & Broadway

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	176	71	56	177	128	69	552	79	72	477	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.93	1.00	0.95			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.93	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.94			0.98			0.99	
Flt Protected		1.00	1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)		1855	1473	1647	1657			3413			4982	
Flt Permitted		0.98	1.00	0.61	1.00			0.84			0.78	
Satd. Flow (perm)		1820	1473	1054	1657			2888			3896	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	191	77	61	192	139	75	594	86	78	518	33
RTOR Reduction (vph)	0	0	49	0	44	0	0	17	0	0	10	0
Lane Group Flow (vph)	0	202	28	61	287	0	0	738	0	0	619	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		667	540	386	608			1457			1169	
v/s Ratio Prot					c0.17			c0.06				
v/s Ratio Perm		0.11	0.02	0.06				c0.19			0.16	
v/c Ratio		0.30	0.05	0.16	0.47			0.51			0.53	
Uniform Delay, d1		13.5	12.3	12.8	14.6			10.6			17.5	
Progression Factor		0.90	0.90	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.1	0.2	0.9	2.6			1.3			1.7	
Delay (s)		13.2	11.3	13.6	17.2			11.9			19.2	
Level of Service		B	B	B	B			B			B	
Approach Delay (s)		12.7			16.6			11.9			19.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative AM
35: 12th St. & Madison Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	478	1728	0	0	0	0	0	591	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.98	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4992						4933	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4992						4933	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	520	1781	0	0	0	0	0	603	113
RTOR Reduction (vph)	0	0	0	0	87	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	2214	0	0	0	0	0	714	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2163						2179	
v/s Ratio Prot											c0.14	
v/s Ratio Perm					0.44							
v/c Ratio					1.02						0.33	
Uniform Delay, d1					17.0						10.9	
Progression Factor					0.48						1.00	
Incremental Delay, d2					21.6						0.4	
Delay (s)					29.7						11.3	
Level of Service					C						B	
Approach Delay (s)		0.0			29.7			0.0			11.3	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	25.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative AM
36: 12th St. & Oak St.
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1936	89	372	904	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.93		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1467		6163				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1467		6163				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1996	97	400	983	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	6	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1996	91	0	1382	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	731		2116				
v/s Ratio Prot					c0.39							
v/s Ratio Perm						0.06		0.22				
v/c Ratio					0.79	0.13		0.65				
Uniform Delay, d1					12.4	8.1		16.7				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					2.6	0.4		1.6				
Delay (s)					15.0	8.4		18.3				
Level of Service					B	A		B				
Approach Delay (s)		0.0			14.7			18.3			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative AM
38: 11th Street & Madison Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	457	174	0	0	0	0	0	0	64	949	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.95								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1503								5063	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1503								5063	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	497	189	0	0	0	0	0	0	70	999	0
RTOR Reduction (vph)	0	0	27	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	497	162	0	0	0	0	0	0	0	1056	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	576								2194	
v/s Ratio Prot		0.10										
v/s Ratio Perm			c0.11								0.21	
v/c Ratio		0.26	0.28								0.48	
Uniform Delay, d1		12.6	12.8								12.2	
Progression Factor		0.73	0.66								0.91	
Incremental Delay, d2		0.3	1.2								0.6	
Delay (s)		9.5	9.6								11.6	
Level of Service		A	A								B	
Approach Delay (s)		9.6			0.0			0.0			11.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative AM
39: 11th Street & Franklin Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	463	0	0	0	0	0	377	68	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		5003						6231				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		5003						6231				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	498	0	0	0	0	0	410	74	0	0	0
RTOR Reduction (vph)	0	77	0	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	0	529	0	0	0	0	0	461	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		11.4						41.6				
Effective Green, g (s)		11.4						41.6				
Actuated g/C Ratio		0.19						0.69				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		951						4320				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.11										
v/c Ratio		0.56						0.11				
Uniform Delay, d1		22.0						3.0				
Progression Factor		1.06						1.00				
Incremental Delay, d2		0.2						0.0				
Delay (s)		23.6						3.1				
Level of Service		C						A				
Approach Delay (s)		23.6			0.0			3.1			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

5: 27th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	459	155	73	604	130	203	555	54	154	532	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1534	1769	1863	1531	1770	1832		1766	1714	
Flt Permitted	0.12	1.00	1.00	0.28	1.00	1.00	0.12	1.00		0.12	1.00	
Satd. Flow (perm)	230	1863	1534	527	1863	1531	226	1832		225	1714	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	499	168	79	657	141	221	603	59	167	578	440
RTOR Reduction (vph)	0	0	103	0	0	87	0	4	0	0	32	0
Lane Group Flow (vph)	260	499	65	79	657	54	221	658	0	167	986	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.39	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	308	721	594	290	612	503	88	711		87	665	
v/s Ratio Prot	c0.11	0.27		0.02	c0.35			0.36			0.57	
v/s Ratio Perm	0.32		0.04	0.09		0.04	c0.98			0.74		
v/c Ratio	0.84	0.69	0.11	0.27	1.07	0.11	2.51	0.93		1.92	1.48	
Uniform Delay, d1	19.8	21.8	16.7	17.2	28.6	19.9	26.0	24.8		26.0	26.0	
Progression Factor	1.00	1.00	1.00	1.00	1.35	2.32	0.72	0.70		1.00	1.00	
Incremental Delay, d2	17.9	5.4	0.4	0.2	56.2	0.4	703.0	13.4		453.2	225.0	
Delay (s)	37.8	27.2	17.0	25.7	94.8	46.5	721.7	30.6		479.2	251.0	
Level of Service	D	C	B	C	F	D	F	C		F	F	
Approach Delay (s)		28.3			80.9			203.6			283.1	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM Average Control Delay	158.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.71		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	125.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

9: West Grand Avenue & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	775	36	21	927	132	110	616	39	158	497	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1762	3337		1770	1844		1762	1792	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.95	1.00		0.36	1.00	
Satd. Flow (perm)	308	3427	1532	307	3337		1770	1844		661	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	34	842	39	23	1008	143	120	670	42	172	523	134
RTOR Reduction (vph)	0	0	28	0	13	0	0	2	0	0	10	0
Lane Group Flow (vph)	34	842	11	23	1138	0	120	710	0	172	647	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		8.6	50.3		37.2	37.2	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		8.6	50.3		37.2	37.2	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.10	0.59		0.44	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	87	950		179	1091		289	784	
v/s Ratio Prot		0.25			c0.34		0.07	c0.38			c0.36	
v/s Ratio Perm	0.11		0.01	0.08						0.26		
v/c Ratio	0.39	0.86	0.03	0.26	1.20		0.67	0.65		0.60	0.83	
Uniform Delay, d1	24.4	28.8	21.9	23.5	30.4		36.8	11.5		18.2	21.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.19	1.21	
Incremental Delay, d2	12.3	10.0	0.1	7.3	99.4		7.5	3.0		0.8	1.0	
Delay (s)	36.8	38.8	22.0	30.8	129.8		44.3	14.5		22.5	26.5	
Level of Service	D	D	C	C	F		D	B		C	C	
Approach Delay (s)		38.0			127.8			18.8			25.7	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM Average Control Delay	59.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

20: 20th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	202	37	14	240	237	32	807	33	49	221	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	0.98	1.00		1.00	1.00	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1739	1799			1855	1527	1738	1847		1770	1764	
Flt Permitted	0.45	1.00			0.97	1.00	0.56	1.00		0.12	1.00	
Satd. Flow (perm)	820	1799			1814	1527	1032	1847		231	1764	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	38	220	40	15	261	258	35	877	36	51	240	85
RTOR Reduction (vph)	0	13	0	0	0	181	0	2	0	0	17	0
Lane Group Flow (vph)	38	247	0	0	276	77	35	911	0	51	308	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	15.1	15.1			15.1	15.1	27.8	27.8		35.9	35.9	
Effective Green, g (s)	15.1	15.1			15.1	15.1	27.8	27.8		35.9	35.9	
Actuated g/C Ratio	0.25	0.25			0.25	0.25	0.46	0.46		0.60	0.60	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	453			457	384	478	856		231	1055	
v/s Ratio Prot		0.14						c0.49		0.01	c0.17	
v/s Ratio Perm	0.05				c0.15	0.05	0.03			0.12		
v/c Ratio	0.18	0.55			0.60	0.20	0.07	1.06		0.22	0.29	
Uniform Delay, d1	17.6	19.5			19.8	17.7	8.9	16.1		11.8	5.9	
Progression Factor	1.00	1.00			1.05	1.52	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.3			1.4	0.2	0.3	49.3		0.5	0.7	
Delay (s)	18.1	20.8			22.1	27.0	9.2	65.4		12.3	6.6	
Level of Service	B	C			C	C	A	E		B	A	
Approach Delay (s)		20.5			24.5			63.3			7.3	
Approach LOS		C			C			E			A	

Intersection Summary			
HCM Average Control Delay	38.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

21: 20th Street & Broadway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	176	110	70	274	119	127	930	131	51	642	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.90	1.00	0.96			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	0.92	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.95			0.98			0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1844	1430	1626	1709			3415			4989	
Flt Permitted		0.92	1.00	0.59	1.00			0.66			0.78	
Satd. Flow (perm)		1715	1430	1002	1709			2260			3904	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	28	191	120	76	298	129	138	1011	138	55	698	49
RTOR Reduction (vph)	0	0	76	0	26	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	219	44	76	401	0	0	1272	0	0	790	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		629	524	367	627			1227			1171	
v/s Ratio Prot					c0.23			c0.12				
v/s Ratio Perm		0.13	0.03	0.08				c0.38			0.20	
v/c Ratio		0.35	0.08	0.21	0.64			1.04			0.67	
Uniform Delay, d1		13.8	12.4	13.0	15.7			15.5			18.4	
Progression Factor		1.14	2.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.4	0.3	1.3	4.9			35.6			3.1	
Delay (s)		17.1	25.2	14.3	20.7			51.1			21.6	
Level of Service		B	C	B	C			D			C	
Approach Delay (s)		19.9			19.7			51.1			21.6	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	290	1096	0	0	0	0	0	812	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4976						5021	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4976						5021	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	315	1130	0	0	0	0	0	883	62
RTOR Reduction (vph)	0	0	0	0	36	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	0	0	0	1409	0	0	0	0	0	932	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2156						2218	
v/s Ratio Prot											c0.19	
v/s Ratio Perm					0.28							
v/c Ratio					0.65						0.42	
Uniform Delay, d1					13.4						11.5	
Progression Factor					0.66						1.00	
Incremental Delay, d2					1.3						0.6	
Delay (s)					10.1						12.1	
Level of Service					B						B	
Approach Delay (s)		0.0			10.1			0.0			12.1	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1183	70	436	1147	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.94		1.00				
Flpb, ped/bikes					1.00	1.00		0.97				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1484		6106				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1484		6106				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1245	76	474	1195	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	2	0	16	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1245	74	0	1653	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	740		2096				
v/s Ratio Prot					c0.24							
v/s Ratio Perm						0.05		0.27				
v/c Ratio					0.49	0.10		0.79				
Uniform Delay, d1					10.0	7.9		17.7				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					0.7	0.3		3.1				
Delay (s)					10.7	8.2		20.8				
Level of Service					B	A		C				
Approach Delay (s)		0.0			10.5			20.8			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1295	226	0	0	0	0	0	0	60	1017	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.96								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1527								5066	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1527								5066	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	1349	246	0	0	0	0	0	0	65	1094	0
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1349	226	0	0	0	0	0	0	0	1155	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	585								2195	
v/s Ratio Prot		c0.27										
v/s Ratio Perm			0.15								0.23	
v/c Ratio		0.69	0.39								0.53	
Uniform Delay, d1		15.5	13.4								12.5	
Progression Factor		0.79	0.66								0.56	
Incremental Delay, d2		2.0	1.9								0.8	
Delay (s)		14.3	10.8								7.7	
Level of Service		B	B								A	
Approach Delay (s)		13.8			0.0			0.0			7.7	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	844	0	0	0	0	0	371	156	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		5071						6031				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		5071						6031				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	30	917	0	0	0	0	0	403	161	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	941	0	0	0	0	0	549	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		17.6						35.4				
Effective Green, g (s)		17.6						35.4				
Actuated g/C Ratio		0.29						0.59				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1487						3558				
v/s Ratio Prot								c0.09				
v/s Ratio Perm		0.19										
v/c Ratio		0.63						0.15				
Uniform Delay, d1		18.4						5.5				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.7						0.1				
Delay (s)		19.0						5.6				
Level of Service		B						A				
Approach Delay (s)		19.0			0.0			5.6			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

5: 27th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	343	365	134	43	253	107	83	362	22	46	341	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1546	1762	1863	1520	1763	1842		1765	1773	
Flt Permitted	0.42	1.00	1.00	0.51	1.00	1.00	0.17	1.00		0.30	1.00	
Satd. Flow (perm)	780	1863	1546	948	1863	1520	319	1842		551	1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	373	397	146	47	275	116	86	393	24	50	371	145
RTOR Reduction (vph)	0	0	77	0	0	72	0	3	0	0	18	0
Lane Group Flow (vph)	373	397	69	47	275	44	86	414	0	50	498	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	48.4	40.1	40.1	35.7	31.9	31.9	27.6	27.6		27.6	27.6	
Effective Green, g (s)	48.4	40.1	40.1	35.7	31.9	31.9	27.6	27.6		27.6	27.6	
Actuated g/C Ratio	0.57	0.47	0.47	0.42	0.38	0.38	0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	584	879	729	435	699	570	104	598		179	576	
v/s Ratio Prot	c0.09	0.21		0.00	0.15			0.22			c0.28	
v/s Ratio Perm	c0.27		0.04	0.04		0.03	0.27			0.09		
v/c Ratio	0.64	0.45	0.09	0.11	0.39	0.08	0.83	0.69		0.28	0.86	
Uniform Delay, d1	11.0	15.1	12.4	14.7	19.5	17.1	26.5	25.0		21.3	26.9	
Progression Factor	1.00	1.00	1.00	0.72	0.65	0.30	1.02	1.01		1.00	1.00	
Incremental Delay, d2	1.7	1.7	0.3	0.0	1.6	0.3	35.9	2.6		0.3	12.4	
Delay (s)	12.7	16.7	12.7	10.6	14.3	5.3	63.0	28.0		21.6	39.3	
Level of Service	B	B	B	B	B	A	E	C		C	D	
Approach Delay (s)		14.4			11.5			34.0			37.7	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

9: West Grand Avenue & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	835	357	68	424	67	201	258	31	100	354	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1764	3427	1553	1768	3340		1770	1827		1757	1805	
Flt Permitted	0.32	1.00	1.00	0.16	1.00		0.95	1.00		0.57	1.00	
Satd. Flow (perm)	592	3427	1553	300	3340		1770	1827		1061	1805	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	870	388	74	461	73	218	272	34	109	385	84
RTOR Reduction (vph)	0	0	275	0	14	0	0	5	0	0	9	0
Lane Group Flow (vph)	117	870	113	74	520	0	218	301	0	109	460	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.8	24.8	24.8	24.8	24.8		12.3	49.7		32.9	32.9	
Effective Green, g (s)	24.8	24.8	24.8	24.8	24.8		12.3	49.7		32.9	32.9	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29		0.14	0.58		0.39	0.39	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	173	1000	453	88	974		256	1068		411	699	
v/s Ratio Prot		c0.25			0.16		c0.12	0.16			c0.25	
v/s Ratio Perm	0.20		0.07	0.25						0.10		
v/c Ratio	0.68	0.87	0.25	0.84	0.53		0.85	0.28		0.27	0.66	
Uniform Delay, d1	26.6	28.6	23.0	28.2	25.2		35.5	8.8		17.8	21.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.94	1.02	
Incremental Delay, d2	19.2	10.3	1.3	59.2	2.1		22.1	0.7		1.4	4.2	
Delay (s)	45.8	38.8	24.3	87.4	27.3		57.6	9.4		18.0	26.0	
Level of Service	D	D	C	F	C		E	A		B	C	
Approach Delay (s)		35.3			34.7			29.5			24.5	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	32.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

20: 20th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	90	20	12	198	101	34	458	37	158	163	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1759	1798			1855	1537	1758	1836		1769	1774	
Flt Permitted	0.51	1.00			0.98	1.00	0.61	1.00		0.27	1.00	
Satd. Flow (perm)	945	1798			1823	1537	1128	1836		505	1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	98	22	13	211	110	37	467	40	172	177	63
RTOR Reduction (vph)	0	17	0	0	0	87	0	5	0	0	16	0
Lane Group Flow (vph)	21	103	0	0	224	23	37	502	0	172	224	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.7	12.7			12.7	12.7	26.2	26.2		38.3	38.3	
Effective Green, g (s)	12.7	12.7			12.7	12.7	26.2	26.2		38.3	38.3	
Actuated g/C Ratio	0.21	0.21			0.21	0.21	0.44	0.44		0.64	0.64	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	200	381			386	325	493	802		482	1132	
v/s Ratio Prot		0.06						c0.27		c0.05	0.13	
v/s Ratio Perm	0.02				c0.12	0.02	0.03			0.18		
v/c Ratio	0.10	0.27			0.58	0.07	0.08	0.63		0.36	0.20	
Uniform Delay, d1	19.1	19.8			21.3	18.9	9.8	13.1		6.2	4.5	
Progression Factor	1.00	1.00			1.02	1.40	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.4			2.1	0.1	0.3	3.7		0.5	0.4	
Delay (s)	19.3	20.2			23.7	26.6	10.1	16.8		6.6	4.9	
Level of Service	B	C			C	C	B	B		A	A	
Approach Delay (s)		20.0			24.6			16.3			5.6	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

21: 20th Street & Broadway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	177	61	48	157	112	60	478	78	63	414	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.93	1.00	0.95			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.93	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.94			0.98			0.99	
Flt Protected		1.00	1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)		1856	1473	1647	1659			3400			4981	
Flt Permitted		0.98	1.00	0.61	1.00			0.86			0.80	
Satd. Flow (perm)		1831	1473	1056	1659			2950			4002	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	192	66	52	171	122	65	514	85	68	450	28
RTOR Reduction (vph)	0	0	42	0	43	0	0	19	0	0	10	0
Lane Group Flow (vph)	0	201	24	52	250	0	0	645	0	0	536	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		671	540	387	608			1478			1201	
v/s Ratio Prot					c0.15			c0.05				
v/s Ratio Perm		0.11	0.02	0.05				c0.16			0.13	
v/c Ratio		0.30	0.04	0.13	0.41			0.44			0.45	
Uniform Delay, d1		13.5	12.2	12.7	14.2			10.1			17.0	
Progression Factor		0.92	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.1	0.1	0.7	2.1			0.9			1.2	
Delay (s)		13.5	12.4	13.4	16.2			11.1			18.2	
Level of Service		B	B	B	B			B			B	
Approach Delay (s)		13.2			15.8			11.1			18.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I) AM
35: 12th St. & Madison Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	415	1502	0	0	0	0	0	378	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4993						4914	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4993						4914	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	451	1548	0	0	0	0	0	386	83
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	1911	0	0	0	0	0	466	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2164						2170	
v/s Ratio Prot											c0.09	
v/s Ratio Perm					0.38							
v/c Ratio					0.88						0.21	
Uniform Delay, d1					15.6						10.3	
Progression Factor					0.48						1.00	
Incremental Delay, d2					4.3						0.2	
Delay (s)					11.8						10.6	
Level of Service					B						B	
Approach Delay (s)		0.0			11.8			0.0			10.6	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I) AM
36: 12th St. & Oak St. — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1684	78	324	797	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.93		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1467		6165				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1467		6165				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1736	85	348	866	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	9	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1736	76	0	1211	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	731		2117				
v/s Ratio Prot					c0.34							
v/s Ratio Perm						0.05		0.20				
v/c Ratio					0.69	0.10		0.57				
Uniform Delay, d1					11.5	8.0		16.1				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					1.5	0.3		1.1				
Delay (s)					13.0	8.2		17.2				
Level of Service					B	A		B				
Approach Delay (s)		0.0			12.8			17.2			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	65.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I) AM
38: 11th Street & Madison Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	398	142	0	0	0	0	0	0	26	778	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.95								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1503								5074	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1503								5074	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	433	154	0	0	0	0	0	0	28	819	0
RTOR Reduction (vph)	0	0	49	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	433	105	0	0	0	0	0	0	0	841	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	576								2199	
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.07								0.17	
v/c Ratio		0.22	0.18								0.38	
Uniform Delay, d1		12.5	12.3								11.5	
Progression Factor		0.76	0.67								1.08	
Incremental Delay, d2		0.3	0.7								0.4	
Delay (s)		9.7	8.9								12.9	
Level of Service		A	A								B	
Approach Delay (s)		9.5			0.0			0.0			12.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I) AM
39: 11th Street & Franklin Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	104	402	0	0	0	0	0	364	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		4990						6247				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		4990						6247				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	432	0	0	0	0	0	396	64	0	0	0
RTOR Reduction (vph)	0	94	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	451	0	0	0	0	0	442	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		10.1						42.9				
Effective Green, g (s)		10.1						42.9				
Actuated g/C Ratio		0.17						0.72				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		840						4467				
v/s Ratio Prot								c0.07				
v/s Ratio Perm		0.09										
v/c Ratio		0.54						0.10				
Uniform Delay, d1		22.8						2.6				
Progression Factor		1.04						1.00				
Incremental Delay, d2		0.2						0.0				
Delay (s)		24.1						2.7				
Level of Service		C						A				
Approach Delay (s)		24.1			0.0			2.7			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis | Near-Term plus Project (I) PM

5: 27th Street & Telegraph Avenue

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	405	136	64	588	114	186	491	46	133	461	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1534	1769	1863	1531	1770	1833		1765	1714	
Flt Permitted	0.12	1.00	1.00	0.35	1.00	1.00	0.12	1.00		0.18	1.00	
Satd. Flow (perm)	226	1863	1534	659	1863	1531	226	1833		338	1714	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	440	148	70	639	124	202	534	50	145	501	380
RTOR Reduction (vph)	0	0	90	0	0	83	0	4	0	0	32	0
Lane Group Flow (vph)	228	440	58	70	639	41	202	580	0	145	849	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.40	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	298	725	597	333	622	512	88	712		131	665	
v/s Ratio Prot	c0.09	0.24		0.01	c0.34			0.32			0.49	
v/s Ratio Perm	0.30		0.04	0.07		0.03	c0.89			0.43		
v/c Ratio	0.77	0.61	0.10	0.21	1.03	0.08	2.30	0.82		1.11	1.28	
Uniform Delay, d1	17.6	20.7	16.5	16.5	28.3	19.4	26.0	23.3		26.0	26.0	
Progression Factor	1.00	1.00	1.00	1.57	1.42	2.79	0.71	0.67		1.00	1.00	
Incremental Delay, d2	10.1	3.8	0.3	0.1	42.2	0.3	609.6	5.3		110.2	135.7	
Delay (s)	27.7	24.5	16.8	26.0	82.3	54.2	628.1	20.9		136.2	161.7	
Level of Service	C	C	B	C	F	D	F	C		F	F	
Approach Delay (s)		24.0			73.4			177.0			158.1	
Approach LOS		C			E			F			F	

Intersection Summary			
HCM Average Control Delay	110.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.58		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis | Near-Term plus Project (I) PM

9: West Grand Avenue & Telegraph Avenue

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	688	32	19	845	128	95	542	33	139	429	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1760	3332		1770	1845		1761	1792	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.95	1.00		0.43	1.00	
Satd. Flow (perm)	308	3427	1532	306	3332		1770	1845		793	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	29	748	35	21	918	139	103	589	36	151	452	115
RTOR Reduction (vph)	0	0	25	0	14	0	0	2	0	0	9	0
Lane Group Flow (vph)	29	748	10	21	1043	0	103	623	0	151	558	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		8.2	50.3		37.6	37.6	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		8.2	50.3		37.6	37.6	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.10	0.59		0.44	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	87	949		171	1092		351	793	
v/s Ratio Prot		0.22			c0.31		0.06	c0.34			c0.31	
v/s Ratio Perm	0.09		0.01	0.07						0.19		
v/c Ratio	0.33	0.77	0.02	0.24	1.10		0.60	0.57		0.43	0.70	
Uniform Delay, d1	24.0	27.8	21.9	23.3	30.4		36.8	10.7		16.3	19.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.18	1.22	
Incremental Delay, d2	9.7	5.7	0.1	6.5	60.3		4.1	2.2		1.3	1.8	
Delay (s)	33.7	33.6	22.0	29.8	90.7		40.9	12.9		20.7	25.3	
Level of Service	C	C	C	C	F		D	B		C	C	
Approach Delay (s)		33.1			89.5			16.8			24.3	
Approach LOS		C			F			B			C	

Intersection Summary			
HCM Average Control Delay	45.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis | Near-Term plus Project (I) PM

20: 20th Street & Telegraph Avenue

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	167	30	12	207	204	26	657	29	40	180	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	0.98	1.00		1.00	1.00	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1737	1799			1855	1526	1735	1846		1770	1764	
Flt Permitted	0.49	1.00			0.98	1.00	0.60	1.00		0.15	1.00	
Satd. Flow (perm)	903	1799			1817	1526	1087	1846		285	1764	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	32	182	33	13	225	222	28	714	32	41	196	70
RTOR Reduction (vph)	0	13	0	0	0	172	0	2	0	0	16	0
Lane Group Flow (vph)	32	202	0	0	238	50	28	744	0	41	250	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	13.5	13.5			13.5	13.5	30.4	30.4		37.5	37.5	
Effective Green, g (s)	13.5	13.5			13.5	13.5	30.4	30.4		37.5	37.5	
Actuated g/C Ratio	0.22	0.22			0.22	0.22	0.51	0.51		0.62	0.62	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	405			409	343	551	935		242	1103	
v/s Ratio Prot		0.11						c0.40		0.01	c0.14	
v/s Ratio Perm	0.04				c0.13	0.03	0.03			0.10		
v/c Ratio	0.16	0.50			0.58	0.15	0.05	0.80		0.17	0.23	
Uniform Delay, d1	18.7	20.3			20.7	18.6	7.5	12.2		8.2	4.9	
Progression Factor	1.00	1.00			1.03	1.71	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.0			1.4	0.1	0.2	7.0		0.3	0.5	
Delay (s)	19.0	21.3			22.9	32.0	7.7	19.2		8.5	5.4	
Level of Service	B	C			C	C	A	B		A	A	
Approach Delay (s)		21.0			27.3			18.8			5.8	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis | Near-Term plus Project (I) PM

21: 20th Street & Broadway

Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	157	95	61	260	112	109	803	115	44	561	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.90	1.00	0.96			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	0.91	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.95			0.98			0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1843	1430	1619	1709			3411			4989	
Flt Permitted		0.93	1.00	0.62	1.00			0.72			0.81	
Satd. Flow (perm)		1725	1430	1050	1709			2484			4036	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	25	171	103	66	283	122	118	873	121	48	610	42
RTOR Reduction (vph)	0	0	65	0	26	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	196	38	66	379	0	0	1097	0	0	688	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		633	524	385	627			1309			1211	
v/s Ratio Prot					c0.22			c0.10				
v/s Ratio Perm		0.11	0.03	0.06				c0.31			0.17	
v/c Ratio		0.31	0.07	0.17	0.60			0.84			0.57	
Uniform Delay, d1		13.6	12.4	12.8	15.5			13.5			17.7	
Progression Factor		1.15	1.94	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.2	0.3	1.0	4.3			6.5			1.9	
Delay (s)		16.8	24.3	13.8	19.7			20.0			19.7	
Level of Service		B	C	B	B			B			B	
Approach Delay (s)		19.4			18.9			20.0			19.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

35: 12th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑						↑↑↱	
Volume (vph)	0	0	0	249	941	0	0	0	0	0	735	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4976						5027	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4976						5027	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	271	970	0	0	0	0	0	799	50
RTOR Reduction (vph)	0	0	0	0	47	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	1194	0	0	0	0	0	837	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2156						2220	
v/s Ratio Prot											c0.17	
v/s Ratio Perm					0.24							
v/c Ratio					0.55						0.38	
Uniform Delay, d1					12.7						11.2	
Progression Factor					0.46						1.00	
Incremental Delay, d2					0.9						0.5	
Delay (s)					6.8						11.7	
Level of Service					A						B	
Approach Delay (s)		0.0			6.8			0.0			11.7	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	8.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

36: 12th Street & Oak St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑	↱		↰↑↑↑				
Volume (vph)	0	0	0	0	1015	60	178	986	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.94		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1484		6239				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1484		6239				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1068	65	193	1027	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	4	0	28	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1068	61	0	1192	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	740		2142				
v/s Ratio Prot					c0.21							
v/s Ratio Perm						0.04		0.19				
v/c Ratio					0.42	0.08		0.56				
Uniform Delay, d1					9.6	7.9		16.0				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					0.5	0.2		1.0				
Delay (s)					10.1	8.1		17.0				
Level of Service					B	A		B				
Approach Delay (s)		0.0			10.0			17.0			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

38: 11th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱								↰↑↑	
Volume (vph)	0	910	194	0	0	0	0	0	0	51	911	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.96								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1527								5067	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1527								5067	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	948	211	0	0	0	0	0	0	55	980	0
RTOR Reduction (vph)	0	0	29	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	948	182	0	0	0	0	0	0	0	1025	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	585								2196	
v/s Ratio Prot		c0.19										
v/s Ratio Perm			0.12								0.20	
v/c Ratio		0.49	0.31								0.47	
Uniform Delay, d1		14.0	13.0								12.1	
Progression Factor		0.78	0.65								0.56	
Incremental Delay, d2		0.8	1.3								0.7	
Delay (s)		11.7	9.8								7.5	
Level of Service		B	A								A	
Approach Delay (s)		11.4			0.0			0.0			7.5	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

39: 11th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑						↑↑↑↱				
Volume (vph)	27	724	0	0	0	0	0	326	134	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		5069						6038				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		5069						6038				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	29	787	0	0	0	0	0	354	138	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	22	0	0	0	0
Lane Group Flow (vph)	0	808	0	0	0	0	0	470	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		15.3						37.7				
Effective Green, g (s)		15.3						37.7				
Actuated g/C Ratio		0.26						0.63				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1293						3794				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.16										
v/c Ratio		0.62						0.12				
Uniform Delay, d1		19.8						4.5				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.7						0.1				
Delay (s)		20.5						4.6				
Level of Service		C						A				
Approach Delay (s)		20.5			0.0			4.6			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	343	392	145	43	263	107	87	364	22	48	356	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1546	1763	1863	1520	1763	1842		1765	1776	
Flt Permitted	0.40	1.00	1.00	0.47	1.00	1.00	0.17	1.00		0.30	1.00	
Satd. Flow (perm)	753	1863	1546	867	1863	1520	309	1842		564	1776	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	373	426	158	47	286	116	91	396	24	52	387	145
RTOR Reduction (vph)	0	0	85	0	0	73	0	3	0	0	17	0
Lane Group Flow (vph)	373	426	73	47	286	43	91	417	0	52	515	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	47.6	39.3	39.3	35.3	31.5	31.5	28.4	28.4		28.4	28.4	
Effective Green, g (s)	47.6	39.3	39.3	35.3	31.5	31.5	28.4	28.4		28.4	28.4	
Actuated g/C Ratio	0.56	0.46	0.46	0.42	0.37	0.37	0.33	0.33		0.33	0.33	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	560	861	715	400	690	563	103	615		188	593	
v/s Ratio Prot	c0.09	0.23		0.01	0.15			0.23			0.29	
v/s Ratio Perm	c0.28		0.05	0.04		0.03	c0.29			0.09		
v/c Ratio	0.67	0.49	0.10	0.12	0.41	0.08	0.88	0.68		0.28	0.87	
Uniform Delay, d1	11.5	15.9	12.9	15.0	19.9	17.3	26.7	24.4		20.8	26.5	
Progression Factor	1.00	1.00	1.00	0.72	0.65	0.30	1.03	1.02		1.00	1.00	
Incremental Delay, d2	2.3	2.0	0.3	0.0	1.8	0.3	49.9	2.2		0.3	12.4	
Delay (s)	13.9	18.0	13.2	10.8	14.7	5.5	77.4	27.0		21.1	38.9	
Level of Service	B	B	B	B	B	A	E	C		C	D	
Approach Delay (s)		15.6			11.9			36.0			37.3	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	903	357	68	431	69	201	262	31	119	368	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1764	3427	1553	1768	3339		1770	1827		1757	1807	
Flt Permitted	0.31	1.00	1.00	0.16	1.00		0.95	1.00		0.57	1.00	
Satd. Flow (perm)	583	3427	1553	297	3339		1770	1827		1057	1807	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	941	388	74	468	75	218	276	34	129	400	84
RTOR Reduction (vph)	0	0	273	0	14	0	0	5	0	0	9	0
Lane Group Flow (vph)	117	941	115	74	529	0	218	305	0	129	475	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	25.1	25.1	25.1	25.1	25.1		12.3	49.4		32.6	32.6	
Effective Green, g (s)	25.1	25.1	25.1	25.1	25.1		12.3	49.4		32.6	32.6	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.14	0.58		0.38	0.38	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	172	1012	459	88	986		256	1062		405	693	
v/s Ratio Prot		c0.27			0.16		c0.12	0.17			c0.26	
v/s Ratio Perm	0.20		0.07	0.25						0.12		
v/c Ratio	0.68	0.93	0.25	0.84	0.54		0.85	0.29		0.32	0.69	
Uniform Delay, d1	26.4	29.1	22.8	28.1	25.1		35.5	8.9		18.4	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.94	1.01	
Incremental Delay, d2	19.6	15.7	1.3	59.2	2.1		22.1	0.7		1.8	4.7	
Delay (s)	46.0	44.8	24.1	87.3	27.2		57.6	9.6		19.1	26.9	
Level of Service	D	D	C	F	C		E	A		B	C	
Approach Delay (s)		39.4			34.4			29.4			25.2	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	34.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	101	20	12	199	105	34	458	47	163	163	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1759	1804			1855	1537	1758	1830		1769	1774	
Flt Permitted	0.51	1.00			0.98	1.00	0.61	1.00		0.26	1.00	
Satd. Flow (perm)	944	1804			1822	1537	1128	1830		481	1774	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	110	22	13	212	114	37	467	51	177	177	63
RTOR Reduction (vph)	0	15	0	0	0	90	0	6	0	0	16	0
Lane Group Flow (vph)	21	117	0	0	225	24	37	512	0	177	224	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.8	12.8			12.8	12.8	25.9	25.9		38.2	38.2	
Effective Green, g (s)	12.8	12.8			12.8	12.8	25.9	25.9		38.2	38.2	
Actuated g/C Ratio	0.21	0.21			0.21	0.21	0.43	0.43		0.64	0.64	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	385			389	328	487	790		474	1129	
v/s Ratio Prot		0.06						c0.28		c0.05	0.13	
v/s Ratio Perm	0.02				c0.12	0.02	0.03			0.19		
v/c Ratio	0.10	0.30			0.58	0.07	0.08	0.65		0.37	0.20	
Uniform Delay, d1	19.0	19.9			21.2	18.9	10.0	13.5		6.4	4.5	
Progression Factor	1.00	1.00			1.02	1.45	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.4			1.9	0.1	0.3	4.1		0.5	0.4	
Delay (s)	19.2	20.3			23.6	27.4	10.3	17.6		6.9	4.9	
Level of Service	B	C			C	C	B	B		A	A	
Approach Delay (s)		20.2			24.9			17.1			5.8	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	202	61	48	162	114	60	487	86	67	415	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.93	1.00	0.95			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.93	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.94			0.98			0.99	
Flt Protected		1.00	1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)		1857	1473	1654	1660			3393			4980	
Flt Permitted		0.99	1.00	0.57	1.00			0.86			0.79	
Satd. Flow (perm)		1835	1473	997	1660			2948			3945	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	220	66	52	176	124	65	524	93	73	451	28
RTOR Reduction (vph)	0	0	42	0	42	0	0	21	0	0	10	0
Lane Group Flow (vph)	0	229	24	52	258	0	0	661	0	0	542	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		673	540	366	609			1477			1184	
v/s Ratio Prot					c0.16			c0.05				
v/s Ratio Perm		0.12	0.02	0.05				c0.16			0.14	
v/c Ratio		0.34	0.04	0.14	0.42			0.45			0.46	
Uniform Delay, d1		13.7	12.2	12.7	14.2			10.2			17.0	
Progression Factor		0.94	1.07	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.3	0.1	0.8	2.1			1.0			1.3	
Delay (s)		14.2	13.2	13.5	16.4			11.2			18.3	
Level of Service		B	B	B	B			B			B	
Approach Delay (s)		14.0			16.0			11.2			18.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

35: 12th St. & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↰↑↑						↑↑↱	
Volume (vph)	0	0	0	415	1502	0	0	0	0	0	384	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.97	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4993						4916	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4993						4916	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	451	1548	0	0	0	0	0	392	83
RTOR Reduction (vph)	0	0	0	0	88	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	1911	0	0	0	0	0	472	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2164						2171	
v/s Ratio Prot											c0.10	
v/s Ratio Perm					0.38							
v/c Ratio					0.88						0.22	
Uniform Delay, d1					15.6						10.3	
Progression Factor					0.48						1.00	
Incremental Delay, d2					4.3						0.2	
Delay (s)					11.8						10.6	
Level of Service					B						B	
Approach Delay (s)		0.0			11.8			0.0			10.6	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

36: 12th St. & Oak St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↑↑↑	↱		↰↑↑↑				
Volume (vph)	0	0	0	0	1684	78	326	814	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.93		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1467		6167				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1467		6167				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1736	85	351	885	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	9	0	3	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1736	76	0	1233	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	731		2117				
v/s Ratio Prot					c0.34							
v/s Ratio Perm						0.05		0.20				
v/c Ratio					0.69	0.10		0.58				
Uniform Delay, d1					11.5	8.0		16.2				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					1.5	0.3		1.2				
Delay (s)					13.0	8.3		17.3				
Level of Service					B	A		B				
Approach Delay (s)		0.0			12.8			17.3			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

38: 11th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↱								↰↑↑	
Volume (vph)	0	398	142	0	0	0	0	0	0	26	784	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.95								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1503								5074	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1503								5074	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	433	154	0	0	0	0	0	0	28	825	0
RTOR Reduction (vph)	0	0	48	0	0	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	433	106	0	0	0	0	0	0	0	847	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	576								2199	
v/s Ratio Prot		c0.09										
v/s Ratio Perm			0.07								0.17	
v/c Ratio		0.22	0.18								0.39	
Uniform Delay, d1		12.5	12.3								11.6	
Progression Factor		0.75	0.63								1.07	
Incremental Delay, d2		0.3	0.7								0.4	
Delay (s)		9.7	8.4								12.8	
Level of Service		A	A								B	
Approach Delay (s)		9.3			0.0			0.0			12.8	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

39: 11th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑						↑↑↱				
Volume (vph)	120	402	0	0	0	0	0	411	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		4979						6263				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		4979						6263				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	432	0	0	0	0	0	447	64	0	0	0
RTOR Reduction (vph)	0	108	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	454	0	0	0	0	0	493	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		10.3						42.7				
Effective Green, g (s)		10.3						42.7				
Actuated g/C Ratio		0.17						0.71				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		855						4457				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.09										
v/c Ratio		0.53						0.11				
Uniform Delay, d1		22.7						2.7				
Progression Factor		1.06						1.00				
Incremental Delay, d2		0.2						0.1				
Delay (s)		24.2						2.8				
Level of Service		C						A				
Approach Delay (s)		24.2			0.0			2.8			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	210	409	137	64	660	115	210	506	46	133	464	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1534	1769	1863	1531	1770	1834		1765	1715	
Flt Permitted	0.12	1.00	1.00	0.35	1.00	1.00	0.12	1.00		0.17	1.00	
Satd. Flow (perm)	226	1863	1534	648	1863	1531	226	1834		308	1715	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	445	149	70	717	125	228	550	50	145	504	380
RTOR Reduction (vph)	0	0	91	0	0	80	0	4	0	0	32	0
Lane Group Flow (vph)	228	445	58	70	717	45	228	596	0	145	852	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	33.1	33.1	33.8	28.4	28.4	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.40	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	298	725	597	329	622	512	88	712		120	666	
v/s Ratio Prot	c0.09	0.24		0.01	c0.38			0.33			0.50	
v/s Ratio Perm	0.30		0.04	0.07		0.03	c1.01			0.47		
v/c Ratio	0.77	0.61	0.10	0.21	1.15	0.09	2.59	0.84		1.21	1.28	
Uniform Delay, d1	17.6	20.8	16.5	16.6	28.3	19.4	26.0	23.6		26.0	26.0	
Progression Factor	1.00	1.00	1.00	1.56	1.41	2.63	0.72	0.68		1.00	1.00	
Incremental Delay, d2	10.1	3.9	0.3	0.1	85.0	0.3	739.6	6.1		148.6	137.1	
Delay (s)	27.7	24.7	16.8	26.0	125.0	51.3	758.4	22.3		174.6	163.1	
Level of Service	C	C	B	C	F	D	F	C		F	F	
Approach Delay (s)		24.1			107.3			225.0			164.8	
Approach LOS		C			F			F			F	

Intersection Summary			
HCM Average Control Delay	131.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	120.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	702	32	19	893	141	95	566	33	143	431	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1761	3329		1770	1845		1761	1792	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.95	1.00		0.41	1.00	
Satd. Flow (perm)	308	3427	1532	306	3329		1770	1845		754	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	29	763	35	21	971	153	103	615	36	155	454	115
RTOR Reduction (vph)	0	0	25	0	14	0	0	2	0	0	9	0
Lane Group Flow (vph)	29	763	10	21	1110	0	103	649	0	155	560	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		8.2	50.3		37.6	37.6	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		8.2	50.3		37.6	37.6	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.10	0.59		0.44	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	87	948		171	1092		334	793	
v/s Ratio Prot		0.22			c0.33		0.06	c0.35			c0.31	
v/s Ratio Perm	0.09		0.01	0.07						0.21		
v/c Ratio	0.33	0.78	0.02	0.24	1.17		0.60	0.59		0.46	0.71	
Uniform Delay, d1	24.0	28.0	21.9	23.3	30.4		36.8	10.9		16.6	19.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.19	1.23	
Incremental Delay, d2	9.7	6.2	0.1	6.5	88.1		4.1	2.4		1.6	1.8	
Delay (s)	33.7	34.2	22.0	29.8	118.5		40.9	13.3		21.4	25.4	
Level of Service	C	C	C	C	F		D	B		C	C	
Approach Delay (s)		33.7			116.9			17.1			24.5	
Approach LOS		C			F			B			C	

Intersection Summary			
HCM Average Control Delay	55.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	169	30	12	218	227	26	657	31	41	180	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	0.98	1.00		1.00	1.00	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1738	1800			1856	1527	1735	1845		1770	1764	
Flt Permitted	0.48	1.00			0.98	1.00	0.60	1.00		0.14	1.00	
Satd. Flow (perm)	880	1800			1820	1527	1087	1845		268	1764	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	32	184	33	13	237	247	28	714	34	42	196	70
RTOR Reduction (vph)	0	13	0	0	0	189	0	2	0	0	17	0
Lane Group Flow (vph)	32	204	0	0	250	58	28	746	0	42	249	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	14.2	14.2			14.2	14.2	29.9	29.9		36.8	36.8	
Effective Green, g (s)	14.2	14.2			14.2	14.2	29.9	29.9		36.8	36.8	
Actuated g/C Ratio	0.24	0.24			0.24	0.24	0.50	0.50		0.61	0.61	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	208	426			431	361	542	919		224	1082	
v/s Ratio Prot		0.11						c0.40		0.01	c0.14	
v/s Ratio Perm	0.04				c0.14	0.04	0.03			0.11		
v/c Ratio	0.15	0.48			0.58	0.16	0.05	0.81		0.19	0.23	
Uniform Delay, d1	18.1	19.7			20.3	18.2	7.7	12.7		8.7	5.2	
Progression Factor	1.00	1.00			1.02	1.88	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.9			1.2	0.1	0.2	7.7		0.4	0.5	
Delay (s)	18.5	20.6			21.9	34.3	7.9	20.4		9.1	5.7	
Level of Service	B	C			C	C	A	C		A	A	
Approach Delay (s)		20.3			28.1			20.0			6.2	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	162	95	61	294	124	109	804	117	45	568	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.90	1.00	0.96			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	0.92	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.96			0.98			0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1845	1430	1621	1711			3410			4989	
Flt Permitted		0.93	1.00	0.61	1.00			0.72			0.80	
Satd. Flow (perm)		1718	1430	1039	1711			2474			4026	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	25	176	103	66	320	135	118	874	123	49	617	42
RTOR Reduction (vph)	0	0	65	0	25	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	201	38	66	430	0	0	1099	0	0	696	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		630	524	381	627			1305			1208	
v/s Ratio Prot					c0.25			c0.10				
v/s Ratio Perm		0.12	0.03	0.06				c0.31			0.17	
v/c Ratio		0.32	0.07	0.17	0.69			0.84			0.58	
Uniform Delay, d1		13.6	12.4	12.8	16.1			13.5			17.8	
Progression Factor		1.14	1.90	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.3	0.3	1.0	6.0			6.7			2.0	
Delay (s)		16.8	23.8	13.8	22.1			20.2			19.8	
Level of Service		B	C	B	C			C			B	
Approach Delay (s)		19.2			21.0			20.2			19.8	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	249	941	0	0	0	0	0	780	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4976						5030	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4976						5030	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	271	970	0	0	0	0	0	848	50
RTOR Reduction (vph)	0	0	0	0	40	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	0	1201	0	0	0	0	0	887	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2156						2222	
v/s Ratio Prot											c0.18	
v/s Ratio Perm					0.24							
v/c Ratio					0.56						0.40	
Uniform Delay, d1					12.7						11.4	
Progression Factor					0.47						1.00	
Incremental Delay, d2					1.0						0.5	
Delay (s)					6.9						11.9	
Level of Service					A						B	
Approach Delay (s)		0.0			6.9			0.0			11.9	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	9.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1015	60	178	989	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.94		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1484		6239				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1484		6239				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1068	65	193	1030	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	4	0	28	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1068	61	0	1195	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	740		2142				
v/s Ratio Prot					c0.21							
v/s Ratio Perm						0.04		0.19				
v/c Ratio					0.42	0.08		0.56				
Uniform Delay, d1					9.6	7.9		16.0				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					0.5	0.2		1.1				
Delay (s)					10.1	8.1		17.1				
Level of Service					B	A		B				
Approach Delay (s)		0.0			10.0			17.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	910	194	0	0	0	0	0	0	51	956	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.96								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1527								5068	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1527								5068	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	948	211	0	0	0	0	0	0	55	1028	0
RTOR Reduction (vph)	0	0	25	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	948	186	0	0	0	0	0	0	0	1073	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	585								2196	
v/s Ratio Prot		c0.19										
v/s Ratio Perm			0.12								0.21	
v/c Ratio		0.49	0.32								0.49	
Uniform Delay, d1		14.0	13.0								12.2	
Progression Factor		0.77	0.66								0.55	
Incremental Delay, d2		0.8	1.4								0.7	
Delay (s)		11.7	9.9								7.4	
Level of Service		B	A								A	
Approach Delay (s)		11.4			0.0			0.0			7.4	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	724	0	0	0	0	0	335	134	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		5066						6045				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		5066						6045				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	34	787	0	0	0	0	0	364	138	0	0	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	22	0	0	0	0
Lane Group Flow (vph)	0	811	0	0	0	0	0	480	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		15.3						37.7				
Effective Green, g (s)		15.3						37.7				
Actuated g/C Ratio		0.26						0.63				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1292						3798				
v/s Ratio Prot								c0.08				
v/s Ratio Perm		0.16										
v/c Ratio		0.63						0.13				
Uniform Delay, d1		19.8						4.5				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.7						0.1				
Delay (s)		20.5						4.6				
Level of Service		C						A				
Approach Delay (s)		20.5			0.0			4.6			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

5: 27th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	394	444	164	50	299	122	100	419	26	55	406	154
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1769	1863	1546	1765	1863	1519	1764	1842		1766	1776	
Flt Permitted	0.33	1.00	1.00	0.38	1.00	1.00	0.13	1.00		0.27	1.00	
Satd. Flow (perm)	618	1863	1546	703	1863	1519	243	1842		495	1776	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	428	483	178	54	325	133	104	455	28	60	441	167
RTOR Reduction (vph)	0	0	102	0	0	89	0	3	0	0	16	0
Lane Group Flow (vph)	428	483	76	54	325	44	104	480	0	60	592	0
Confl. Peds. (#/hr)	1		1	8		8	12		12	6		6
Confl. Bikes (#/hr)			2			5			27			6
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	44.7	36.3	36.3	32.2	28.3	28.3	31.3	31.3		31.3	31.3	
Effective Green, g (s)	44.7	36.3	36.3	32.2	28.3	28.3	31.3	31.3		31.3	31.3	
Actuated g/C Ratio	0.53	0.43	0.43	0.38	0.33	0.33	0.37	0.37		0.37	0.37	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	486	796	660	315	620	506	89	678		182	654	
v/s Ratio Prot	c0.12	0.26		0.01	0.17			0.26			0.33	
v/s Ratio Perm	c0.34		0.05	0.06		0.03	c0.43			0.12		
v/c Ratio	0.88	0.61	0.12	0.17	0.52	0.09	1.17	0.71		0.33	0.90	
Uniform Delay, d1	15.2	18.8	14.7	17.2	22.9	19.5	26.8	23.0		19.3	25.4	
Progression Factor	1.00	1.00	1.00	0.70	0.63	0.24	1.03	1.02		1.00	1.00	
Incremental Delay, d2	16.4	3.4	0.4	0.1	3.1	0.3	141.9	2.5		0.4	15.7	
Delay (s)	31.6	22.3	15.0	12.2	17.5	5.0	169.6	25.9		19.7	41.1	
Level of Service	C	C	B	B	B	A	F	C		B	D	
Approach Delay (s)		24.8			13.7			51.4			39.2	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM Average Control Delay	31.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

9: West Grand Avenue & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	1019	410	79	494	78	232	302	35	132	423	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1765	3427	1553	1770	3340		1770	1828		1757	1807	
Flt Permitted	0.26	1.00	1.00	0.16	1.00		0.95	1.00		0.55	1.00	
Satd. Flow (perm)	475	3427	1553	297	3340		1770	1828		1014	1807	
Peak-hour factor, PHF	0.92	0.96	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	1061	446	86	537	85	252	318	38	143	460	97
RTOR Reduction (vph)	0	0	314	0	14	0	0	3	0	0	9	0
Lane Group Flow (vph)	136	1061	132	86	608	0	252	353	0	143	548	0
Confl. Peds. (#/hr)	4		4	4		4	4		4	11		11
Confl. Bikes (#/hr)			3			7			21			1
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	25.1	25.1	25.1	25.1	25.1		12.9	49.4		32.0	32.0	
Effective Green, g (s)	25.1	25.1	25.1	25.1	25.1		12.9	49.4		32.0	32.0	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30		0.15	0.58		0.38	0.38	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	140	1012	459	88	986		269	1062		382	680	
v/s Ratio Prot		c0.31			0.18		c0.14	0.19			c0.30	
v/s Ratio Perm	0.29		0.08	0.29						0.14		
v/c Ratio	0.97	1.05	0.29	0.98	0.62		0.94	0.33		0.37	0.81	
Uniform Delay, d1	29.6	30.0	23.1	29.7	25.8		35.6	9.2		19.2	23.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.92	0.99	
Incremental Delay, d2	68.8	41.8	1.6	89.9	2.9		37.4	0.8		2.2	8.0	
Delay (s)	98.4	71.8	24.6	119.5	28.7		73.1	10.1		19.9	31.5	
Level of Service	F	E	C	F	C		E	B		B	C	
Approach Delay (s)		61.2			39.7			36.2			29.1	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

20: 20th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	116	24	15	237	125	40	547	51	193	194	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00			1.00	1.00	0.99	1.00		1.00	1.00	
Frt	1.00	0.97			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1760	1803			1855	1538	1759	1833		1770	1773	
Flt Permitted	0.45	1.00			0.98	1.00	0.58	1.00		0.15	1.00	
Satd. Flow (perm)	835	1803			1819	1538	1081	1833		283	1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	126	26	16	252	136	43	558	55	210	211	76
RTOR Reduction (vph)	0	14	0	0	0	103	0	5	0	0	17	0
Lane Group Flow (vph)	24	138	0	0	268	33	43	608	0	210	270	0
Confl. Peds. (#/hr)	10		10	19		19	5		5	4		4
Confl. Bikes (#/hr)			4			1			3			9
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	14.4	14.4			14.4	14.4	24.1	24.1		36.6	36.6	
Effective Green, g (s)	14.4	14.4			14.4	14.4	24.1	24.1		36.6	36.6	
Actuated g/C Ratio	0.24	0.24			0.24	0.24	0.40	0.40		0.61	0.61	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	200	433			437	369	434	736		371	1082	
v/s Ratio Prot		0.08						c0.33		c0.08	0.15	
v/s Ratio Perm	0.03				c0.15	0.02	0.04			0.27		
v/c Ratio	0.12	0.32			0.61	0.09	0.10	0.83		0.57	0.25	
Uniform Delay, d1	17.8	18.8			20.3	17.7	11.2	16.1		9.1	5.4	
Progression Factor	1.00	1.00			1.04	1.60	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4			2.3	0.1	0.5	10.2		2.0	0.6	
Delay (s)	18.1	19.2			23.4	28.5	11.6	26.3		11.0	5.9	
Level of Service	B	B			C	C	B	C		B	A	
Approach Delay (s)		19.0			25.1			25.3			8.1	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

21: 20th Street & Broadway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	226	71	56	185	131	69	561	97	76	479	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.93	1.00	0.95			0.99			1.00	
Flpb, ped/bikes		1.00	1.00	0.94	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.94			0.98			0.99	
Flt Protected		1.00	1.00	0.95	1.00			1.00			0.99	
Satd. Flow (prot)		1856	1473	1661	1660			3397			4981	
Flt Permitted		0.98	1.00	0.54	1.00			0.84			0.77	
Satd. Flow (perm)		1828	1473	938	1660			2879			3836	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	246	77	61	201	142	75	603	105	83	521	33
RTOR Reduction (vph)	0	0	49	0	42	0	0	21	0	0	10	0
Lane Group Flow (vph)	0	257	28	61	301	0	0	762	0	0	627	0
Confl. Peds. (#/hr)	58		58	99		99	72		72	49		49
Confl. Bikes (#/hr)			7			33			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		670	540	344	609			1452			1151	
v/s Ratio Prot					c0.18			c0.06				
v/s Ratio Perm		0.14	0.02	0.07				c0.19			0.16	
v/c Ratio		0.38	0.05	0.18	0.49			0.53			0.54	
Uniform Delay, d1		14.0	12.3	12.9	14.7			10.7			17.6	
Progression Factor		0.94	1.02	1.00	1.00			1.00			1.00	
Incremental Delay, d2		1.5	0.2	1.1	2.8			1.4			1.9	
Delay (s)		14.6	12.7	14.0	17.5			12.1			19.4	
Level of Service		B	B	B	B			B			B	
Approach Delay (s)		14.1			17.0			12.1			19.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	15.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

35: 12th St. & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	478	1728	0	0	0	0	0	603	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						0.99	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.98	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4992						4935	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4992						4935	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.92	0.92	0.92	0.92	0.98	0.92
Adj. Flow (vph)	0	0	0	520	1781	0	0	0	0	0	615	113
RTOR Reduction (vph)	0	0	0	0	84	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	0	2217	0	0	0	0	0	726	0
Confl. Peds. (#/hr)	48		48	30		30	54		54	27		27
Confl. Bikes (#/hr)			9			5			4			1
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2163						2180	
v/s Ratio Prot											c0.15	
v/s Ratio Perm					0.44							
v/c Ratio					1.02						0.33	
Uniform Delay, d1					17.0						11.0	
Progression Factor					0.48						1.00	
Incremental Delay, d2					21.9						0.4	
Delay (s)					30.1						11.4	
Level of Service					C						B	
Approach Delay (s)		0.0			30.1			0.0			11.4	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

36: 12th St. & Oak St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1936	89	374	932	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.93		1.00				
Flpb, ped/bikes					1.00	1.00		0.98				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1467		6167				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1467		6167				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.97	0.92	0.93	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1996	97	402	1013	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	5	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1996	92	0	1414	0	0	0	0
Confl. Peds. (#/hr)	102		102	84		84	84		84	168		168
Confl. Bikes (#/hr)			1									1
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	731		2117				
v/s Ratio Prot					c0.39							
v/s Ratio Perm						0.06		0.23				
v/c Ratio					0.79	0.13		0.67				
Uniform Delay, d1					12.4	8.1		16.8				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					2.6	0.4		1.7				
Delay (s)					15.0	8.4		18.5				
Level of Service					B	A		B				
Approach Delay (s)		0.0			14.7			18.5			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

38: 11th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	457	174	0	0	0	0	0	0	64	961	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.95								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1503								5063	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1503								5063	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	0	497	189	0	0	0	0	0	0	70	1012	0
RTOR Reduction (vph)	0	0	26	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	497	163	0	0	0	0	0	0	0	1069	0
Confl. Peds. (#/hr)	32		32	21		21	23		23	17		17
Confl. Bikes (#/hr)			10			10			2			3
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	576								2194	
v/s Ratio Prot		0.10										
v/s Ratio Perm			c0.11								0.21	
v/c Ratio		0.26	0.28								0.49	
Uniform Delay, d1		12.6	12.8								12.2	
Progression Factor		0.72	0.64								0.90	
Incremental Delay, d2		0.3	1.2								0.6	
Delay (s)		9.4	9.5								11.6	
Level of Service		A	A								B	
Approach Delay (s)		9.4			0.0			0.0			11.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

39: 11th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	463	0	0	0	0	0	460	68	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						1.00				
Flpb, ped/bikes		0.99						1.00				
Frt		1.00						0.98				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		4982						6259				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		4982						6259				
Peak-hour factor, PHF	0.92	0.93	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	498	0	0	0	0	0	500	74	0	0	0
RTOR Reduction (vph)	0	118	0	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	0	525	0	0	0	0	0	551	0	0	0	0
Confl. Peds. (#/hr)	46		46	56		56	21		21	52		52
Confl. Bikes (#/hr)			2			2			5			
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		11.3						41.7				
Effective Green, g (s)		11.3						41.7				
Actuated g/C Ratio		0.19						0.70				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		938						4350				
v/s Ratio Prot								c0.09				
v/s Ratio Perm		0.11										
v/c Ratio		0.56						0.13				
Uniform Delay, d1		22.1						3.1				
Progression Factor		1.08						1.00				
Incremental Delay, d2		0.3						0.1				
Delay (s)		24.1						3.1				
Level of Service		C						A				
Approach Delay (s)		24.1			0.0			3.1			0.0	
Approach LOS		C			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

5: 27th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	465	156	73	734	131	238	582	54	154	537	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1534	1769	1863	1531	1770	1833		1766	1715	
Flt Permitted	0.12	1.00	1.00	0.28	1.00	1.00	0.12	1.00		0.12	1.00	
Satd. Flow (perm)	230	1863	1534	513	1863	1531	226	1833		225	1715	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	505	170	79	798	142	259	633	59	167	584	440
RTOR Reduction (vph)	0	0	104	0	0	81	0	4	0	0	32	0
Lane Group Flow (vph)	260	505	66	79	798	61	259	688	0	167	992	0
Confl. Peds. (#/hr)	4		4	1		1	17		17	10		10
Confl. Bikes (#/hr)			4			10			17			28
Turn Type	pm+pt		Perm	pm+pt		Perm	Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Effective Green, g (s)	43.0	32.9	32.9	33.5	27.9	27.9	33.0	33.0		33.0	33.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.39	0.33	0.33	0.39	0.39		0.39	0.39	
Clearance Time (s)	4.5	3.5	3.5	4.5	3.5	3.5	5.5	5.5		5.5	5.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	308	721	594	285	612	503	88	712		87	666	
v/s Ratio Prot	c0.11	0.27		0.02	c0.43			0.38			0.58	
v/s Ratio Perm	0.32		0.04	0.09		0.04	c1.15			0.74		
v/c Ratio	0.84	0.70	0.11	0.28	1.30	0.12	2.94	0.97		1.92	1.49	
Uniform Delay, d1	19.8	21.9	16.7	17.2	28.6	20.0	26.0	25.5		26.0	26.0	
Progression Factor	1.00	1.00	1.00	1.53	1.38	2.24	0.74	0.73		1.00	1.00	
Incremental Delay, d2	17.9	5.6	0.4	0.2	146.8	0.4	893.4	18.9		453.2	228.3	
Delay (s)	37.8	27.5	17.1	26.5	186.1	45.2	912.7	37.4		479.2	254.3	
Level of Service	D	C	B	C	F	D	F	D		F	F	
Approach Delay (s)		28.5			154.1			275.8			285.9	
Approach LOS		C			F			F			F	

Intersection Summary

HCM Average Control Delay	192.0	HCM Level of Service	F
HCM Volume to Capacity ratio	2.00		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	134.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

9: West Grand Avenue & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	800	36	21	1010	157	110	651	39	164	499	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Lane Util. Factor	1.00	*0.92	1.00	1.00	*0.92		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3427	1532	1763	3330		1770	1845		1763	1792	
Flt Permitted	0.17	1.00	1.00	0.17	1.00		0.95	1.00		0.32	1.00	
Satd. Flow (perm)	308	3427	1532	307	3330		1770	1845		599	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92
Adj. Flow (vph)	34	870	39	23	1098	171	120	708	42	178	525	134
RTOR Reduction (vph)	0	0	28	0	14	0	0	2	0	0	10	0
Lane Group Flow (vph)	34	870	11	23	1255	0	120	748	0	178	649	0
Confl. Peds. (#/hr)	12		12	18		18	3		3	12		12
Confl. Bikes (#/hr)			8			6			10			28
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			4		5	2			6	
Permitted Phases	4		4	4						6		
Actuated Green, G (s)	24.2	24.2	24.2	24.2	24.2		8.6	50.3		37.2	37.2	
Effective Green, g (s)	24.2	24.2	24.2	24.2	24.2		8.6	50.3		37.2	37.2	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.10	0.59		0.44	0.44	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	6.0		6.0	6.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	88	976	436	87	948		179	1092		262	784	
v/s Ratio Prot		0.25			c0.38		0.07	c0.41			c0.36	
v/s Ratio Perm	0.11		0.01	0.07						0.30		
v/c Ratio	0.39	0.89	0.03	0.26	1.32		0.67	0.68		0.68	0.83	
Uniform Delay, d1	24.4	29.1	21.9	23.5	30.4		36.8	11.9		19.1	21.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.20	1.22	
Incremental Delay, d2	12.3	12.1	0.1	7.3	153.0		7.5	3.5		1.3	1.0	
Delay (s)	36.8	41.3	22.0	30.8	183.4		44.3	15.4		24.3	26.7	
Level of Service	D	D	C	C	F		D	B		C	C	
Approach Delay (s)		40.3			180.7			19.4			26.1	
Approach LOS		D			F			B			C	

Intersection Summary

HCM Average Control Delay	78.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

20: 20th Street & Telegraph Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	206	37	14	262	271	32	807	37	50	221	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99			1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00			1.00	1.00	0.98	1.00		1.00	1.00	
Frt	1.00	0.98			1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1741	1800			1856	1527	1738	1845		1770	1764	
Flt Permitted	0.42	1.00			0.98	1.00	0.56	1.00		0.13	1.00	
Satd. Flow (perm)	761	1800			1818	1527	1032	1845		234	1764	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.92	0.92
Adj. Flow (vph)	38	224	40	15	285	295	35	877	40	52	240	85
RTOR Reduction (vph)	0	13	0	0	0	179	0	2	0	0	17	0
Lane Group Flow (vph)	38	251	0	0	300	116	35	915	0	52	308	0
Confl. Peds. (#/hr)	32		32	24		24	16		16	19		19
Confl. Bikes (#/hr)			6			4			25			3
Turn Type	Perm			Perm		Perm	Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	15.6	15.6			15.6	15.6	27.3	27.3		35.4	35.4	
Effective Green, g (s)	15.6	15.6			15.6	15.6	27.3	27.3		35.4	35.4	
Actuated g/C Ratio	0.26	0.26			0.26	0.26	0.46	0.46		0.59	0.59	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	198	468			473	397	470	839		230	1041	
v/s Ratio Prot		0.14						c0.50		0.01	c0.17	
v/s Ratio Perm	0.05				c0.17	0.08	0.03			0.12		
v/c Ratio	0.19	0.54			0.63	0.29	0.07	1.09		0.23	0.30	
Uniform Delay, d1	17.3	19.1			19.7	17.8	9.2	16.3		11.8	6.1	
Progression Factor	1.00	1.00			1.02	1.37	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.2			1.4	0.2	0.3	58.6		0.5	0.7	
Delay (s)	17.8	20.3			21.6	24.5	9.5	75.0		12.3	6.8	
Level of Service	B	C			C	C	A	E		B	A	
Approach Delay (s)		20.0			23.0			72.6			7.6	
Approach LOS		B			C			E			A	

Intersection Summary

HCM Average Control Delay	41.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

21: 20th Street & Broadway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	186	110	70	331	141	127	931	135	52	656	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			0.95			0.91	
Frpb, ped/bikes		1.00	0.90	1.00	0.96			0.99			0.99	
Flpb, ped/bikes		1.00	1.00	0.92	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	0.96			0.98			0.99	
Flt Protected		0.99	1.00	0.95	1.00			0.99			1.00	
Satd. Flow (prot)		1846	1430	1629	1711			3413			4990	
Flt Permitted		0.83	1.00	0.57	1.00			0.65			0.77	
Satd. Flow (perm)		1541	1430	980	1711			2240			3879	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.92
Adj. Flow (vph)	28	202	120	76	360	153	138	1012	142	57	713	49
RTOR Reduction (vph)	0	0	76	0	25	0	0	16	0	0	12	0
Lane Group Flow (vph)	0	230	44	76	488	0	0	1276	0	0	807	0
Confl. Peds. (#/hr)	74		74	120		120	85		85	65		65
Confl. Bikes (#/hr)			30			13			10			6
Turn Type	Perm		Perm	Perm			Prot			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8						6		
Actuated Green, G (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Effective Green, g (s)		22.0	22.0	22.0	22.0			29.0			18.0	
Actuated g/C Ratio		0.37	0.37	0.37	0.37			0.48			0.30	
Clearance Time (s)		4.0	4.0	4.0	4.0			5.0			5.0	
Lane Grp Cap (vph)		565	524	359	627			1220			1164	
v/s Ratio Prot					c0.29			c0.12				
v/s Ratio Perm		0.15	0.03	0.08				c0.38			0.21	
v/c Ratio		0.41	0.08	0.21	0.78			1.05			0.69	
Uniform Delay, d1		14.1	12.4	13.0	16.8			15.5			18.6	
Progression Factor		1.14	1.94	1.00	1.00			1.00			1.00	
Incremental Delay, d2		2.0	0.3	1.3	9.2			38.6			3.4	
Delay (s)		18.2	24.3	14.4	26.0			54.1			22.0	
Level of Service		B	C	B	C			D			C	
Approach Delay (s)		20.3			24.5			54.1			22.0	
Approach LOS		C			C			D			C	

Intersection Summary

HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

35: 12th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	290	1096	0	0	0	0	0	895	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5						4.0	
Lane Util. Factor					0.91						0.91	
Frpb, ped/bikes					1.00						1.00	
Flpb, ped/bikes					0.99						1.00	
Frt					1.00						0.99	
Flt Protected					0.99						1.00	
Satd. Flow (prot)					4976						5026	
Flt Permitted					0.99						1.00	
Satd. Flow (perm)					4976						5026	
Peak-hour factor, PHF	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25	0.25	0.25	0.92	0.92
Adj. Flow (vph)	0	0	0	315	1130	0	0	0	0	0	973	62
RTOR Reduction (vph)	0	0	0	0	27	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	0	0	0	1418	0	0	0	0	0	1023	0
Confl. Peds. (#/hr)	32		32	47		47	36		36	29		29
Confl. Bikes (#/hr)			3			13			9			2
Turn Type				Perm								
Protected Phases					6						4	
Permitted Phases				6								
Actuated Green, G (s)					26.0						26.5	
Effective Green, g (s)					26.0						26.5	
Actuated g/C Ratio					0.43						0.44	
Clearance Time (s)					3.5						4.0	
Lane Grp Cap (vph)					2156						2220	
v/s Ratio Prot											c0.20	
v/s Ratio Perm					0.29							
v/c Ratio					0.66						0.46	
Uniform Delay, d1					13.5						11.7	
Progression Factor					0.66						1.00	
Incremental Delay, d2					1.3						0.7	
Delay (s)					10.2						12.4	
Level of Service					B						B	
Approach Delay (s)		0.0			10.2			0.0			12.4	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

36: 12th Street & Oak St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1183	70	436	1152	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.5	5.5		4.0				
Lane Util. Factor					0.91	1.00		0.86				
Frpb, ped/bikes					1.00	0.94		1.00				
Flpb, ped/bikes					1.00	1.00		0.97				
Frt					1.00	0.85		1.00				
Flt Protected					1.00	1.00		0.99				
Satd. Flow (prot)					5085	1484		6107				
Flt Permitted					1.00	1.00		0.99				
Satd. Flow (perm)					5085	1484		6107				
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.95	0.92	0.92	0.96	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	1245	76	474	1200	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	2	0	16	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1245	74	0	1658	0	0	0	0
Confl. Peds. (#/hr)	121		121	69		69	118		118	84		84
Confl. Bikes (#/hr)			3									15
Turn Type						Perm	Perm					
Protected Phases					6			4				
Permitted Phases						6	4					
Actuated Green, G (s)					29.9	29.9		20.6				
Effective Green, g (s)					29.9	29.9		20.6				
Actuated g/C Ratio					0.50	0.50		0.34				
Clearance Time (s)					5.5	5.5		4.0				
Lane Grp Cap (vph)					2534	740		2097				
v/s Ratio Prot					c0.24							
v/s Ratio Perm						0.05		0.27				
v/c Ratio					0.49	0.10		0.79				
Uniform Delay, d1					10.0	7.9		17.8				
Progression Factor					1.00	1.00		1.00				
Incremental Delay, d2					0.7	0.3		3.1				
Delay (s)					10.7	8.2		20.9				
Level of Service					B	A		C				
Approach Delay (s)		0.0			10.5			20.9			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

38: 11th Street & Madison Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1295	226	0	0	0	0	0	0	60	1100	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5								5.5	
Lane Util. Factor		0.91	1.00								0.91	
Frpb, ped/bikes		1.00	0.96								1.00	
Flpb, ped/bikes		1.00	1.00								1.00	
Frt		1.00	0.85								1.00	
Flt Protected		1.00	1.00								1.00	
Satd. Flow (prot)		5085	1527								5068	
Flt Permitted		1.00	1.00								1.00	
Satd. Flow (perm)		5085	1527								5068	
Peak-hour factor, PHF	0.25	0.96	0.92	0.25	0.25	0.25	0.25	0.25	0.25	0.92	0.93	0.25
Adj. Flow (vph)	0	1349	246	0	0	0	0	0	0	65	1183	0
RTOR Reduction (vph)	0	0	15	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1349	231	0	0	0	0	0	0	0	1244	0
Confl. Peds. (#/hr)	20		20	30		30	12		12	17		17
Confl. Bikes (#/hr)			5			7			3			
Turn Type			Perm							Perm		
Protected Phases		2									4	
Permitted Phases			2							4		
Actuated Green, G (s)		23.0	23.0								26.0	
Effective Green, g (s)		23.0	23.0								26.0	
Actuated g/C Ratio		0.38	0.38								0.43	
Clearance Time (s)		5.5	5.5								5.5	
Lane Grp Cap (vph)		1949	585								2196	
v/s Ratio Prot		c0.27										
v/s Ratio Perm			0.15								0.25	
v/c Ratio		0.69	0.40								0.57	
Uniform Delay, d1		15.5	13.4								12.8	
Progression Factor		0.79	0.68								0.52	
Incremental Delay, d2		2.0	1.9								0.9	
Delay (s)		14.3	11.1								7.6	
Level of Service		B	B								A	
Approach Delay (s)		13.8			0.0			0.0			7.6	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

39: 11th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	844	0	0	0	0	0	387	156	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5						3.5				
Lane Util. Factor		0.91						0.86				
Frpb, ped/bikes		1.00						0.98				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.96				
Flt Protected		1.00						1.00				
Satd. Flow (prot)		5067						6042				
Flt Permitted		1.00						1.00				
Satd. Flow (perm)		5067						6042				
Peak-hour factor, PHF	0.92	0.92	0.25	0.25	0.25	0.25	0.25	0.92	0.97	0.25	0.25	0.25
Adj. Flow (vph)	38	917	0	0	0	0	0	421	161	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	947	0	0	0	0	0	567	0	0	0	0
Confl. Peds. (#/hr)	46		46	17		17	53		53	68		68
Confl. Bikes (#/hr)			1			1			6			2
Turn Type	Perm											
Protected Phases		2						4				
Permitted Phases	2											
Actuated Green, G (s)		17.6						35.4				
Effective Green, g (s)		17.6						35.4				
Actuated g/C Ratio		0.29						0.59				
Clearance Time (s)		3.5						3.5				
Vehicle Extension (s)		2.0						2.0				
Lane Grp Cap (vph)		1486						3565				
v/s Ratio Prot								c0.09				
v/s Ratio Perm		0.19										
v/c Ratio		0.64						0.16				
Uniform Delay, d1		18.4						5.6				
Progression Factor		1.00						1.00				
Incremental Delay, d2		0.7						0.1				
Delay (s)		19.1						5.7				
Level of Service		B						A				
Approach Delay (s)		19.1			0.0			5.7			0.0	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2015					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
Other MTS	Telegraph between 20th St. and 27th St.	NB	900	1	900	C	576	0.64	E	879	0.98
		SB	900	1	900	E	779	0.87	D	672	0.75

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2030					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
Other MTS	Telegraph between 20th St. and 27th St.	NB	900	1	900	D	688	0.76	F	1,080	1.20
		SB	900	1	900	E	897	1.00	E	779	0.87

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2015 + Phase 1					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
Other MTS	Telegraph between 20th St. and 27th St.	NB	900	1	900	C	578	0.64	E	890	0.99
		SB	900	1	900	E	779	0.87	D	674	0.75

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2015 + Project					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
Other MTS	Telegraph between 20th St. and 27th St.	NB	900	1	900	C	582	0.65	F	913	1.01
		SB	900	1	900	E	793	0.88	D	680	0.76

Type	Segment	Direction	Capacity (vphpl)	Lanes	Capacity (vph)	2030 + Project					
						AM Peak Hour			PM Peak Hour		
						LOS	Volume	v/c	LOS	Volume	v/c
Other MTS	Telegraph between 20th St. and 27th St.	NB	900	1	900	D	694	0.77	F	1,114	1.24
		SB	900	1	900	F	911	1.01	E	787	0.87

17: 21st Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	190	56	50	51	0	0	0	0	154	400	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.94						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.99	
Satd. Flow (prot)		1863	1341		1712						3337	
Flt Permitted		1.00	1.00		0.63						0.99	
Satd. Flow (perm)		1863	1341		1100						3337	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	207	61	54	55	0	0	0	0	167	435	33
RTOR Reduction (vph)	0	0	50	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	207	11	0	109	0	0	0	0	0	633	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		14.8	14.8		14.8						57.2	
Effective Green, g (s)		14.8	14.8		14.8						57.2	
Actuated g/C Ratio		0.18	0.18		0.18						0.72	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		345	248		204						2386	
v/s Ratio Prot		c0.11										
v/s Ratio Perm			0.01		0.10						0.19	
v/c Ratio		0.60	0.05		0.53						0.27	
Uniform Delay, d1		29.9	26.8		29.5						4.0	
Progression Factor		1.00	1.00		1.00						0.71	
Incremental Delay, d2		2.9	0.1		2.7						0.3	
Delay (s)		32.8	26.9		32.2						3.1	
Level of Service		C	C		C						A	
Approach Delay (s)		31.5			32.2			0.0			3.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

18: 21st Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	172	4	0	39	34	10	202	81	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.94			0.96				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.96				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1847			1643			3254				
Flt Permitted		0.99			1.00			1.00				
Satd. Flow (perm)		1839			1643			3254				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	187	4	0	42	37	11	220	88	0	0	0
RTOR Reduction (vph)	0	1	0	0	13	0	0	73	0	0	0	0
Lane Group Flow (vph)	0	198	0	0	66	0	0	246	0	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		29.3			29.3			7.7				
Effective Green, g (s)		29.3			29.3			7.7				
Actuated g/C Ratio		0.65			0.65			0.17				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1197			1070			557				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.11						0.08				
v/c Ratio		0.17			0.06			0.44				
Uniform Delay, d1		3.1			2.9			16.7				
Progression Factor		0.82			1.00			1.00				
Incremental Delay, d2		0.3			0.1			0.2				
Delay (s)		2.8			3.0			16.9				
Level of Service		A			A			B				
Approach Delay (s)		2.8			3.0			16.9			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

22: 20th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	277	0	0	252	86	32	190	94	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3512			3366	1337		3486	1459			
Flt Permitted		0.91			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3225			3366	1337		3486	1459			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	301	0	0	274	93	35	207	102	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	19	0	0	88	0	0	0
Lane Group Flow (vph)	0	331	0	0	282	65	0	242	14	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		62.0			62.0	62.0		11.0	11.0			
Effective Green, g (s)		62.0			62.0	62.0		11.0	11.0			
Actuated g/C Ratio		0.78			0.78	0.78		0.14	0.14			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2499			2609	1036		479	201			
v/s Ratio Prot					0.08							
v/s Ratio Perm		c0.10				0.05		0.07	0.01			
v/c Ratio		0.13			0.11	0.06		0.51	0.07			
Uniform Delay, d1		2.3			2.2	2.1		32.0	30.0			
Progression Factor		1.00			0.49	0.09		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		0.8	0.1			
Delay (s)		2.4			1.2	0.3		32.8	30.2			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.4			1.0			32.0			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

23: 20th Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	226	150	158	249	0	0	0	0	67	340	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.90	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.95	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1422	1610	3350						3336	1091
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1422	1610	3148						3336	1091
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	246	158	172	271	0	0	0	0	73	370	97
RTOR Reduction (vph)	0	0	112	0	0	0	0	0	0	0	0	59
Lane Group Flow (vph)	0	246	46	143	300	0	0	0	0	0	443	38
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	31.0
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	31.0
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	0.39
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		929	373	322	1654						1293	423
v/s Ratio Prot		c0.07		c0.09	0.04							
v/s Ratio Perm			0.03		0.06						0.13	0.03
v/c Ratio		0.26	0.12	0.44	0.18						0.34	0.09
Uniform Delay, d1		23.4	22.5	28.1	10.5						17.3	15.5
Progression Factor		1.08	1.76	1.26	1.75						1.13	1.82
Incremental Delay, d2		0.7	0.7	0.3	0.0						0.1	0.0
Delay (s)		25.9	40.2	35.7	18.3						19.6	28.3
Level of Service		C	D	D	B						B	C
Approach Delay (s)		31.5			23.9			0.0			21.2	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰↑↱	
Volume (vph)	0	203	102	75	170	0	0	0	0	51	521	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.97						0.98	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						1.00	
Satd. Flow (prot)		1863	1435		1786						3380	
Flt Permitted		1.00	1.00		0.74						1.00	
Satd. Flow (perm)		1863	1435		1339						3380	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	221	111	82	185	0	0	0	0	55	537	32
RTOR Reduction (vph)	0	0	21	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	221	90	0	267	0	0	0	0	0	621	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		20.7	20.7		20.7						51.3	
Effective Green, g (s)		20.7	20.7		20.7						51.3	
Actuated g/C Ratio		0.26	0.26		0.26						0.64	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		482	371		346						2167	
v/s Ratio Prot		0.12										
v/s Ratio Perm			0.06		c0.20						0.18	
v/c Ratio		0.46	0.24		0.77						0.29	
Uniform Delay, d1		24.9	23.5		27.5						6.3	
Progression Factor		1.00	1.00		1.00						1.23	
Incremental Delay, d2		0.7	0.3		10.2						0.3	
Delay (s)		25.6	23.8		37.7						8.1	
Level of Service		C	C		D						A	
Approach Delay (s)		25.0			37.7			0.0			8.1	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↰↑↱				
Volume (vph)	13	106	1	0	102	72	21	342	181	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.97			0.94				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.95				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1841			1706			3134				
Flt Permitted		0.97			1.00			1.00				
Satd. Flow (perm)		1800			1706			3134				
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	14	115	1	0	111	78	23	368	197	0	0	0
RTOR Reduction (vph)	0	0	0	0	32	0	0	151	0	0	0	0
Lane Group Flow (vph)	0	130	0	0	157	0	0	437	0	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		26.5			26.5			10.5				
Effective Green, g (s)		26.5			26.5			10.5				
Actuated g/C Ratio		0.59			0.59			0.23				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1060			1005			731				
v/s Ratio Prot					c0.09							
v/s Ratio Perm		0.07						0.14				
v/c Ratio		0.12			0.16			0.60				
Uniform Delay, d1		4.1			4.2			15.4				
Progression Factor		0.44			1.00			1.00				
Incremental Delay, d2		0.2			0.3			0.9				
Delay (s)		2.0			4.5			16.2				
Level of Service		A			A			B				
Approach Delay (s)		2.0			4.5			16.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑			↑↑↱	↱		↰↑↑	↱			
Volume (vph)	38	331	0	0	389	97	65	391	257	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3510			3372	1319		3482	1459			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3118			3372	1319		3482	1459			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	41	360	0	0	423	103	71	425	276	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	29	0	0	213	0	0	0
Lane Group Flow (vph)	0	401	0	0	432	64	0	496	63	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		54.8			54.8	54.8		18.2	18.2			
Effective Green, g (s)		54.8			54.8	54.8		18.2	18.2			
Actuated g/C Ratio		0.68			0.68	0.68		0.23	0.23			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2136			2310	904		792	332			
v/s Ratio Prot					0.13							
v/s Ratio Perm		c0.13				0.05		0.14	0.04			
v/c Ratio		0.19			0.19	0.07		0.63	0.19			
Uniform Delay, d1		4.6			4.6	4.2		27.8	24.9			
Progression Factor		1.00			0.86	0.63		1.00	1.00			
Incremental Delay, d2		0.2			0.2	0.1		1.6	0.3			
Delay (s)		4.7			4.1	2.8		29.4	25.2			
Level of Service		A			A	A		C	C			
Approach Delay (s)		4.7			3.8			27.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑↑						↰↑↑	↱
Volume (vph)	0	408	178	141	366	0	0	0	0	82	522	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.91	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1439	1610	3376						3372	1094
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1439	1610	3196						3372	1094
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	443	193	153	398	0	0	0	0	89	567	129
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	0	81
Lane Group Flow (vph)	0	443	148	138	413	0	0	0	0	0	656	48
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	30.0
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	30.0
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	0.38
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		1239	504	201	1700						1265	410
v/s Ratio Prot		c0.13		c0.09	0.03							
v/s Ratio Perm			0.10		0.10						0.19	0.04
v/c Ratio		0.36	0.29	0.69	0.24						0.52	0.12
Uniform Delay, d1		19.3	18.8	33.5	10.3						19.4	16.3
Progression Factor		1.06	1.08	1.00	1.00						1.32	3.03
Incremental Delay, d2		0.8	1.4	7.5	0.0						0.1	0.0
Delay (s)		21.3	21.9	41.0	10.4						25.8	49.5
Level of Service		C	C	D	B						C	D
Approach Delay (s)		21.4			18.0			0.0			29.7	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	227	67	59	61	0	0	0	0	184	477	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.95						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.99	
Satd. Flow (prot)		1863	1341		1724						3337	
Flt Permitted		1.00	1.00		0.56						0.99	
Satd. Flow (perm)		1863	1341		992						3337	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	247	73	64	66	0	0	0	0	200	518	39
RTOR Reduction (vph)	0	0	42	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	247	31	0	130	0	0	0	0	0	755	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		16.7	16.7		16.7						55.3	
Effective Green, g (s)		16.7	16.7		16.7						55.3	
Actuated g/C Ratio		0.21	0.21		0.21						0.69	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		389	280		207						2307	
v/s Ratio Prot		c0.13										
v/s Ratio Perm			0.02		0.13						0.23	
v/c Ratio		0.63	0.11		0.63						0.33	
Uniform Delay, d1		28.9	25.6		28.8						4.9	
Progression Factor		1.00	1.00		1.00						0.84	
Incremental Delay, d2		3.4	0.2		5.8						0.3	
Delay (s)		32.2	25.8		34.7						4.5	
Level of Service		C	C		C						A	
Approach Delay (s)		30.8			34.7			0.0			4.5	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	198	4	0	45	39	12	242	96	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.94			0.96				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.96				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1848			1647			3256				
Flt Permitted		0.99			1.00			1.00				
Satd. Flow (perm)		1840			1647			3256				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	215	4	0	49	42	13	263	104	0	0	0
RTOR Reduction (vph)	0	1	0	0	15	0	0	85	0	0	0	0
Lane Group Flow (vph)	0	227	0	0	76	0	0	295	0	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		28.7			28.7			8.3				
Effective Green, g (s)		28.7			28.7			8.3				
Actuated g/C Ratio		0.64			0.64			0.18				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1174			1050			601				
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.12						0.09				
v/c Ratio		0.19			0.07			0.49				
Uniform Delay, d1		3.4			3.1			16.5				
Progression Factor		0.75			1.00			1.00				
Incremental Delay, d2		0.4			0.1			0.2				
Delay (s)		2.9			3.2			16.7				
Level of Service		A			A			B				
Approach Delay (s)		2.9			3.2			16.7			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	330	0	0	301	102	39	227	113	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3513			3366	1337		3485	1461			
Flt Permitted		0.91			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3197			3366	1337		3485	1461			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	359	0	0	327	111	42	247	123	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	24	0	0	104	0	0	0
Lane Group Flow (vph)	0	394	0	0	337	76	0	289	19	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		60.7			60.7	60.7		12.3	12.3			
Effective Green, g (s)		60.7			60.7	60.7		12.3	12.3			
Actuated g/C Ratio		0.76			0.76	0.76		0.15	0.15			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2426			2554	1014		536	225			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.12				0.06		0.08	0.01			
v/c Ratio		0.16			0.13	0.07		0.54	0.08			
Uniform Delay, d1		2.7			2.6	2.5		31.2	29.0			
Progression Factor		1.00			0.48	0.26		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		1.0	0.2			
Delay (s)		2.8			1.3	0.8		32.3	29.2			
Level of Service		A			A	A		C	C			
Approach Delay (s)		2.8			1.2			31.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	270	179	188	298	0	0	0	0	80	406	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.90	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.95	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1422	1610	3354						3336	1091
Flt Permitted		1.00	1.00	0.95	0.93						0.99	1.00
Satd. Flow (perm)		3539	1422	1610	3134						3336	1091
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	293	188	204	324	0	0	0	0	87	441	116
RTOR Reduction (vph)	0	0	91	0	0	0	0	0	0	0	0	71
Lane Group Flow (vph)	0	293	97	171	357	0	0	0	0	0	528	45
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	31.0
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	31.0
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	0.39
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		929	373	322	1650						1293	423
v/s Ratio Prot		c0.08		c0.11	0.04							
v/s Ratio Perm			0.07		0.07						0.16	0.04
v/c Ratio		0.32	0.26	0.53	0.22						0.41	0.11
Uniform Delay, d1		23.7	23.4	28.6	10.7						17.8	15.7
Progression Factor		1.02	1.22	1.17	1.93						1.14	2.03
Incremental Delay, d2		0.9	1.7	0.7	0.0						0.1	0.0
Delay (s)		25.1	30.3	34.3	20.6						20.4	31.9
Level of Service		C	C	C	C						C	C
Approach Delay (s)		27.1			25.0			0.0			22.4	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	24.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
17: 21st Street & Webster Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰↑↱	
Volume (vph)	0	250	126	92	209	0	0	0	0	62	640	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.98	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						1.00	
Satd. Flow (prot)		1863	1437		1792						3382	
Flt Permitted		1.00	1.00		0.70						1.00	
Satd. Flow (perm)		1863	1437		1270						3382	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	272	137	100	227	0	0	0	0	67	660	38
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	272	127	0	327	0	0	0	0	0	763	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		25.2	25.2		25.2						46.8	
Effective Green, g (s)		25.2	25.2		25.2						46.8	
Actuated g/C Ratio		0.32	0.32		0.32						0.58	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		587	453		400						1978	
v/s Ratio Prot		0.15										
v/s Ratio Perm			0.09		c0.26						0.23	
v/c Ratio		0.46	0.28		0.82						0.39	
Uniform Delay, d1		22.0	20.6		25.3						8.9	
Progression Factor		1.00	1.00		1.00						1.21	
Incremental Delay, d2		0.6	0.3		12.2						0.5	
Delay (s)		22.6	20.9		37.5						11.2	
Level of Service		C	C		D						B	
Approach Delay (s)		22.0			37.5			0.0			11.2	
Approach LOS		C			D			A			B	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
18: 21st Street & Franklin Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↑↱			↰↑↱				
Volume (vph)	15	122	1	0	116	83	25	420	223	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.97			0.94				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.95				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1842			1705			3142				
Flt Permitted		0.97			1.00			1.00				
Satd. Flow (perm)		1795			1705			3142				
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	16	133	1	0	126	90	27	452	242	0	0	0
RTOR Reduction (vph)	0	0	0	0	40	0	0	177	0	0	0	0
Lane Group Flow (vph)	0	150	0	0	176	0	0	544	0	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		25.0			25.0			12.0				
Effective Green, g (s)		25.0			25.0			12.0				
Actuated g/C Ratio		0.56			0.56			0.27				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		997			947			838				
v/s Ratio Prot					c0.10							
v/s Ratio Perm		0.08						0.17				
v/c Ratio		0.15			0.19			0.65				
Uniform Delay, d1		4.8			5.0			14.6				
Progression Factor		0.46			1.00			1.00				
Incremental Delay, d2		0.3			0.4			1.3				
Delay (s)		2.5			5.4			15.9				
Level of Service		A			A			B				
Approach Delay (s)		2.5			5.4			15.9			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	12.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
22: 20th Street & Franklin Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑			↑↑	↱		↰↑	↱			
Volume (vph)	46	406	0	0	478	119	80	481	315	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		0.99			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3512			3371	1319		3482	1460			
Flt Permitted		0.86			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3046			3371	1319		3482	1460			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	50	441	0	0	520	127	87	523	339	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	41	0	0	159	0	0	0
Lane Group Flow (vph)	0	491	0	0	532	73	0	610	180	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		51.5			51.5	51.5		21.5	21.5			
Effective Green, g (s)		51.5			51.5	51.5		21.5	21.5			
Actuated g/C Ratio		0.64			0.64	0.64		0.27	0.27			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		1961			2170	849		936	392			
v/s Ratio Prot					0.16							
v/s Ratio Perm		c0.16				0.06		0.18	0.12			
v/c Ratio		0.25			0.24	0.09		0.65	0.46			
Uniform Delay, d1		6.1			6.0	5.4		25.9	24.4			
Progression Factor		1.00			0.73	0.25		1.00	1.00			
Incremental Delay, d2		0.3			0.2	0.2		1.6	0.9			
Delay (s)		6.4			4.6	1.5		27.6	25.3			
Level of Service		A			A	A		C	C			
Approach Delay (s)		6.4			4.1			26.7			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
23: 20th Street & Webster Street
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑↑						↰↑↑	↱
Volume (vph)	0	502	218	174	449	0	0	0	0	100	642	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.91	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1439	1610	3377						3372	1094
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1439	1610	3178						3372	1094
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	546	237	189	488	0	0	0	0	109	698	159
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	0	0	0	99
Lane Group Flow (vph)	0	546	206	170	507	0	0	0	0	0	807	60
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	30.0
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	30.0
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	0.38
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		1239	504	201	1693						1265	410
v/s Ratio Prot		c0.15		c0.11	0.04							
v/s Ratio Perm			0.14		0.12						0.24	0.05
v/c Ratio		0.44	0.41	0.85	0.30						0.64	0.15
Uniform Delay, d1		20.0	19.7	34.2	10.7						20.5	16.5
Progression Factor		1.03	1.03	1.00	1.00						1.29	3.07
Incremental Delay, d2		1.1	2.4	25.6	0.0						0.8	0.1
Delay (s)		21.7	22.7	59.8	10.7						27.3	50.7
Level of Service		C	C	E	B						C	D
Approach Delay (s)		22.0			23.1			0.0			31.1	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	283	56	50	56	0	0	0	0	228	400	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.96						0.96	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1342		1744						3296	
Flt Permitted		1.00	1.00		0.58						0.98	
Satd. Flow (perm)		1863	1342		1041						3296	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	308	61	54	61	0	0	0	0	248	435	33
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	308	15	0	115	0	0	0	0	0	714	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		19.8	19.8		19.8						52.2	
Effective Green, g (s)		19.8	19.8		19.8						52.2	
Actuated g/C Ratio		0.25	0.25		0.25						0.65	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		461	332		258						2151	
v/s Ratio Prot		c0.17										
v/s Ratio Perm			0.01		0.11						0.22	
v/c Ratio		0.67	0.05		0.45						0.33	
Uniform Delay, d1		27.1	22.9		25.5						6.2	
Progression Factor		1.00	1.00		1.00						0.72	
Incremental Delay, d2		3.7	0.1		1.2						0.4	
Delay (s)		30.8	23.0		26.7						4.8	
Level of Service		C	C		C						A	
Approach Delay (s)		29.5			26.7			0.0			4.8	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	213	4	0	40	38	10	204	133	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.94			0.95				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.93			0.94				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1850			1635			3155				
Flt Permitted		0.99			1.00			1.00				
Satd. Flow (perm)		1843			1635			3155				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	232	4	0	43	41	11	222	145	0	0	0
RTOR Reduction (vph)	0	1	0	0	15	0	0	119	0	0	0	0
Lane Group Flow (vph)	0	243	0	0	69	0	0	259	0	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		29.0			29.0			8.0				
Effective Green, g (s)		29.0			29.0			8.0				
Actuated g/C Ratio		0.64			0.64			0.18				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1188			1054			561				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.13						0.08				
v/c Ratio		0.20			0.07			0.46				
Uniform Delay, d1		3.3			3.0			16.6				
Progression Factor		0.52			1.00			1.00				
Incremental Delay, d2		0.4			0.1			0.2				
Delay (s)		2.1			3.1			16.8				
Level of Service		A			A			B				
Approach Delay (s)		2.1			3.1			16.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	313	0	0	257	88	32	242	96	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3515			3364	1337		3496	1462			
Flt Permitted		0.92			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3237			3364	1337		3496	1462			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	340	0	0	279	96	35	263	104	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	21	0	0	88	0	0	0
Lane Group Flow (vph)	0	370	0	0	288	65	0	298	16	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		60.6			60.6	60.6		12.4	12.4			
Effective Green, g (s)		60.6			60.6	60.6		12.4	12.4			
Actuated g/C Ratio		0.76			0.76	0.76		0.16	0.16			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2452			2548	1013		542	227			
v/s Ratio Prot					0.09							
v/s Ratio Perm		c0.11				0.05		0.09	0.01			
v/c Ratio		0.15			0.11	0.06		0.55	0.07			
Uniform Delay, d1		2.7			2.6	2.5		31.2	28.9			
Progression Factor		1.00			2.00	4.21		1.00	1.00			
Incremental Delay, d2		0.1			0.1	0.1		1.1	0.1			
Delay (s)		2.8			5.2	10.5		32.4	29.0			
Level of Service		A			A	B		C	C			
Approach Delay (s)		2.8			6.5			31.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	264	150	159	256	0	0	0	0	67	340	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.90	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.95	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1422	1610	3354						3336	1091
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1422	1610	3152						3336	1091
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	287	158	173	278	0	0	0	0	73	370	97
RTOR Reduction (vph)	0	0	111	0	0	0	0	0	0	0	0	59
Lane Group Flow (vph)	0	287	47	145	306	0	0	0	0	0	443	38
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	31.0
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	31.0
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	0.39
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		929	373	322	1656						1293	423
v/s Ratio Prot		c0.08		c0.09	0.04							
v/s Ratio Perm			0.03		0.06						0.13	0.03
v/c Ratio		0.31	0.13	0.45	0.18						0.34	0.09
Uniform Delay, d1		23.7	22.5	28.1	10.5						17.3	15.5
Progression Factor		1.04	1.67	1.48	0.47						1.13	1.86
Incremental Delay, d2		0.9	0.7	0.3	0.0						0.1	0.0
Delay (s)		25.5	38.3	42.1	5.0						19.6	28.9
Level of Service		C	D	D	A						B	C
Approach Delay (s)		30.1			16.9			0.0			21.3	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

17: 21st Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰↑↱	
Volume (vph)	0	220	102	75	204	0	0	0	0	65	521	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1436		1797						3360	
Flt Permitted		1.00	1.00		0.77						0.99	
Satd. Flow (perm)		1863	1436		1398						3360	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	239	111	82	222	0	0	0	0	71	537	32
RTOR Reduction (vph)	0	0	20	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	239	91	0	304	0	0	0	0	0	637	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		22.9	22.9		22.9						49.1	
Effective Green, g (s)		22.9	22.9		22.9						49.1	
Actuated g/C Ratio		0.29	0.29		0.29						0.61	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		533	411		400						2062	
v/s Ratio Prot		0.13										
v/s Ratio Perm			0.06		c0.22						0.19	
v/c Ratio		0.45	0.22		0.76						0.31	
Uniform Delay, d1		23.4	21.8		26.0						7.4	
Progression Factor		1.00	1.00		1.00						1.25	
Incremental Delay, d2		0.6	0.3		8.3						0.4	
Delay (s)		24.0	22.0		34.3						9.6	
Level of Service		C	C		C						A	
Approach Delay (s)		23.4			34.3			0.0			9.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

18: 21st Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↰↑↱				
Volume (vph)	13	113	1	0	109	99	21	358	191	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.97			0.94				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.95				
Flt Protected		0.99			1.00			1.00				
Satd. Flow (prot)		1843			1682			3134				
Flt Permitted		0.97			1.00			1.00				
Satd. Flow (perm)		1800			1682			3134				
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	14	123	1	0	118	108	23	385	208	0	0	0
RTOR Reduction (vph)	0	0	0	0	45	0	0	158	0	0	0	0
Lane Group Flow (vph)	0	138	0	0	181	0	0	458	0	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		26.2			26.2			10.8				
Effective Green, g (s)		26.2			26.2			10.8				
Actuated g/C Ratio		0.58			0.58			0.24				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1048			979			752				
v/s Ratio Prot					c0.11							
v/s Ratio Perm		0.08						0.15				
v/c Ratio		0.13			0.18			0.61				
Uniform Delay, d1		4.3			4.4			15.2				
Progression Factor		0.44			1.00			1.00				
Incremental Delay, d2		0.2			0.4			1.0				
Delay (s)		2.1			4.8			16.2				
Level of Service		A			A			B				
Approach Delay (s)		2.1			4.8			16.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

22: 20th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑			↑↱	↱		↰↑↑	↱			
Volume (vph)	38	338	0	0	421	113	65	401	257	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3512			3370	1319		3483	1459			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3107			3370	1319		3483	1459			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	41	367	0	0	458	120	71	436	276	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	34	0	0	211	0	0	0
Lane Group Flow (vph)	0	408	0	0	469	74	0	507	65	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		54.6			54.6	54.6		18.4	18.4			
Effective Green, g (s)		54.6			54.6	54.6		18.4	18.4			
Actuated g/C Ratio		0.68			0.68	0.68		0.23	0.23			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2121			2300	900		801	336			
v/s Ratio Prot					c0.14							
v/s Ratio Perm		0.13				0.06		0.15	0.04			
v/c Ratio		0.19			0.20	0.08		0.63	0.19			
Uniform Delay, d1		4.6			4.7	4.3		27.8	24.8			
Progression Factor		1.00			0.82	0.52		1.00	1.00			
Incremental Delay, d2		0.2			0.2	0.2		1.6	0.3			
Delay (s)		4.8			4.0	2.4		29.4	25.1			
Level of Service		A			A	A		C	C			
Approach Delay (s)		4.8			3.7			27.9			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

23: 20th Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑↑						↰↑↑	↱
Volume (vph)	0	415	178	147	414	0	0	0	0	82	522	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	1.00	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.91	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1439	1610	3377						3372	1094
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1439	1610	3195						3372	1094
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	451	193	160	450	0	0	0	0	89	567	129
RTOR Reduction (vph)	0	0	43	0	0	0	0	0	0	0	0	81
Lane Group Flow (vph)	0	451	150	144	466	0	0	0	0	0	656	48
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	30.0
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	30.0
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	0.38
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		1239	504	201	1700						1265	410
v/s Ratio Prot		c0.13		c0.09	0.03							
v/s Ratio Perm			0.10		0.11						0.19	0.04
v/c Ratio		0.36	0.30	0.72	0.27						0.52	0.12
Uniform Delay, d1		19.4	18.9	33.6	10.5						19.4	16.3
Progression Factor		1.05	1.06	1.00	1.00						1.34	3.01
Incremental Delay, d2		0.8	1.5	9.7	0.0						0.1	0.0
Delay (s)		21.2	21.6	43.3	10.6						26.1	49.3
Level of Service		C	C	D	B						C	D
Approach Delay (s)		21.3			18.3			0.0			29.9	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰↑↱	
Volume (vph)	0	354	65	50	64	0	0	0	0	285	412	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.97						0.95	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1342		1766						3275	
Flt Permitted		1.00	1.00		0.57						0.98	
Satd. Flow (perm)		1863	1342		1035						3275	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	385	71	54	70	0	0	0	0	310	448	33
RTOR Reduction (vph)	0	0	46	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	385	25	0	124	0	0	0	0	0	789	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		23.8	23.8		23.8						48.2	
Effective Green, g (s)		23.8	23.8		23.8						48.2	
Actuated g/C Ratio		0.30	0.30		0.30						0.60	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		554	399		308						1973	
v/s Ratio Prot		c0.21										
v/s Ratio Perm			0.02		0.12						0.24	
v/c Ratio		0.69	0.06		0.40						0.40	
Uniform Delay, d1		24.9	20.1		22.4						8.3	
Progression Factor		1.00	1.00		1.00						0.79	
Incremental Delay, d2		3.8	0.1		0.9						0.5	
Delay (s)		28.7	20.2		23.3						7.1	
Level of Service		C	C		C						A	
Approach Delay (s)		27.3			23.3			0.0			7.1	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↱			↰↑↱				
Volume (vph)	7	253	4	0	43	43	10	213	173	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.94			0.94				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.93			0.93				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1852			1629			3108				
Flt Permitted		1.00			1.00			1.00				
Satd. Flow (perm)		1846			1629			3108				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	8	275	4	0	47	47	11	232	188	0	0	0
RTOR Reduction (vph)	0	1	0	0	17	0	0	154	0	0	0	0
Lane Group Flow (vph)	0	286	0	0	77	0	0	277	0	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		28.8			28.8			8.2				
Effective Green, g (s)		28.8			28.8			8.2				
Actuated g/C Ratio		0.64			0.64			0.18				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1181			1043			566				
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.16						0.09				
v/c Ratio		0.24			0.07			0.49				
Uniform Delay, d1		3.5			3.1			16.5				
Progression Factor		0.49			1.00			1.00				
Incremental Delay, d2		0.5			0.1			0.2				
Delay (s)		2.2			3.2			16.8				
Level of Service		A			A			B				
Approach Delay (s)		2.2			3.2			16.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑			↑↑↱	↱		↰↑↑	↱			
Volume (vph)	29	350	0	0	261	90	35	289	113	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3517			3365	1336		3499	1463			
Flt Permitted		0.92			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3248			3365	1336		3499	1463			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	380	0	0	284	98	38	314	123	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	23	0	0	102	0	0	0
Lane Group Flow (vph)	0	410	0	0	293	65	0	352	21	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		59.3			59.3	59.3		13.7	13.7			
Effective Green, g (s)		59.3			59.3	59.3		13.7	13.7			
Actuated g/C Ratio		0.74			0.74	0.74		0.17	0.17			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2408			2494	990		599	251			
v/s Ratio Prot					0.09							
v/s Ratio Perm		c0.13				0.05		0.10	0.01			
v/c Ratio		0.17			0.12	0.07		0.59	0.08			
Uniform Delay, d1		3.1			2.9	2.8		30.5	27.9			
Progression Factor		1.00			1.95	4.01		1.00	1.00			
Incremental Delay, d2		0.2			0.1	0.1		1.5	0.1			
Delay (s)		3.2			5.8	11.4		32.0	28.0			
Level of Service		A			A	B		C	C			
Approach Delay (s)		3.2			7.1			31.0			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑↑						↰↑↑	↱
Volume (vph)	0	301	167	194	259	0	0	0	0	67	361	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.90	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.95	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	0.99						0.99	1.00
Satd. Flow (prot)		3539	1422	1610	3334						3346	1091
Flt Permitted		1.00	1.00	0.95	0.89						0.99	1.00
Satd. Flow (perm)		3539	1422	1610	2995						3346	1091
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	327	176	211	282	0	0	0	0	73	392	97
RTOR Reduction (vph)	0	0	94	0	0	0	0	0	0	0	0	59
Lane Group Flow (vph)	0	327	82	160	333	0	0	0	0	0	465	38
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	31.0
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	31.0
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	0.39
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		929	373	322	1603						1297	423
v/s Ratio Prot		c0.09		c0.10	0.04							
v/s Ratio Perm			0.06		0.06						0.14	0.03
v/c Ratio		0.35	0.22	0.50	0.21						0.36	0.09
Uniform Delay, d1		24.0	23.1	28.4	10.6						17.4	15.5
Progression Factor		1.01	1.30	1.50	0.46						1.09	1.79
Incremental Delay, d2		1.0	1.4	0.4	0.0						0.1	0.0
Delay (s)		25.3	31.4	43.0	4.9						19.1	27.8
Level of Service		C	C	D	A						B	C
Approach Delay (s)		27.5			17.3			0.0			20.6	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
17: 21st Street & Webster Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰↑↱	
Volume (vph)	0	237	103	75	238	0	0	0	0	78	529	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1436		1805						3345	
Flt Permitted		1.00	1.00		0.79						0.99	
Satd. Flow (perm)		1863	1436		1442						3345	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	258	112	82	259	0	0	0	0	85	545	32
RTOR Reduction (vph)	0	0	19	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	258	93	0	341	0	0	0	0	0	660	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		25.0	25.0		25.0						47.0	
Effective Green, g (s)		25.0	25.0		25.0						47.0	
Actuated g/C Ratio		0.31	0.31		0.31						0.59	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		582	449		451						1965	
v/s Ratio Prot		0.14										
v/s Ratio Perm			0.07		c0.24						0.20	
v/c Ratio		0.44	0.21		0.76						0.34	
Uniform Delay, d1		21.9	20.2		24.8						8.5	
Progression Factor		1.00	1.00		1.00						1.26	
Incremental Delay, d2		0.5	0.2		7.1						0.4	
Delay (s)		22.5	20.5		31.8						11.1	
Level of Service		C	C		C						B	
Approach Delay (s)		21.9			31.8			0.0			11.1	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
18: 21st Street & Franklin Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↱			↰↑↱				
Volume (vph)	13	121	1	0	134	108	21	380	200	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.97			0.94				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.95				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1844			1694			3140				
Flt Permitted		0.97			1.00			1.00				
Satd. Flow (perm)		1799			1694			3140				
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	14	132	1	0	146	117	23	409	217	0	0	0
RTOR Reduction (vph)	0	0	0	0	45	0	0	163	0	0	0	0
Lane Group Flow (vph)	0	147	0	0	218	0	0	486	0	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		25.9			25.9			11.1				
Effective Green, g (s)		25.9			25.9			11.1				
Actuated g/C Ratio		0.58			0.58			0.25				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1035			975			775				
v/s Ratio Prot					c0.13							
v/s Ratio Perm		0.08						0.15				
v/c Ratio		0.14			0.22			0.63				
Uniform Delay, d1		4.4			4.7			15.1				
Progression Factor		0.48			1.00			1.00				
Incremental Delay, d2		0.3			0.5			1.1				
Delay (s)		2.4			5.2			16.2				
Level of Service		A			A			B				
Approach Delay (s)		2.4			5.2			16.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
22: 20th Street & Franklin Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↱	↱		↰↑	↱			
Volume (vph)	38	346	0	0	453	129	80	417	298	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3513			3368	1319		3475	1460			
Flt Permitted		0.88			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3096			3368	1319		3475	1460			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	41	376	0	0	492	137	87	453	320	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	41	0	0	201	0	0	0
Lane Group Flow (vph)	0	417	0	0	505	82	0	540	119	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		53.4			53.4	53.4		19.6	19.6			
Effective Green, g (s)		53.4			53.4	53.4		19.6	19.6			
Actuated g/C Ratio		0.67			0.67	0.67		0.25	0.25			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2067			2248	880		851	358			
v/s Ratio Prot					c0.15							
v/s Ratio Perm		0.13				0.06		0.16	0.08			
v/c Ratio		0.20			0.22	0.09		0.63	0.33			
Uniform Delay, d1		5.1			5.2	4.7		27.0	24.8			
Progression Factor		1.00			0.79	0.39		1.00	1.00			
Incremental Delay, d2		0.2			0.2	0.2		1.6	0.6			
Delay (s)		5.3			4.3	2.0		28.6	25.4			
Level of Service		A			A	A		C	C			
Approach Delay (s)		5.3			3.9			27.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
23: 20th Street & Webster Street — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑						↰↑	↱
Volume (vph)	0	450	192	157	462	0	0	0	0	82	531	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.91	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1439	1610	3378						3374	1094
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1439	1610	3193						3374	1094
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	489	209	171	502	0	0	0	0	89	577	129
RTOR Reduction (vph)	0	0	38	0	0	0	0	0	0	0	0	81
Lane Group Flow (vph)	0	489	171	154	519	0	0	0	0	0	666	48
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	30.0
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	30.0
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	0.38
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		1239	504	201	1699						1265	410
v/s Ratio Prot		c0.14		c0.10	0.04							
v/s Ratio Perm			0.12		0.12						0.20	0.04
v/c Ratio		0.39	0.34	0.77	0.31						0.53	0.12
Uniform Delay, d1		19.6	19.2	33.9	10.7						19.5	16.3
Progression Factor		1.06	1.08	1.00	1.00						1.34	2.98
Incremental Delay, d2		0.9	1.8	14.4	0.0						0.2	0.0
Delay (s)		21.7	22.4	48.3	10.8						26.4	48.8
Level of Service		C	C	D	B						C	D
Approach Delay (s)		21.9			19.4			0.0			30.0	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

17: 21st Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰↑↱	
Volume (vph)	0	391	76	59	74	0	0	0	0	315	489	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.85		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.97						0.96	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.98						0.98	
Satd. Flow (prot)		1863	1343		1770						3284	
Flt Permitted		1.00	1.00		0.53						0.98	
Satd. Flow (perm)		1863	1343		956						3284	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	425	83	64	80	0	0	0	0	342	532	39
RTOR Reduction (vph)	0	0	33	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	425	50	0	144	0	0	0	0	0	911	0
Confl. Peds. (#/hr)	106		106	134		134	73		73	52		52
Confl. Bikes (#/hr)			3			7			21			1
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		26.0	26.0		26.0						46.0	
Effective Green, g (s)		26.0	26.0		26.0						46.0	
Actuated g/C Ratio		0.32	0.32		0.32						0.57	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		605	436		311						1888	
v/s Ratio Prot		c0.23										
v/s Ratio Perm			0.04		0.15						0.28	
v/c Ratio		0.70	0.11		0.46						0.48	
Uniform Delay, d1		23.6	18.9		21.5						10.0	
Progression Factor		1.00	1.00		1.00						0.90	
Incremental Delay, d2		3.7	0.1		1.1						0.7	
Delay (s)		27.3	19.0		22.5						9.7	
Level of Service		C	B		C						A	
Approach Delay (s)		26.0			22.5			0.0			9.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

18: 21st Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↱			↰↑↱				
Volume (vph)	8	279	4	0	49	48	12	253	188	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.94			0.95				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.93			0.94				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1852			1631			3129				
Flt Permitted		0.99			1.00			1.00				
Satd. Flow (perm)		1846			1631			3129				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	303	4	0	53	52	13	275	204	0	0	0
RTOR Reduction (vph)	0	1	0	0	19	0	0	164	0	0	0	0
Lane Group Flow (vph)	0	315	0	0	86	0	0	328	0	0	0	0
Confl. Peds. (#/hr)	58		58	134		134	73		73	87		87
Confl. Bikes (#/hr)						5			5			2
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		28.2			28.2			8.8				
Effective Green, g (s)		28.2			28.2			8.8				
Actuated g/C Ratio		0.63			0.63			0.20				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1157			1022			612				
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.17						0.10				
v/c Ratio		0.27			0.08			0.54				
Uniform Delay, d1		3.8			3.3			16.3				
Progression Factor		0.52			1.00			1.00				
Incremental Delay, d2		0.5			0.2			0.5				
Delay (s)		2.5			3.5			16.7				
Level of Service		A			A			B				
Approach Delay (s)		2.5			3.5			16.7			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	10.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

22: 20th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑			↑↑	↱		↰↑↑	↱			
Volume (vph)	34	403	0	0	310	106	42	326	132	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.93		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			0.99	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3518			3364	1336		3496	1464			
Flt Permitted		0.91			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3220			3364	1336		3496	1464			
Peak-hour factor, PHF	0.96	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	438	0	0	337	115	46	354	143	0	0	0
RTOR Reduction (vph)	0	0	0	0	1	28	0	0	116	0	0	0
Lane Group Flow (vph)	0	473	0	0	348	75	0	400	27	0	0	0
Confl. Peds. (#/hr)	40		40	45		45	51		51	207		207
Confl. Bikes (#/hr)			5			6			8			12
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		58.0			58.0	58.0		15.0	15.0			
Effective Green, g (s)		58.0			58.0	58.0		15.0	15.0			
Actuated g/C Ratio		0.72			0.72	0.72		0.19	0.19			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		2335			2439	969		656	275			
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.15				0.06		0.11	0.02			
v/c Ratio		0.20			0.14	0.08		0.61	0.10			
Uniform Delay, d1		3.5			3.4	3.2		29.8	26.9			
Progression Factor		1.00			1.66	3.19		1.00	1.00			
Incremental Delay, d2		0.2			0.1	0.1		1.6	0.2			
Delay (s)		3.7			5.7	10.4		31.4	27.1			
Level of Service		A			A	B		C	C			
Approach Delay (s)		3.7			6.8			30.3			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM
Kaiser Center Transportation Study

23: 20th Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑↑						↰↑↑	↱
Volume (vph)	0	345	196	224	308	0	0	0	0	80	427	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.90	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	0.99						0.95	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	0.99						0.99	1.00
Satd. Flow (prot)		3539	1422	1610	3341						3345	1091
Flt Permitted		1.00	1.00	0.95	0.88						0.99	1.00
Satd. Flow (perm)		3539	1422	1610	2974						3345	1091
Peak-hour factor, PHF	0.92	0.92	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	375	206	243	335	0	0	0	0	87	464	116
RTOR Reduction (vph)	0	0	76	0	0	0	0	0	0	0	0	71
Lane Group Flow (vph)	0	375	130	187	391	0	0	0	0	0	551	45
Confl. Peds. (#/hr)	53		53	86		86	105		105	331		331
Confl. Bikes (#/hr)			16			2			1			14
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		21.0	21.0	16.0	41.0						31.0	31.0
Effective Green, g (s)		21.0	21.0	16.0	41.0						31.0	31.0
Actuated g/C Ratio		0.26	0.26	0.20	0.51						0.39	0.39
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		929	373	322	1598						1296	423
v/s Ratio Prot		c0.11		c0.12	0.05							
v/s Ratio Perm			0.09		0.08						0.16	0.04
v/c Ratio		0.40	0.35	0.58	0.24						0.43	0.11
Uniform Delay, d1		24.3	23.9	29.0	10.9						18.0	15.7
Progression Factor		0.96	1.04	1.52	0.56						1.04	1.91
Incremental Delay, d2		1.3	2.5	0.9	0.0						0.1	0.0
Delay (s)		24.7	27.4	45.0	6.2						18.7	30.0
Level of Service		C	C	D	A						B	C
Approach Delay (s)		25.7			18.7			0.0			20.7	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

17: 21st Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰↑						↰↑↱	
Volume (vph)	0	284	127	92	277	0	0	0	0	89	648	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0						4.0	
Lane Util. Factor		1.00	1.00		1.00						0.95	
Frpb, ped/bikes		1.00	0.91		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		0.98						0.97	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						0.99	
Satd. Flow (prot)		1863	1438		1807						3353	
Flt Permitted		1.00	1.00		0.75						0.99	
Satd. Flow (perm)		1863	1438		1367						3353	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.97	0.92
Adj. Flow (vph)	0	309	138	100	301	0	0	0	0	97	668	38
RTOR Reduction (vph)	0	0	9	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	309	129	0	401	0	0	0	0	0	800	0
Confl. Peds. (#/hr)	58		58	100		100	50		50	104		104
Confl. Bikes (#/hr)			8			6			10			28
Turn Type			Perm	Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases			4	4						2		
Actuated Green, G (s)		29.7	29.7		29.7						42.3	
Effective Green, g (s)		29.7	29.7		29.7						42.3	
Actuated g/C Ratio		0.37	0.37		0.37						0.53	
Clearance Time (s)		4.0	4.0		4.0						4.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		692	534		507						1773	
v/s Ratio Prot		0.17										
v/s Ratio Perm			0.09		c0.29						0.24	
v/c Ratio		0.45	0.24		0.79						0.45	
Uniform Delay, d1		19.0	17.4		22.4						11.7	
Progression Factor		1.00	1.00		1.00						1.22	
Incremental Delay, d2		0.5	0.2		8.2						0.7	
Delay (s)		19.4	17.6		30.6						15.0	
Level of Service		B	B		C						B	
Approach Delay (s)		18.9			30.6			0.0			15.0	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

18: 21st Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↱			↰↑↱				
Volume (vph)	15	137	1	0	148	119	25	458	242	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.95				
Frpb, ped/bikes		1.00			0.97			0.94				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.94			0.95				
Flt Protected		1.00			1.00			1.00				
Satd. Flow (prot)		1845			1694			3147				
Flt Permitted		0.97			1.00			1.00				
Satd. Flow (perm)		1792			1694			3147				
Peak-hour factor, PHF	0.92	0.92	0.92	0.25	0.92	0.92	0.92	0.93	0.92	0.25	0.25	0.25
Adj. Flow (vph)	16	149	1	0	161	129	27	492	263	0	0	0
RTOR Reduction (vph)	0	0	0	0	50	0	0	174	0	0	0	0
Lane Group Flow (vph)	0	166	0	0	240	0	0	608	0	0	0	0
Confl. Peds. (#/hr)	71		71	82		82	88		88	75		75
Confl. Bikes (#/hr)			8			2			40			1
Turn Type	Perm						Perm					
Protected Phases		2			2			1				
Permitted Phases	2						1					
Actuated Green, G (s)		24.1			24.1			12.9				
Effective Green, g (s)		24.1			24.1			12.9				
Actuated g/C Ratio		0.54			0.54			0.29				
Clearance Time (s)		4.0			4.0			4.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		960			907			902				
v/s Ratio Prot					c0.14							
v/s Ratio Perm		0.09						0.19				
v/c Ratio		0.17			0.26			0.67				
Uniform Delay, d1		5.3			5.7			14.2				
Progression Factor		0.55			1.00			1.00				
Incremental Delay, d2		0.4			0.7			1.6				
Delay (s)		3.3			6.4			15.8				
Level of Service		A			A			B				
Approach Delay (s)		3.3			6.4			15.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

22: 20th Street & Franklin Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↑			↑↑↱	↱		↰↑↑	↱			
Volume (vph)	46	421	0	0	542	151	95	507	356	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0			3.0	3.0		4.0	4.0			
Lane Util. Factor		0.95			0.91	0.91		0.95	1.00			
Frpb, ped/bikes		1.00			1.00	0.92		1.00	0.92			
Flpb, ped/bikes		1.00			1.00	1.00		0.99	1.00			
Frt		1.00			1.00	0.85		1.00	0.85			
Flt Protected		1.00			1.00	1.00		0.99	1.00			
Satd. Flow (prot)		3514			3369	1319		3477	1461			
Flt Permitted		0.86			1.00	1.00		0.99	1.00			
Satd. Flow (perm)		3020			3369	1319		3477	1461			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.94	0.92	0.92	0.93	0.92	0.92	0.92
Adj. Flow (vph)	50	458	0	0	589	161	103	551	383	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	55	0	0	145	0	0	0
Lane Group Flow (vph)	0	508	0	0	603	90	0	654	238	0	0	0
Confl. Peds. (#/hr)	42		42	54		54	58		58	194		194
Confl. Bikes (#/hr)			12			7			5			8
Turn Type	Perm					Perm	Perm		Perm			
Protected Phases		2			2			1				
Permitted Phases	2					2	1		1			
Actuated Green, G (s)		49.5			49.5	49.5		23.5	23.5			
Effective Green, g (s)		49.5			49.5	49.5		23.5	23.5			
Actuated g/C Ratio		0.62			0.62	0.62		0.29	0.29			
Clearance Time (s)		3.0			3.0	3.0		4.0	4.0			
Vehicle Extension (s)		3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)		1869			2085	816		1021	429			
v/s Ratio Prot					c0.18							
v/s Ratio Perm		0.17				0.07		0.19	0.16			
v/c Ratio		0.27			0.29	0.11		0.64	0.55			
Uniform Delay, d1		7.0			7.1	6.2		24.6	23.8			
Progression Factor		1.00			0.64	0.11		1.00	1.00			
Incremental Delay, d2		0.4			0.3	0.2		1.4	1.5			
Delay (s)		7.3			4.9	1.0		26.0	25.4			
Level of Service		A			A	A		C	C			
Approach Delay (s)		7.3			4.1			25.7			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

23: 20th Street & Webster Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↰↑↑						↰↑↑	↱
Volume (vph)	0	544	232	190	545	0	0	0	0	100	651	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		0.95	1.00	0.91	0.91						0.95	1.00
Frpb, ped/bikes		1.00	0.91	1.00	1.00						1.00	0.69
Flpb, ped/bikes		1.00	1.00	1.00	1.00						0.96	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.99	1.00
Satd. Flow (prot)		3539	1439	1610	3379						3374	1094
Flt Permitted		1.00	1.00	0.95	0.94						0.99	1.00
Satd. Flow (perm)		3539	1439	1610	3174						3374	1094
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.25	0.92	0.92	0.92
Adj. Flow (vph)	0	591	252	207	592	0	0	0	0	109	708	159
RTOR Reduction (vph)	0	0	26	0	0	0	0	0	0	0	0	97
Lane Group Flow (vph)	0	591	226	186	613	0	0	0	0	0	817	62
Confl. Peds. (#/hr)	51		51	114		114	115		115	333		333
Confl. Bikes (#/hr)			8			3			17			6
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Actuated Green, G (s)		28.0	28.0	10.0	42.0						30.0	30.0
Effective Green, g (s)		28.0	28.0	10.0	42.0						30.0	30.0
Actuated g/C Ratio		0.35	0.35	0.12	0.52						0.38	0.38
Clearance Time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Vehicle Extension (s)		2.0	2.0	2.0	2.0						2.0	2.0
Lane Grp Cap (vph)		1239	504	201	1692						1265	410
v/s Ratio Prot		c0.17		c0.12	0.05							
v/s Ratio Perm			0.16		0.14						0.24	0.06
v/c Ratio		0.48	0.45	0.93	0.36						0.65	0.15
Uniform Delay, d1		20.3	20.0	34.6	11.1						20.6	16.6
Progression Factor		1.03	1.02	1.00	1.00						1.23	2.65
Incremental Delay, d2		1.3	2.7	42.2	0.0						0.8	0.1
Delay (s)		22.0	23.2	76.8	11.2						26.2	44.0
Level of Service		C	C	E	B						C	D
Approach Delay (s)		22.4			26.5			0.0			29.1	
Approach LOS		C			C			A			C	

Intersection Summary			
HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX G.11

Alternative Freeway Access Route Analysis Memo

AECOM
155 Grand Avenue, Suite 700, Oakland, CA 94612
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Memorandum

Date:	March 25, 2009
To:	Margaret Stanzione, Community and Economic Development Agency, City of Oakland Gordon Lum, Transportation Services Division, Community and Economic Development Agency, City of Oakland
From:	Jeffrey Chan, PTP
Subject:	Kaiser Center Redevelopment Project Transportation Impact Analysis – Alternative Freeway Access Route Analysis

This memorandum summarizes the findings from the supplemental analysis considering the effect of high intersection delays on the diversion of Project-generated vehicles to alternative access routes to and from freeways. The analysis considers the following alternative routes:

- To / from I-580 Grand Avenue / Lakeshore Avenue On- and Off-Ramps;
- To SR 13 via Oakland Avenue / Harrison Avenue; and,
- To SB I-880 via the Embarcadero / 10th Avenue On-Ramp.

The following seven "diversion" intersections were selected for analysis:

45. Grand Avenue / El Embarcadero (*signalized*);
46. Lakeshore Avenue / El Embarcadero (*unsignalized*);
47. Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (*signalized*);
48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (*signalized*);
49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (*signalized*);
50. Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (*signalized*); and,
51. Oakland Avenue / Monte Vista Avenue (*unsignalized*).

All intersections are located outside of the Downtown[1] area. The alternative routes and selected study locations are illustrated in **Figure 1**.

[1] Downtown is defined in the Land Use and Transportation Element of the City of Oakland General Plan (page 67) as the area generally bounded by West Grand Avenue to the north, Lake Merritt and Channel Park to the east, the Oakland Estuary to the south and I-980 / Brush Street to the west.

AECOM

alternative routes.cdr

KAISER CENTER TRANSPORTATION STUDY ALTERNATIVE FREEWAY ACCESS ROUTE MEMO

Figure 1

ALTERNATIVE ROUTES

Existing Conditions

Existing Conditions level of service (LOS) at each of the selected study locations is summarized in **Table 1**.

Table 1: Intersection Level of Service – Existing Conditions

No.	Intersection	Traffic Control[a]	AM Peak Hour		PM Peak Hour	
			LOS	Delay[b]	LOS	Delay[b]
Outside Downtown						
45	Grand Avenue / El Embarcadero	Signal	B	15.7	B	17.4
46	Lakeshore Avenue / El Embarcadero	OWSC	**F**	**>50.0**	**F**	**>50.0**
47	Grand Avenue / MacArthur Blvd. (EB) / I-580 EB Off-Ramp	Signal	D	40.2	**E**	**59.7**
48	Lakeshore Avenue / MacArthur Blvd. (EB) / I-580 EB On-Ramp	Signal	C	22.9	D	41.6
49	Oakland Avenue / MacArthur Blvd. (WB) / Santa Clara Avenue / I-580 WB Off-Ramp	Signal	B	19.5	B	12.9
50	Harrison Street / MacArthur Blvd. (WB) / Santa Clara Avenue	Signal	C	26.9	B	16.7
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	11.4	B	12.1

Bold indicates intersections operating at LOS E or LOS F.

[a] AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

[b] The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

As shown in **Table 1**, the following intersections currently operate at LOS E or LOS F:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – LOS F; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E.

Near-Term (2015) Conditions

Near-Term (2015) Conditions LOS at each of the selected study locations is summarized in **Table 2**.

Table 2: Intersection Level of Service – Near-Term (2015) Conditions

			Existing Conditions				Near-Term (2015) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
45	Grand Avenue / El Embarcadero	Signal	B	15.7	B	17.4	C	24.5	**E**	**77.7**
46	Lakeshore Avenue / El Embarcadero	OWSC[c]	**F**	**>50.0**	**F**	**>50.0**	B	16.3	B	15.2
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	40.2	**E**	**59.7**	D	37.6	**F**	**>80.0**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	22.9	D	41.6	C	27.1	**F**	**>80.0**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	B	19.5	B	12.9	C	23.2	B	15.1
50	Harrison Street / MacArthur Blvd. (WB)	Signal	C	26.9	B	16.7	D	46.4	B	17.9
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	11.4	B	12.1	B	13.9	C	20.2

Bold indicates intersections operating at LOS E or LOS F.

a AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

b The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

c Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 2**, the following intersections would operate at LOS E or LOS F under Near-Term (2015) Conditions:

- Intersection #45: Grand Avnue / El Embarcadero (PM) – LOS E;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) (PM) – LOS F.

LOS at some intersections, such as Lakeshore Avenue / El Embarcadero, would improve in the future, mostly as a result of improvements proposed under Measure DD.

Cumulative (2030) Conditions

Cumulative (2030) Conditions LOS at each of the selected study locations is summarized in **Table 3**.

Table 3: Intersection Level of Service – Cumulative (2030) Conditions

			Existing Conditions				Cumulative (2030) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
45	Grand Avenue / El Embarcadero	Signal	B	15.7	B	17.4	D	38.8	**F**	**>80.0**
46	Lakeshore Avenue / El Embarcadero	OWSC[c]	**F**	**51.9**	**F**	**>80.0**	B	18.7	B	16.2
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	40.2	**E**	**59.7**	D	43.6	**F**	**>80.0**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	22.9	D	41.6	C	29.1	**F**	**>80.0**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	B	19.5	B	12.9	D	51.0	C	20.4
50	Harrison Street / MacArthur Blvd. (WB)	Signal	C	26.9	B	16.7	**E**	**72.1**	C	21.0
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	11.4	B	12.1	C	18.7	**E**	**48.8**

Bold indicates intersections operating at LOS E or LOS F.

[a] AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

[b] The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

[c] Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 3**, the following intersections would operate at LOS E or LOS F under Cumulative (2030) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS E;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) (PM) – LOS F.

LOS at some intersections, such as Lakeshore Avenue / El Embarcadero, would improve in the future, mostly as a result of improvements proposed under Measure DD.

Existing plus Project (Phase I and Phase II) Conditions

Existing plus Project (Phase I and Phase II) Conditions LOS at each of the selected study locations is summarized in **Table 4**.

Table 4: Intersection Level of Service – Existing plus Project Conditions

			Existing Conditions				Existing plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
45	Grand Avenue / El Embarcadero	Signal	B	15.7	B	17.4	B	17.5	B	18.8
46	Lakeshore Avenue / El Embarcadero	OWSC	**F**	**>50.0**	**F**	**>50.0**	**F**	**>50.0**	**F**	**>50.0**
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	40.2	**E**	**59.7**	D	39.3	**E**	**76.7**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	22.9	D	41.6	C	22.8	D	45.6
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	B	19.5	B	12.9	C	21.0	B	13.3
50	Harrison Street / MacArthur Blvd. (WB)	Signal	C	26.9	B	16.7	C	30.6	B	16.8
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	11.4	B	12.1	B	12.4	B	14.8

Bold indicates intersections operating at LOS E or LOS F.

[a] AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

[b] The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

SOURCE: AECOM, 2009.

As shown in **Table 4**, the following intersections would operate at LOS E or LOS F under Existing plus Project (Phase I and Phase II) Conditions:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – LOS F; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E.

The Project's impacts at each of the above intersections are discussed below:

- <u>Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM)</u>
  The intersection of Lakeshore Avenue / El Embarcadero would operate at LOS F in both the AM and PM peak hours under both Existing plus Project Conditions and Existing plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

  The intersection satisfies California MUTCD peak hour traffic signal warrants under Existing plus Project (Phase I and Phase II) Conditions for both the AM and PM peak hours. However, the intersection satisfies peak hour traffic signal warrants even under Existing Conditions without the Project.

It should also be noted that this intersection would be signalized under Measure DD and would operate at acceptable conditions under Near-Term (2015) Conditions and Cumulative (2030) Conditions. Given these considerations, the Project impacts at this intersection are considered less than significant.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)
  The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS E in the PM peak hour during both Existing Conditions and Existing plus Project (Phase I and Phase II) Conditions.

  Since the Project would cause an increase in average intersection delay of 17.0 seconds, which is greater than the four (4) second threshold of significance, and cause an increase in average delay on the critical northbound right movement greater than the six (6) second threshold of significance, the Project would would potentially result in a significant impact at this intersection.

  Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall reconstruct and restripe the right-turn channel on the northbound Grand Avenue approach to accommodate an additional right turn lane. After implementation of the mitigation measure, the intersection would operate at LOS C in the PM peak hour. During the AM peak hour, the intersection would continue to operate at LOS D.

  Significance after Implementation of Mitigation: Less than significant.

The 95th percentile queues at LOS E or LOS F intersections under Existing plus Project (Phase I and Phase II) Conditions as shown in **Table 4**, are summarized in **Table 5**. In all cases, the storage capacity is taken as the distance to the nearest intersection, major driveway, or pedestrian crossing.

Table 5: 95th Percentile Queues – Existing plus Project (Phase I and Phase II) Conditions

				Existing Conditions			Existing plus Project (Phase I and Phase II) Conditions		
					Queue Length (ft)			Queue Length (ft)	
No.	**Intersection**	**Lane Group**		**Storage Cap. (ft)**	**AM Peak Hour**	**PM Peak Hour**	**Storage Cap. (ft)**	**AM Peak Hour**	**PM Peak Hour**
46	Lakeshore Avenue / El Embarcadero	EB	L	275	207	**521**	275	**451**	**>1,000**
			R	275	51	**305**	275	51	**305**
47	Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	T	350	--	**374**	350	--	**374**
			R	200	--	**621**	200	--	**720**
		SW	L	175	--	**283**	175	--	**283**
			T	425	--	162	425	--	175
		SE	LTR	375	--	306	375	--	306

Bold indicates exceedance of storage capacity.

SOURCE: AECOM, 2009.

As shown in **Table 5**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Existing plus Project (Phase I and Phase II) Conditions would exceed the available storage capacity:

- Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – EBL; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (AM / PM) – NET (AM / PM), NER (PM), SWL (AM / PM).

It should be noted, however, that in general, the 95th percentile queues at the above locations already exceed the available storage capacity under Existing Conditions. At the following locations where 95th percentile queues exceed storage capacity under Existing plus Project (Phase I and Phase II) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- <u>Intersection #46: Lakeshore Avenue / El Embarcadero (AM / PM) – EBL</u>
  In the EBL lane group, the Project would cause an increase in 95th percentile queue length of 244 feet in the AM peak hour. In the PM peak hour, the queue length is infinitely long. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

  As noted in the intersection impact discussion, the intersection would already meet signal warrants under Existing Conditions and is planned for improvements under Measure DD including signalization. After signalization, the 95th percentile queues on the EBL lane group would no longer exceed the storage capacity under Existing plus Project (Phase I and Phase II) Conditions.

  Mitigation: None required.

- <u>Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – NER</u>
  In the NER lane group, the Project would cause an increase in 95th percentile queue length of 99 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

  Mitigation: After implementation of the mitigation measure proposed to mitigate intersection LOS impacts, the 95th percentile queues in the NER lane group would no longer exceed the storage capacity under Existing plus Project (Phase I and Phase II) Conditions.

  Significance after Implementation of Mitigation: Less than significant.

Near-Term (2015) plus Project (Phase I) Conditions

Near-Term (2015) plus Project (Phase I) Conditions LOS at each of the selected study locations is summarized in **Table 6**.

As shown in **Table 6**, the following intersections would operate at LOS E or LOS F under Near-Term (2015) plus Project (Phase I) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS F;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – LOS F.

Table 6: Intersection Level of Service – Near-Term (2015) plus Project (Phase I) Conditions

			Near-Term (2015) Conditions				Near-Term (2015) plus Project (Phase I) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
45	Grand Avenue / El Embarcadero	Signal	C	24.5	**E**	**77.7**	C	24.7	**F**	**>80.0**
46	Lakeshore Avenue / El Embarcadero	Signal[c]	B	16.3	B	15.2	B	16.3	B	15.8
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	37.6	**F**	**>80.0**	D	37.3	**F**	**>80.0**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	27.1	**F**	**>80.0**	C	27.1	**F**	**>80.0**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	C	23.2	B	15.1	C	24.1	B	15.4
50	Harrison Street / MacArthur Blvd. (WB)	Signal	D	46.4	B	17.9	D	48.7	B	18.0
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	13.9	C	20.2	B	14.7	C	23.8

Bold indicates intersections operating at LOS E or LOS F.

[a] AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

[b] The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

[c] Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

The Project's impacts at each of the above intersections are discussed below:

- Intersection #45: Grand Avenue / El Embarcadero (PM)
  The intersection of Grand Avenue / El Embarcadero would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I) Conditions. The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) Conditions. The intersection is located outside the Downtown area.

  Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. It should be noted, however, that this intersection would undergo geometric changes as part of Measure DD and would already operate at LOS E with 77.7 seconds of average intersection delay under Near-Term (2015) Conditions as a direct result of these changes. The highest delays would be on the northeast Grand Avenue approach, which would have a limited amount of green time available due to the protected left-turn phase on the southwest Grand Avenue approach and the split northwest El Embarcadero approach. While the Project would add traffic to this approach, the poor operation of this approach is directly a result of the Measure DD changes to this intersection. Therefore, the Project's impacts at this intersection are considered less than significant.

  Given that there is approximately 30 feet of right-of-way on the northeast Grand Avenue approach, an additional northeast through lane could be accommodated by restriping the approach, which would improve operations to LOS C in the PM peak hour. In the AM peak hour, the intersection would continue to operate at LOS C.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)
  The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

  Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.20 under Near-Term (2015) Conditions and 1.23 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be three (3) percent, which is not above the three (3) percent threshold of significance, the Project would not potentially contribute to a significant near-term impact at this intersection.

  Mitigation: None required.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (EB) (PM)
  The intersection of Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

  Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.11 under Near-Term (2015) Conditions and 1.13 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be two (2) percent, which is below the three (3) percent threshold of significance, the Project would not potentially contribute to a significant near-term impact at this intersection.

  Mitigation: None required.

The 95th percentile queues at LOS E or LOS F intersections under Near-Term (2015) plus Project (Phase I) Conditions as shown in **Table 6**, are summarized in **Table 7**.

Table 7: 95th Percentile Queues – Near-Term (2015) plus Project (Phase I) Conditions

				Near-Term (2015)Conditions			Near-Term (2015) plus Project (Phase I) Conditions		
					Queue Length (ft)			Queue Length (ft)	
No.	Intersection	Lane Group		Storage Cap. (ft)	AM Peak Hour	PM Peak Hour	Storage Cap. (ft)	AM Peak Hour	PM Peak Hour
45	Grand Avenue / El Embarcadero	NE	TR	600	--	**964**	600	--	**1,005**
		SW	L	325	--	85[a]	325	--	88[a]
			T	325	--	0[a]	325	--	0[a]
		NW	LR	275	--	241	275	--	241
47	Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	T	350	--	167	350	--	162
			R	200	--	**420**	200	--	**435**
		SW	L	175	--	**462**	175	--	**462**
			T	425	--	242	425	--	250
		SE	LTR	375	--	**553**	375	--	**553**
48	Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	TR	250	--	**296**	250	--	**309**
		SW	L	150	--	**473**	150	--	**473**
			T	150	--	48	150	--	48
		EB	L	475	--	126	475	--	126
			T	475	--	**487**	475	--	**487**
			R	475	--	354	475	--	363

Bold indicates exceedance of storage capacity.

[a] Volume for 95th percentile queue is metered by upstream signal.

SOURCE: AECOM, 2009.

As shown in **Table 7**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Near-Term (2015) plus Project (Phase I) Conditions would exceed the available storage capacity:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR;
- Intersection #46: Lakeshore Avenue / El Embarcadero (PM) – NER, SWL, and SELTR; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR, SWL, and EBT.

It should be noted, however, that the 95th percentile queues at the above locations already exceed the available storage capacity under Near-Term (2015) Conditions. At the following location where 95th percentile queues exceed storage capacity under Near-Term (2015) plus Project (Phase I) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR
  In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 41 feet in the PM peak hour. On the SWL and SWT lane groups, queues are short because the arrival of vehicles at the approach is controlled by the traffic signal at the upstream intersection. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

As noted in the intersection impact discussion, this intersection would undergo geometric changes as part of Measure DD. The 95th percentile queue length on the NETR lane group would already exceed the storage capacity under Near-Term (2015) Conditions as a direct result of these changes. Therefore, the Project's impacts at this intersection are considered less than significant.

If the northeast Grand Avenue approach were restriped to accommodate an additional through lane, the 95th percentile queues in the PM peak hour would be reduced to 596 feet, which would no longer exceed the storage capacity.

Mitigation: None required.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Near-Term (2015) plus Project (Phase I and Phase II) Conditions LOS at each of the selected study locations is summarized in **Table 8**.

Table 8: Intersection Level of Service – Near-Term (2015) plus Project (Phase I and Phase II) Conditions

			Near-Term (2015) Conditions				Near-Term (2015) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
45	Grand Avenue / El Embarcadero	Signal	C	24.5	**E**	**77.7**	C	25.5	**F**	**>80.0**
46	Lakeshore Avenue / El Embarcadero	Signal[c]	B	16.3	B	15.2	B	16.4	B	17.0
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	37.6	**F**	**>80.0**	D	37.3	**F**	**>80.0**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	27.1	**F**	**>80.0**	C	27.2	**F**	**>80.0**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	C	23.2	B	15.1	C	27.8	B	15.8
50	Harrison Street / MacArthur Blvd. (WB)	Signal	D	46.4	B	17.9	D	52.0	B	18.1
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	13.9	C	20.2	C	15.9	D	30.9

Bold indicates intersections operating at LOS E or LOS F.

[a] AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection

[b] The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.

[c] Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 8**, the following intersections would operate at LOS E or LOS F under Near-Term (2015) plus Project (Phase I and Phase II) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS F;

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS E; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F.

The Project's impacts at each of the above intersections are discussed below:

- <u>Intersection #45: Grand Avenue / El Embarcadero (PM)</u>
  The intersection of Grand Avenue / El Embarcadero would operate at LOS F in the PM peak hour under Near-Term (2015) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS E in the PM peak hour under Near-Term (2015) Conditions. The intersection is located outside the Downtown area.

  Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection. It should be noted, however, that this intersection would undergo geometric changes as part of Measure DD and would already operate at LOS E with 77.7 seconds of average intersection delay under Near-Term (2015) Conditions as a direct result of these changes. The highest delays would be on the northeast Grand Avenue approach, which would have a limited amount of green time available due to the protected left-turn phase on the southwest Grand Avenue approach and the split northwest El Embarcadero approach. While the Project would add traffic to this approach, the poor operation of this approach is directly a result of the Measure DD changes to this intersection. Therefore, the Project's impacts at this intersection are considered less than significant.

  Given that there is approximately 30 feet of right-of-way on the northeast Grand Avenue approach, an additional northeast through lane could be accommodated by restriping the approach, which would improve operations to LOS C in the PM peak hour. In the AM peak hour, the intersection would continue to operate at LOS C.

  Mitigation: None required.

- <u>Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)</u>
  The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

  Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.20 under Near-Term (2015) Conditions and 1.26 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be six (6) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

  Mitigation: As proposed under Existing plus Project (Phase I and Phase II) Conditions, the Applicant, Owners, or Successors-in-Interest of the Project shall reconstruct and restripe the right-turn channel on the northbound Grand Avenue approach to accommodate an additional right turn lane. After implementation of the mitigation measure, the intersection would still operate at LOS E in the PM peak hour, but the Project's impacts at this intersection would be mitigated. During the AM peak hour, the intersection would continue to operate at LOS D.

  Significance after Implementation of Mitigation: Less than significant.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (EB) (PM)
  The intersection of Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp would operate at LOS F in the PM peak hour under both Near-Term (2015) Conditions and Near-Term (2015) plus Project (Phase I) Conditions. The intersection is located outside the Downtown area.

  Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.11 under Near-Term (2015) Conditions and 1.15 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be four (4) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

  Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall retime the signal at this intersection, increasing green time to the critical southbound left-turn movement from Lakeshore Avenue and eastbound through movement from MacArthur Boulevard. After implementation of the mitigation measure, the intersection would still operate at LOS E in the PM peak hour, but the Project's impacts at this intersection would be mitigated.

  Significance after Implementation of Mitigation: Less than significant.

The 95th percentile queues at LOS E or LOS F intersections under Near-Term (2015) plus Project (Phase I) Conditions as shown in **Table 8**, are summarized in **Table 9**.

As shown in **Table 9**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Near-Term (2015) plus Project (Phase I and Phase II) Conditions would exceed the available storage capacity:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR;
- Intersection #46: Lakeshore Avenue / El Embarcadero (PM) – NER, SWL, and SELTR; and,
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR, SWL, and EBT.

It should be noted, however, that the 95th percentile queues at the above locations already exceed the available storage capacity under Near-Term (2015) Conditions. At the following location where 95th percentile queues exceed storage capacity under Near-Term (2015) plus Project (Phase I) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR
  In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 41 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

  As noted in the intersection impact discussion, this intersection would undergo geometric changes as part of Measure DD. The 95th percentile queue length on the NETR lane group would already exceed the storage capacity under Near-Term (2015) Conditions as a direct result of these changes. Therefore, the Project's impacts at this intersection are considered less than significant.

Table 9: 95th Percentile Queues – Near-Term (2015) plus Project (Phase I and Phase II) Conditions

				Near-Term (2015) Conditions			Near-Term (2015) plus Project (Phase I and Phase II) Conditions		
					Queue Length (ft)			Queue Length (ft)	
No.	Intersection	Lane Group		Storage Cap. (ft)	AM Peak Hour	PM Peak Hour	Storage Cap. (ft)	AM Peak Hour	PM Peak Hour
45	Grand Avenue / El Embarcadero	NE	TR	600	--	**964**	600	--	**1,057**
		SW	L	325	--	85[a]	325	--	89[a]
			T	325	--	0[a]	325	--	0[a]
		NW	LR	275	--	241	275	--	241
47	Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	T	350	--	167	350	--	154
			R	200	--	**420**	200	--	**452**
		SW	L	175	--	**462**	175	--	**462**
			T	425	--	242	425	--	258
		SE	LTR	375	--	**553**	375	--	**553**
48	Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	TR	250	--	**296**	250	--	**326**
		SW	L	150	--	**473**	150	--	**473**
			T	150	--	48	150	--	48
		EB	L	475	--	126	475	--	124
			T	475	--	**487**	475	--	**488**
			R	475	--	354	475	--	364

Bold indicates exceedance of storage capacity.

[a] Volume for 95th percentile queue is metered by upstream signal.

SOURCE: AECOM, 2009.

If the northeast Grand Avenue approach were restriped to accommodate an additional through lane, the 95th percentile queues in the PM peak hour would be reduced to 632 feet, which would still exceed the storage capacity, but mitigate the Project's impacts at this intersection

Mitigation: None required.

Cumulative (2030) plus Project (Phase I and Phase II) Conditions

Cumulative (2030) plus Project (Phase I and Phase II) Conditions LOS at each of the selected study locations is summarized in **Table 10**.

Table 10: Intersection Level of Service – Cumulative (2030) plus Project (Phase I and Phase II) Conditions

			Cumulative (2030) Conditions				Cumulative (2030) plus Project (Phase I and Phase II) Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
45	Grand Avenue / El Embarcadero	Signal	D	38.8	**F**	**>80.0**	D	41.4	**F**	**>80.0**
46	Lakeshore Avenue / El Embarcadero	Signal[c]	B	18.7	B	16.2	B	18.7	B	18.2
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	43.6	**F**	**>80.0**	D	44.0	**F**	**>80.0**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	29.1	**F**	**>80.0**	C	29.0	**F**	**>80.0**
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	D	51.0	C	20.4	**E**	**69.0**	C	23.3
50	Harrison Street / MacArthur Blvd. (WB)	Signal	**E**	**72.1**	C	21.0	**F**	**>80.0**	C	21.3
51	Oakland Avenue / Monte Vista Avenue	AWSC	C	18.7	**E**	**48.8**	C	22.7	**F**	**>50.0**

Bold indicates intersections operating at LOS E or LOS F.

[a] AWSC = All-way stop controlled intersection; OWSC = One-way stop controlled intersection
[b] The LOS and delay for one-way stop controlled intersections represents the worst movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all movements.
[c] Intersection would be signalized as part of Measure DD.

SOURCE: AECOM, 2009.

As shown in **Table 10**, the following intersections would operate at LOS E or LOS F under Cumulative (2030) plus Project (Phase I and Phase II) Conditions:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – LOS F;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F;
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – LOS F;
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM) – LOS E;
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – LOS F; and,
- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM) – LOS F.

The Project's impacts at each of the above intersections are discussed below:

- <u>Intersection #45: Grand Avenue / El Embarcadero (PM)</u>
  The intersection of Grand Avenue / El Embarcadero would operate at LOS F in the PM peak hour under both Cumulative (2030) Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.01 under Cumulative (2030) Conditions and 1.06 under Cumulative (2030) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be five (5) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

It should be noted, however, that this intersection would undergo geometric changes as part of Measure DD and would already operate at LOS F with greater than 80.0 seconds of average intersection delay under Cumulative (2030) Conditions as a direct result of these changes. The highest delays would be on the northeast Grand Avenue approach, which would have a limited amount of green time available due to the protected left-turn phase on the southwest Grand Avenue approach and the split northwest El Embarcadero approach. While the Project would add traffic to this approach, the poor operation of this approach is directly a result of the Measure DD changes to this intersection. Therefore, the Project's impacts at this intersection are considered less than significant.

Given that there is approximately 30 feet of right-of-way on the northeast Grand Avenue approach, an additional northeast through lane could be accommodated by restriping the approach, which would improve operations to LOS C in the PM peak hour. In the AM peak hour, the intersection would continue to operate at LOS C.

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM)
  The intersection of Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp would operate at LOS F in the PM peak hour under both Cumulative (2030) Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

  Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.61 under Cumulative (2030) Conditions and 1.66 under Cumulative (2030) plus Project (Phase I and Phase II) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be five (5) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

  Mitigation: As proposed under Existing plus Project (Phase I and Phase II) Conditions and Near-Term (2015) plus Project (Phase I and Phase II) Conditions, the Applicant, Owners, or Successors-in-Interest of the Project shall reconstruct and restripe the right-turn channel on the northbound Grand Avenue approach to accommodate an additional right turn lane. In addition, they shall restripe the eastbound MacArthur Boulevard / I-580 EB Off-Ramp approach to accommodate an additional through lane. After implementation of the mitigation measure, the intersection would still operate at LOS F in the PM peak hour, but the Project's impacts at this intersection would be mitigated. During the AM peak hour, the intersection would continue to operate at LOS C.

  Significance after Implementation of Mitigation: Less than significant.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (EB) (PM)
  The intersection of Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp would operate at LOS F in the PM peak hour under both Cumulative (2030) Conditions and Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection is located outside the Downtown area.

  Because delay values over 80.0 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.32 under Near-Term (2015) Conditions and 1.37 under Near-Term (2015) plus Project (Phase I) Conditions in the PM peak hour. Since the maximum increase in v/c ratio would be five (5) percent, which is above the three (3) percent threshold of significance, the Project would potentially contribute to a significant near-term impact at this intersection.

  Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall redesign the I-580 EB On-Ramp with an additional lane and restripe the approaches at this intersection as follows:

  - The southbound Lakeshore Avenue approach would be restriped from the existing configuration of one exclusive left-turn lane and two through lanes to two exclusive left-turn lanes and one through lane; and,
  - The median on the northeast Lakeshore Avenue approach would be narrowed and restriped from the existing configuration of one through lane and one shared through-right lane to one through lane and two exclusive right-turn lanes.

  After implementation of the mitigation measure, the intersection would still operate at LOS F in the PM peak hour, but the Project's impacts at this intersection would be mitigated. In the AM peak hour, the intersection would operate at LOS C.

  Significance after Implementation of Mitigation: Less than significant.

- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM)
  The intersection of Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp would operate at LOS E in the AM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS D in the AM peak hour under Cumulative (2030) Conditions. The intersection is located outside the Downtown area.

  Because the Project would cause the intersection to degrade from LOS D to LOS E, the Project would potentially contribute to a significant near-term impact at this intersection.

  Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall retime the signal to increase the green time to the northwest MacArthur Boulevard approach. After implementation of the mitigation measure, the intersection would operate at LOS C.

  Significance after Implementation of Mitigation: Less than significant.

- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM)
  The intersection of Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue would operate at LOS F in the AM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS E in the AM peak hour under Cumulative (2030) Conditions. The intersection is located outside the Downtown area.

Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

Mitigation: The Applicant, Owners, or Successors-in-Interest of the Project shall restripe the southwest Harrison Street approach to accommodate an additional through lane. After implementation of the mitigation measure, the intersection would operate at LOS D in the AM peak hour and LOS B in the PM peak hour.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM)
  The intersection of Oakland Avenue / Monte Vista Avenue would operate at LOS F in the PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. The intersection would operate at LOS E in the PM peak hour under Cumulative (2030) Conditions. The intersection is located outside the Downtown area.

  Because the Project would cause the intersection to degrade from LOS E to LOS F, the Project would potentially contribute to a significant near-term impact at this intersection.

  Mitigation: The delays at the intersection are primarily on the eastbound Oakland Avenue approach. The Applicant, Owners, or Successors-in-Interest of the Project shall signalize the intersection. After implementation of the mitigation measure, the intersection would operate at LOS B in the PM peak hour. In the AM peak hour, the intersection would operate at LOS B.

  Significance after Implementation of Mitigation: Less than significant.

The 95th percentile queues at LOS E or LOS F intersections under Cumulative (2030) plus Project (Phase I) Conditions as shown in **Table 10**, are summarized in **Table 11**.

As shown in **Table 11**, the 95th percentile queues in the following lane groups at LOS E or LOS F locations under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would exceed the available storage capacity:

- Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR;
- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – NER, SWL, and SELTR;
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR, SWL, and EBT;
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM) – NWTR and NELT;
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – NWL, NWT, and SWTR; and,
- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM) – EBTR.

Table 11: 95th Percentile Queues – Cumulative (2030) plus Project (Phase I and Phase II) Conditions

No.	Intersection	Lane Group		Cumulative (2030) Conditions Storage Cap. (ft)	Cumulative (2030) Conditions Queue Length (ft) AM Peak Hour	Cumulative (2030) Conditions Queue Length (ft) PM Peak Hour	Cumulative (2030) plus Project (Phase I and Phase II) Conditions Storage Cap. (ft)	Cumulative (2030) plus Project (Phase I and Phase II) Conditions Queue Length (ft) AM Peak Hour	Cumulative (2030) plus Project (Phase I and Phase II) Conditions Queue Length (ft) PM Peak Hour
45	Grand Avenue / El Embarcadero	NE	TR	600	--	**1,031**	600	--	**1,121**
		SW	L	325	--	89[a]	325	--	92[a]
			T	325	--	0[a]	325	--	0[a]
		NW	LR	275	--	249	275	--	249
47	Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	T	350	--	173	350	--	163
			R	200	--	**477**	200	--	**508**
		SW	L	175	--	**770**	175	--	**770**
			T	425	--	257	425	--	273
		SE	LTR	375	--	**904**	375	--	**904**
48	Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp	NE	TR	250	--	**314**	250	--	**344**
		SW	L	150	--	**497**	150	--	**497**
			T	150	--	50	150	--	50
		EB	L	475	--	86	475	--	86
			T	475	--	**478**	475	--	**484**
			R	475	--	309	475	--	320
49	Oakland Avenue / MacArthur Boulevard (WB)	NW	TR	175	**610**	--	175	**663**	--
		NE	LT	200	**204**	--	200	**205**	--
50	Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue	NW	L	250	**375**	--	250	**373**	--
			T	250	**379**	--	250	**379**	--
		SW	TR	300	**655**	--	300	**680**	--
51	Oakland Avenue / Monte Vista Avenue[b]	NB	LTR	250	--	5	250	--	5
		SB	LTR	275	--	15	275	--	15
		EB	L	50	--	28	50	--	28
			TR	150	--	**313**	150	--	**508**
		WB	LTR	350	--	35	350	--	38

Bold indicates exceedance of storage capacity.

[a] Volume for 95th percentile queue is metered by upstream signal.
[b] For all-way stop intersections, queue length represents average queue.

SOURCE: AECOM, 2009.

It should be noted, however, that the 95th percentile queues at the above locations already exceed the available storage capacity under Cumulative (2030) Conditions. At the following location where 95th percentile queues exceed storage capacity under Cumulative (2030) plus Project (Phase I and Phase II) Conditions, the Project would cause an increase of 25 feet or greater in 95th percentile queues:

- <u>Intersection #45: Grand Avenue / El Embarcadero (PM) – NETR</u>
  In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 90 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue

length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

As noted in the intersection impact discussion, this intersection would undergo geometric changes as part of Measure DD. The 95th percentile queue length on the NETR lane group would already exceed the storage capacity under Cumulative (2030) Conditions as a direct result of these changes. Therefore, the Project's impacts at this intersection are considered less than significant.

If the northeast Grand Avenue approach were restriped to accommodate an additional through lane, the 95th percentile queues in the PM peak hour would be reduced to 682 feet, which would still exceed the storage capacity, but mitigate the Project's impacts at this intersection

Mitigation: None required.

- Intersection #47: Grand Avenue / MacArthur Boulevard (EB) / I-580 EB Off-Ramp (PM) – NER
  In the NER lane group, the Project would cause an increase in 95th percentile queue length of 31 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

  Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be reduced to 330 feet in the PM peak hour, which would no longer exceed the available storage capacity.

  Significance after Implementation of Mitigation: Less than significant.

- Intersection #48: Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp (PM) – NETR
  In the NETR lane group, the Project would cause an increase in 95th percentile queue length of 30 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

  Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would still exceed the available storage capacity. Given geometric constraints after implementation of that mitigation measure, it would not be possible to make further changes to lane configuration to mitigate the Project's queuing impacts at this intersection. Therefore, the Project's impacts at this intersection are significant and unavoidable.

  Significance after Implementation of Mitigation: Significant and unavoidable.

- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp (AM) – NWTR
  In the EBTR lane group, the Project would cause an increase in 95th percentile queue length of 195 feet in the PM peak hour. Since the Project would cause an increase in 95th percentile queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be reduced to 337 feet, which would no longer exceed the available storage capacity.

Significance after Implementation of Mitigation: Less than significant.

- Intersection #51: Oakland Avenue / Monte Vista Avenue (PM) – EBTR
  In the EBTR lane group, the Project would cause an increase in 95th percentile queue length of 195 feet in the PM peak hour. Since the Project would cause an increase in the average queue length greater than 25 feet, the Project would potentially result in a significant impact at this intersection.

  Mitigation: After implementation of the mitigation measure proposed to mitigate LOS impacts at this intersection, the 95th percentile queues on the NER lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be 299 feet, which would still exceed the available storage capacity, but mitigate the Project's impacts at this intersection.

  For the other lane groups, installation of a signal at this intersection would not result in 95th percentile queues that exceed the available storage capacity in the PM peak hour, except for the EBL lane group, which is currently striped as a 50-foot turn pocket. In the PM peak hour, the 95th percentile queues on the EBL lane group under Cumulative (2030) plus Project (Phase I and Phase II) Conditions would be 112 feet. Therefore, the Applicant, Owners, or Successors-in-Interest of the Project shall restripe the pocket with 125 feet of storage capacity.

  Significance after Implementation of Mitigation: Less than significant.

Kaiser Center Redevelopment Project
Transportation Study

Alternative Freeway Access Route Analysis
Technical Appendices

A: Intersection Turning Movement Counts
B: Level of Service Calculation Worksheets
C: Queue Calculation Worksheets

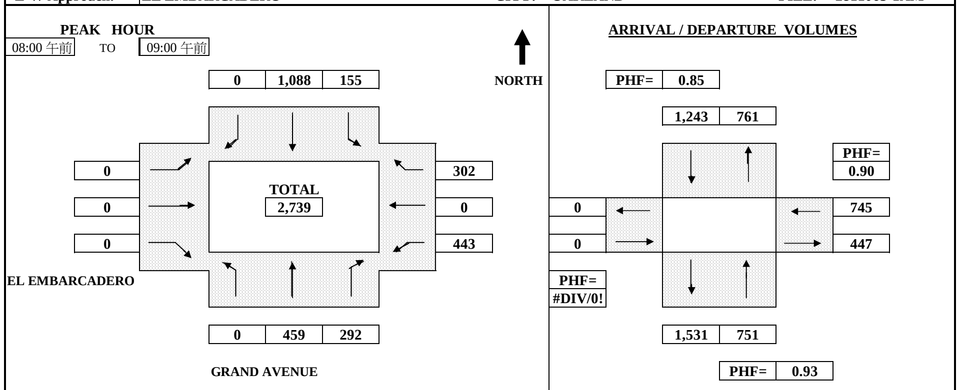
Appendix A

Intersection Turning Movement Counts

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/12	DAY:	WEDNESDAY
N-S Approach:	GRAND AVENUE	SURVEY TIME:	7:00 午前	TO	9:00 午前
E-W Approach:	EL EMBARCADERO	CITY:	OAKLAND	FILE:	2811065-1AM



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	0	73	58	19	91	0	0	0	0	37	0	47	***325***
7:15 午前	---	7:30 午前	0	144	90	35	191	0	0	0	0	73	0	103	***636***
7:30 午前	---	7:45 午前	0	233	132	76	375	0	0	0	0	128	0	175	***1,119***
7:45 午前	---	8:00 午前	0	326	193	121	558	0	0	0	0	215	0	251	***1,664***
8:00 午前	---	8:15 午前	0	436	267	150	779	0	0	0	0	318	0	330	***2,280***
8:15 午前	---	8:30 午前	0	550	350	192	1,041	0	0	0	0	443	0	412	***2,988***
8:30 午前	---	8:45 午前	0	646	423	235	1,321	0	0	0	0	534	0	491	***3,650***
8:45 午前	---	9:00 午前	0	785	485	276	1,646	0	0	0	0	658	0	553	***4,403***
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	0	73	58	19	91	0	0	0	0	37	0	47	***325***
7:15 午前	---	7:30 午前	0	71	32	16	100	0	0	0	0	36	0	56	***311***
7:30 午前	---	7:45 午前	0	89	42	41	184	0	0	0	0	55	0	72	***483***
7:45 午前	---	8:00 午前	0	93	61	45	183	0	0	0	0	87	0	76	***545***
8:00 午前	---	8:15 午前	0	110	74	29	221	0	0	0	0	103	0	79	***616***
8:15 午前	---	8:30 午前	0	114	83	42	262	0	0	0	0	125	0	82	***708***
8:30 午前	---	8:45 午前	0	96	73	43	280	0	0	0	0	91	0	79	***662***
8:45 午前	---	9:00 午前	0	139	62	41	325	0	0	0	0	124	0	62	***753***
HOURLY TOTALS															
7:00 AM	---	8:00 午前	0	326	193	121	558	0	0	0	0	215	0	251	***1,664***
7:15 午前	---	8:15 午前	0	363	209	131	688	0	0	0	0	281	0	283	***1,955***
7:30 午前	---	8:30 午前	0	406	260	157	850	0	0	0	0	370	0	309	***2,352***
7:45 午前	---	8:45 午前	0	413	291	159	946	0	0	0	0	406	0	316	***2,531***
8:00 午前	---	9:00 午前	0	459	292	155	1,088	0	0	0	0	443	0	302	***2,739***

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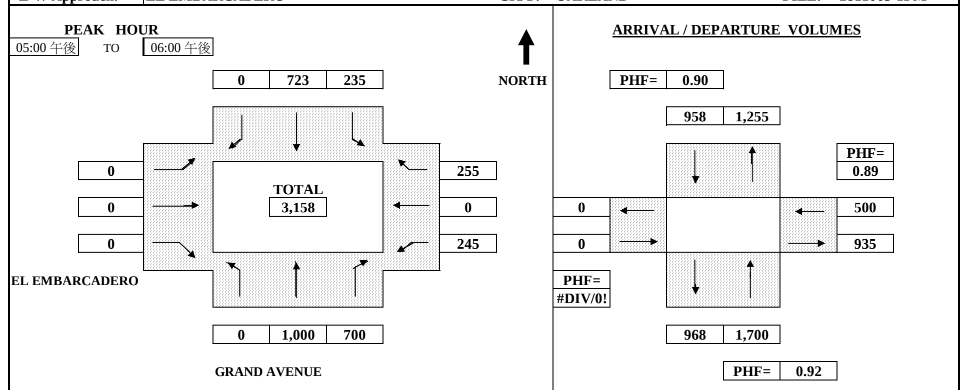
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/06	DAY:	THURSDAY
N-S Approach:	GRAND AVENUE	SURVEY TIME:	4:00 午後	TO	6:00 午後
E-W Approach:	EL EMBARCADERO	CITY:	OAKLAND	FILE:	2811065-1PM



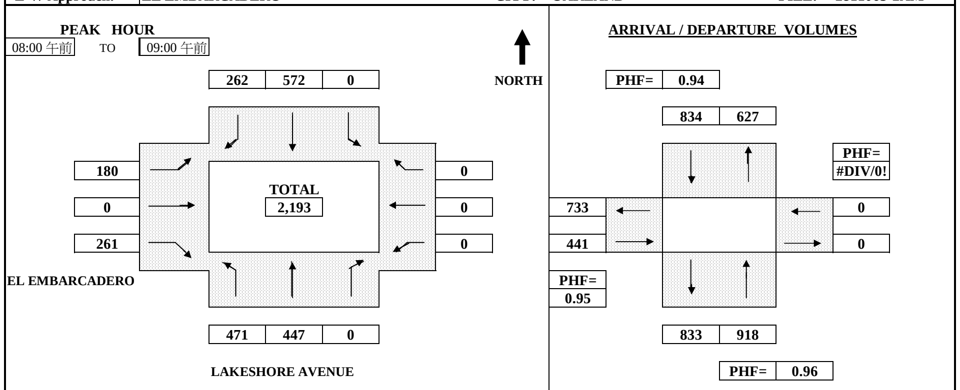
TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	0	142	114	47	143	0	0	0	0	48	0	47	***541***
4:15 午後	---	4:30 午後	0	285	219	95	275	0	0	0	0	99	0	92	***1,065***
4:30 午後	---	4:45 午後	0	498	392	164	429	0	0	0	0	154	0	129	***1,766***
4:45 午後	---	5:00 午後	0	681	541	206	565	0	0	0	0	197	0	189	***2,379***
5:00 午後	---	5:15 午後	0	891	665	270	738	0	0	0	0	255	0	271	***3,090***
5:15 午後	---	5:30 午後	0	1,145	874	328	915	0	0	0	0	316	0	350	***3,928***
5:30 午後	---	5:45 午後	0	1,412	1,070	381	1,083	0	0	0	0	375	0	407	***4,728***
5:45 午後	---	6:00 午後	0	1,681	1,241	441	1,288	0	0	0	0	442	0	444	***5,537***
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	0	142	114	47	143	0	0	0	0	48	0	47	***541***
4:15 午後	---	4:30 午後	0	143	105	48	132	0	0	0	0	51	0	45	***524***
4:30 午後	---	4:45 午後	0	213	173	69	154	0	0	0	0	55	0	37	***701***
4:45 午後	---	5:00 午後	0	183	149	42	136	0	0	0	0	43	0	60	***613***
5:00 午後	---	5:15 午後	0	210	124	64	173	0	0	0	0	58	0	82	***711***
5:15 午後	---	5:30 午後	0	254	209	58	177	0	0	0	0	61	0	79	***838***
5:30 午後	---	5:45 午後	0	267	196	53	168	0	0	0	0	59	0	57	***800***
5:45 午後	---	6:00 午後	0	269	171	60	205	0	0	0	0	67	0	37	***809***
HOURLY TOTALS															
4:00 PM	---	5:00 午後	0	681	541	206	565	0	0	0	0	197	0	189	***2,379***
4:15 午後	---	5:15 午後	0	749	551	223	595	0	0	0	0	207	0	224	***2,549***
4:30 午後	---	5:30 午後	0	860	655	233	640	0	0	0	0	217	0	258	***2,863***
4:45 午後	---	5:45 午後	0	914	678	217	654	0	0	0	0	221	0	278	***2,962***
5:00 午後	---	6:00 午後	0	1,000	700	235	723	0	0	0	0	245	0	255	***3,158***

Telephone: (510)232-1271 **Fax: (510)232-1272**

B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/12	DAY:	WEDNESDAY
N-S Approach:	LAKESHORE AVENUE	SURVEY TIME:	7:00 午前	TO	9:00 午前
E-W Approach:	EL EMBARCADERO	CITY: OAKLAND		FILE:	2811065-2AM



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	62	60	0	0	67	25	35	0	32	0	0	0	***281***
7:15 午前	---	7:30 午前	127	150	0	0	186	47	59	0	57	0	0	0	***626***
7:30 午前	---	7:45 午前	218	250	0	0	343	85	87	0	108	0	0	0	***1,091***
7:45 午前	---	8:00 午前	336	372	0	0	494	128	123	0	175	0	0	0	***1,628***
8:00 午前	---	8:15 午前	461	479	0	0	627	184	176	0	238	0	0	0	***2,165***
8:15 午前	---	8:30 午前	586	587	0	0	759	258	224	0	302	0	0	0	***2,716***
8:30 午前	---	8:45 午前	693	702	0	0	908	331	273	0	365	0	0	0	***3,272***
8:45 午前	---	9:00 午前	807	819	0	0	1,066	390	303	0	436	0	0	0	***3,821***
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	62	60	0	0	67	25	35	0	32	0	0	0	***281***
7:15 午前	---	7:30 午前	65	90	0	0	119	22	24	0	25	0	0	0	***345***
7:30 午前	---	7:45 午前	91	100	0	0	157	38	28	0	51	0	0	0	***465***
7:45 午前	---	8:00 午前	118	122	0	0	151	43	36	0	67	0	0	0	***537***
8:00 午前	---	8:15 午前	125	107	0	0	133	56	53	0	63	0	0	0	***537***
8:15 午前	---	8:30 午前	125	108	0	0	132	74	48	0	64	0	0	0	***551***
8:30 午前	---	8:45 午前	107	115	0	0	149	73	49	0	63	0	0	0	***556***
8:45 午前	---	9:00 午前	114	117	0	0	158	59	30	0	71	0	0	0	***549***
HOURLY TOTALS															
7:00 AM	---	8:00 午前	336	372	0	0	494	128	123	0	175	0	0	0	***1,628***
7:15 午前	---	8:15 午前	399	419	0	0	560	159	141	0	206	0	0	0	***1,884***
7:30 午前	---	8:30 午前	459	437	0	0	573	211	165	0	245	0	0	0	***2,090***
7:45 午前	---	8:45 午前	475	452	0	0	565	246	186	0	257	0	0	0	***2,181***
8:00 午前	---	9:00 午前	471	447	0	0	572	262	180	0	261	0	0	0	***2,193***

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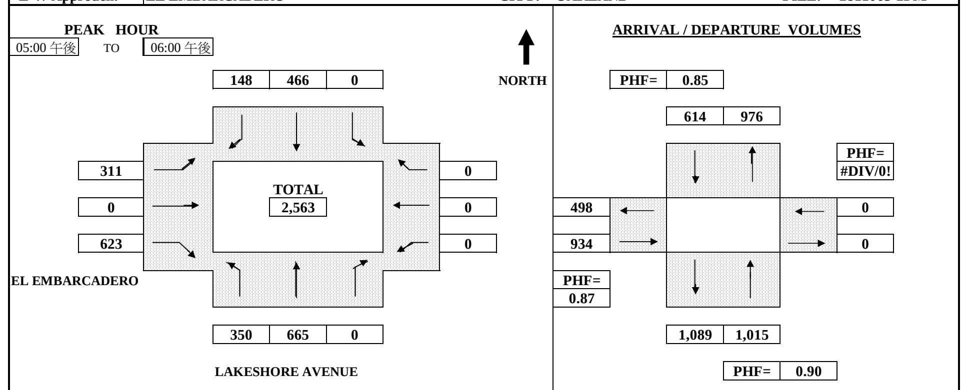
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/06	DAY:	THURSDAY
N-S Approach:	LAKESHORE AVENUE	SURVEY TIME:	4:00 午後	TO	6:00 午後
E-W Approach:	EL EMBARCADERO	CITY: OAKLAND		FILE:	2811065-2PM



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	61	136	0	0	120	35	67	0	95	0	0	0	***514***
4:15 午後	---	4:30 午後	127	258	0	0	221	65	124	0	191	0	0	0	***986***
4:30 午後	---	4:45 午後	194	396	0	0	325	91	185	0	376	0	0	0	***1,567***
4:45 午後	---	5:00 午後	261	525	0	0	448	127	274	0	475	0	0	0	***2,110***
5:00 午後	---	5:15 午後	355	713	0	0	582	173	359	0	578	0	0	0	***2,760***
5:15 午後	---	5:30 午後	459	866	0	0	692	207	443	0	761	0	0	0	***3,428***
5:30 午後	---	5:45 午後	541	1,059	0	0	798	241	526	0	926	0	0	0	***4,091***
5:45 午後	---	6:00 午後	611	1,190	0	0	914	275	585	0	1,098	0	0	0	***4,673***
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	61	136	0	0	120	35	67	0	95	0	0	0	***514***
4:15 午後	---	4:30 午後	66	122	0	0	101	30	57	0	96	0	0	0	***472***
4:30 午後	---	4:45 午後	67	138	0	0	104	26	61	0	185	0	0	0	***581***
4:45 午後	---	5:00 午後	67	129	0	0	123	36	89	0	99	0	0	0	***543***
5:00 午後	---	5:15 午後	94	188	0	0	134	46	85	0	103	0	0	0	***650***
5:15 午後	---	5:30 午後	104	153	0	0	110	34	84	0	183	0	0	0	***668***
5:30 午後	---	5:45 午後	82	193	0	0	106	34	83	0	165	0	0	0	***663***
5:45 午後	---	6:00 午後	70	131	0	0	116	34	59	0	172	0	0	0	***582***
HOURLY TOTALS															
4:00 PM	---	5:00 午後	261	525	0	0	448	127	274	0	475	0	0	0	***2,110***
4:15 午後	---	5:15 午後	294	577	0	0	462	138	292	0	483	0	0	0	***2,246***
4:30 午後	---	5:30 午後	332	608	0	0	471	142	319	0	570	0	0	0	***2,442***
4:45 午後	---	5:45 午後	347	663	0	0	473	150	341	0	550	0	0	0	***2,524***
5:00 午後	---	6:00 午後	350	665	0	0	466	148	311	0	623	0	0	0	***2,563***

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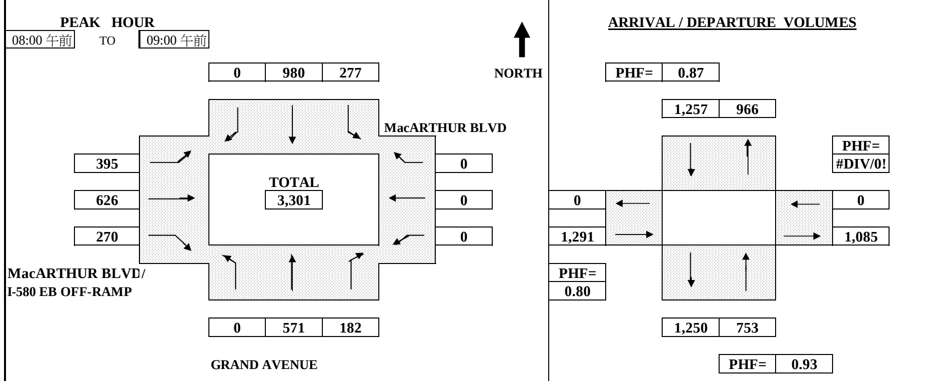
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/12	DAY:	WEDNESDAY
N-S Approach:	GRAND AVENUE	SURVEY TIME:	7:00 午前	TO	9:00 午前
E-W Approach:	MacARTHUR BLVD / I-580 EB OFF-RAMP	CITY: OAKLAND		FILE:	2811065-3AM



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	0	91	27	32	87	0	43	67	21	0	0	0	368
7:15 午前	---	7:30 午前	0	193	48	53	179	0	87	164	47	0	0	0	771
7:30 午前	---	7:45 午前	0	314	90	95	351	0	143	275	100	0	0	0	1,368
7:45 午前	---	8:00 午前	0	440	133	162	534	0	210	411	144	0	0	0	2,034
8:00 午前	---	8:15 午前	0	588	174	212	715	0	319	577	209	0	0	0	2,794
8:15 午前	---	8:30 午前	0	744	216	284	972	0	401	731	260	0	0	0	3,608
8:30 午前	---	8:45 午前	0	868	255	371	1,221	0	479	859	316	0	0	0	4,369
8:45 午前	---	9:00 午前	0	1,011	315	439	1,514	0	605	1,037	414	0	0	0	5,335
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	0	91	27	32	87	0	43	67	21	0	0	0	368
7:15 午前	---	7:30 午前	0	102	21	21	92	0	44	97	26	0	0	0	403
7:30 午前	---	7:45 午前	0	121	42	42	172	0	56	111	53	0	0	0	597
7:45 午前	---	8:00 午前	0	126	43	67	183	0	67	136	44	0	0	0	666
8:00 午前	---	8:15 午前	0	148	41	50	181	0	109	166	65	0	0	0	760
8:15 午前	---	8:30 午前	0	156	42	72	257	0	82	154	51	0	0	0	814
8:30 午前	---	8:45 午前	0	124	39	87	249	0	78	128	56	0	0	0	761
8:45 午前	---	9:00 午前	0	143	60	68	293	0	126	178	98	0	0	0	966
HOURLY TOTALS															
7:00 AM	---	8:00 午前	0	440	133	162	534	0	210	411	144	0	0	0	2,034
7:15 午前	---	8:15 午前	0	497	147	180	628	0	276	510	188	0	0	0	2,426
7:30 午前	---	8:30 午前	0	551	168	231	793	0	314	567	213	0	0	0	2,837
7:45 午前	---	8:45 午前	0	554	165	276	870	0	336	584	216	0	0	0	3,001
8:00 午前	---	9:00 午前	0	571	182	277	980	0	395	626	270	0	0	0	3,301

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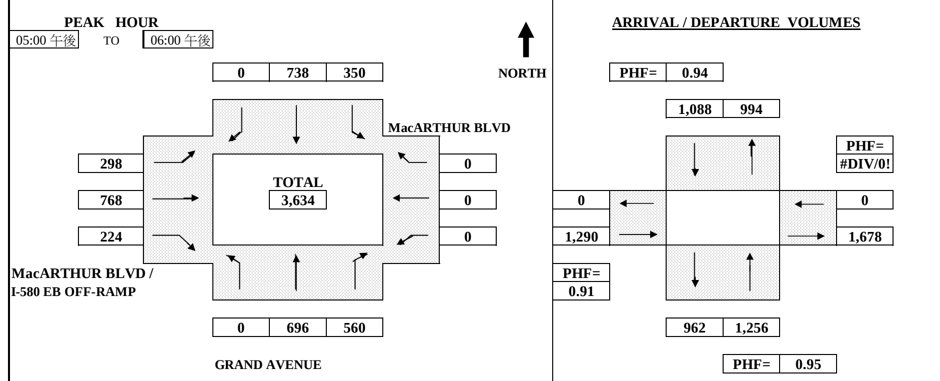
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/06	DAY:	THURSDAY
N-S Approach:	GRAND AVENUE	SURVEY TIME:	4:00 午後	TO	6:00 午後
E-W Approach:	MacARTHUR BLVD / I-580 EB OFF-RAMP	CITY: OAKLAND		FILE:	2811065-3PM



TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	0	115	72	80	134	0	85	158	62	0	0	0	706
4:15 午後	---	4:30 午後	0	232	140	145	263	0	176	286	110	0	0	0	1,352
4:30 午後	---	4:45 午後	0	351	260	219	420	0	267	479	181	0	0	0	2,177
4:45 午後	---	5:00 午後	0	497	365	302	568	0	339	687	214	0	0	0	2,972
5:00 午後	---	5:15 午後	0	656	492	379	740	0	415	898	277	0	0	0	3,857
5:15 午後	---	5:30 午後	0	843	633	476	925	0	493	1,105	325	0	0	0	4,800
5:30 午後	---	5:45 午後	0	1,007	799	565	1,104	0	563	1,272	371	0	0	0	5,681
5:45 午後	---	6:00 午後	0	1,193	925	652	1,306	0	637	1,455	438	0	0	0	6,606
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	0	115	72	80	134	0	85	158	62	0	0	0	706
4:15 午後	---	4:30 午後	0	117	68	65	129	0	91	128	48	0	0	0	646
4:30 午後	---	4:45 午後	0	119	120	74	157	0	91	193	71	0	0	0	825
4:45 午後	---	5:00 午後	0	146	105	83	148	0	72	208	33	0	0	0	795
5:00 午後	---	5:15 午後	0	159	127	77	172	0	76	211	63	0	0	0	885
5:15 午後	---	5:30 午後	0	187	141	97	185	0	78	207	48	0	0	0	943
5:30 午後	---	5:45 午後	0	164	166	89	179	0	70	167	46	0	0	0	881
5:45 午後	---	6:00 午後	0	186	126	87	202	0	74	183	67	0	0	0	925
HOURLY TOTALS															
4:00 PM	---	5:00 午後	0	497	365	302	568	0	339	687	214	0	0	0	2,972
4:15 午後	---	5:15 午後	0	541	420	299	606	0	330	740	215	0	0	0	3,151
4:30 午後	---	5:30 午後	0	611	493	331	662	0	317	819	215	0	0	0	3,448
4:45 午後	---	5:45 午後	0	656	539	346	684	0	296	793	190	0	0	0	3,504
5:00 午後	---	6:00 午後	0	696	560	350	738	0	298	768	224	0	0	0	3,634

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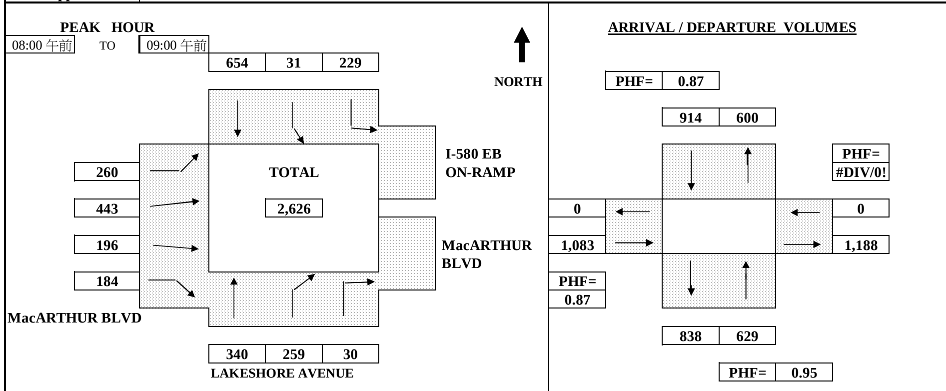
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/12	DAY:	WEDNESDAY
N-S Approach:	LAKESHORE AVENUE	SURVEY TIME:	7:00 午前	TO	9:00 午前
E-W Approach:	MacARTHUR BLVD / I-580 EB ON-RAMP	CITY: OAKLAND		FILE:	2811065-4AM



TIME PERIOD From		To	NORTHBOUND Thur	To 580	To Mac	SOUTHBOUND Thru	To Mac	To 580	EASTBOUND Left	To 580	To Mac	Right	WESTBOUND		TOTAL
SURVEY DATA															
7:00 AM	---	7:15 午前	28	58	7	71	5	57	30	57	20	18	0	0	*351*
7:15 午前	---	7:30 午前	84	112	10	191	8	133	55	132	45	40	0	0	*810*
7:30 午前	---	7:45 午前	151	165	15	365	17	213	85	233	81	68	0	0	*1,393*
7:45 午前	---	8:00 午前	230	237	25	511	21	307	118	365	122	110	0	0	*2,046*
8:00 午前	---	8:15 午前	320	298	34	666	29	357	178	474	171	150	0	0	*2,677*
8:15 午前	---	8:30 午前	405	360	43	817	33	427	228	582	222	202	0	0	*3,319*
8:30 午前	---	8:45 午前	489	436	49	996	43	494	298	682	263	244	0	0	*3,994*
8:45 午前	---	9:00 午前	570	496	55	1,165	52	536	378	808	318	294	0	0	*4,672*
TOTAL BY PERIOD															
7:00 AM	---	7:15 午前	28	58	7	71	5	57	30	57	20	18	0	0	*351*
7:15 午前	---	7:30 午前	56	54	3	120	3	76	25	75	25	22	0	0	*459*
7:30 午前	---	7:45 午前	67	53	5	174	9	80	30	101	36	28	0	0	*583*
7:45 午前	---	8:00 午前	79	72	10	146	4	94	33	132	41	42	0	0	*653*
8:00 午前	---	8:15 午前	90	61	9	155	8	50	60	109	49	40	0	0	*631*
8:15 午前	---	8:30 午前	85	62	9	151	4	70	50	108	51	52	0	0	*642*
8:30 午前	---	8:45 午前	84	76	6	179	10	67	70	100	41	42	0	0	*675*
8:45 午前	---	9:00 午前	81	60	6	169	9	42	80	126	55	50	0	0	*678*
HOURLY TOTALS															
7:00 AM	---	8:00 午前	230	237	25	511	21	307	118	365	122	110	0	0	*2,046*
7:15 午前	---	8:15 午前	292	240	27	595	24	300	148	417	151	132	0	0	*2,326*
7:30 午前	---	8:30 午前	321	248	33	626	25	294	173	450	177	162	0	0	*2,509*
7:45 午前	---	8:45 午前	338	271	34	631	26	281	213	449	182	176	0	0	*2,601*
8:00 午前	---	9:00 午前	340	259	30	654	31	229	260	443	196	184	0	0	*2,626*

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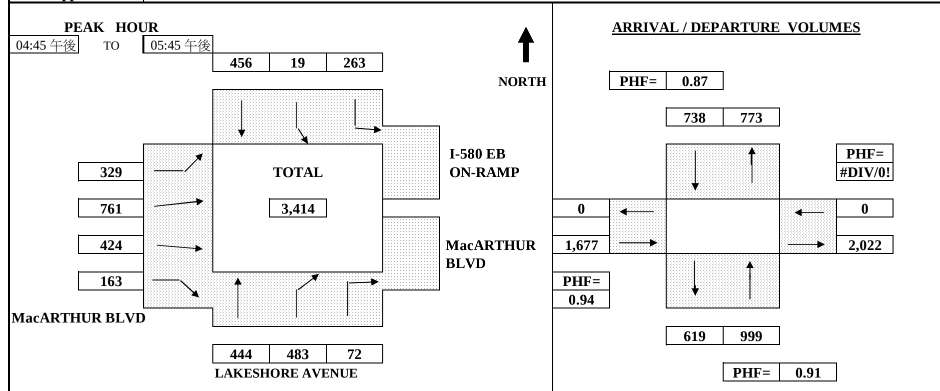
B.A.Y.M.E.T.R.I.C.S.

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT:	OAKLAND TRAFFIC STUDY	SURVEY DATE:	2008/11/06	DAY:	THURSDAY
N-S Approach:	LAKESHORE AVENUE	SURVEY TIME:	4:00 午後	TO	6:00 午後
E-W Approach:	MacARTHUR BLVD / I-580 EB ON-RAMP	CITY: OAKLAND		FILE:	2811065-4PM



TIME PERIOD From		To	NORTHBOUND Thur	To 580	To Mac	SOUTHBOUND Thru	To Mac	To 580	EASTBOUND Left	To 580	To Mac	Right	WESTBOUND		TOTAL
SURVEY DATA															
4:00 PM	---	4:15 午後	84	121	0	104	0	76	8	176	86	42	0	0	*697*
4:15 午後	---	4:30 午後	166	206	7	191	6	138	50	311	129	83	0	0	*1,287*
4:30 午後	---	4:45 午後	253	309	11	279	11	206	191	447	194	128	0	0	*2,029*
4:45 午後	---	5:00 午後	351	424	27	385	18	272	264	629	280	183	0	0	*2,833*
5:00 午後	---	5:15 午後	461	567	40	522	20	344	318	832	395	224	0	0	*3,723*
5:15 午後	---	5:30 午後	560	675	63	619	24	405	435	1,017	496	267	0	0	*4,561*
5:30 午後	---	5:45 午後	697	792	83	735	30	469	520	1,208	618	291	0	0	*5,443*
5:45 午後	---	6:00 午後	790	879	100	848	36	537	591	1,362	750	329	0	0	*6,222*
TOTAL BY PERIOD															
4:00 PM	---	4:15 午後	84	121	0	104	0	76	8	176	86	42	0	0	*697*
4:15 午後	---	4:30 午後	82	85	7	87	6	62	42	135	43	41	0	0	*590*
4:30 午後	---	4:45 午後	87	103	4	88	5	68	141	136	65	45	0	0	*742*
4:45 午後	---	5:00 午後	98	115	16	106	7	66	73	182	86	55	0	0	*804*
5:00 午後	---	5:15 午後	110	143	13	137	2	72	54	203	115	41	0	0	*890*
5:15 午後	---	5:30 午後	99	108	23	97	4	61	117	185	101	43	0	0	*838*
5:30 午後	---	5:45 午後	137	117	20	116	6	64	85	191	122	24	0	0	*882*
5:45 午後	---	6:00 午後	93	87	17	113	6	68	71	154	132	38	0	0	*779*
HOURLY TOTALS															
4:00 PM	---	5:00 午後	351	424	27	385	18	272	264	629	280	183	0	0	*2,833*
4:15 午後	---	5:15 午後	377	446	40	418	20	268	310	656	309	182	0	0	*3,026*
4:30 午後	---	5:30 午後	394	469	56	428	18	267	385	706	367	184	0	0	*3,274*
4:45 午後	---	5:45 午後	444	483	72	456	19	263	329	761	424	163	0	0	*3,414*
5:00 午後	---	6:00 午後	439	455	73	463	18	265	327	733	470	146	0	0	*3,389*

Telephone: (510)232-1271 **Fax: (510)232-1272**

WILTEC
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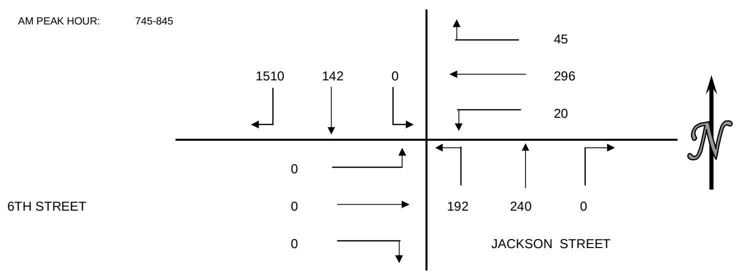
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
PROJECT: 1938 BROADWAY TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 23, 2008
PERIOD" 7:00 AM TO 9:00 AM
INTERSECTION: N/S JACKSON STREET
E/W 6TH STREET
CITY: OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-715	277	19	0	7	65	3	0	33	38	0	0	0	442
715-730	373	36	0	10	71	6	0	33	43	0	0	0	572
730-745	336	19	0	9	81	2	0	42	61	0	0	0	550
745-800	392	33	0	9	77	5	0	69	57	0	0	0	642
800-815	368	26	0	11	73	5	0	54	47	0	0	0	584
815-830	399	39	0	13	77	3	0	65	41	0	0	0	637
830-845	351	44	0	12	69	7	0	52	47	0	0	0	582
845-900	320	42	0	7	96	5	0	66	50	0	0	0	586
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
700-800	1378	107	0	35	294	16	0	177	199	0	0	0	2206
715-815	1469	114	0	39	302	18	0	198	208	0	0	0	2348
730-830	1495	117	0	42	308	15	0	230	206	0	0	0	2413
745-845	1510	142	0	45	296	20	0	240	192	0	0	0	2445
800-900	1438	151	0	43	315	20	0	237	185	0	0	0	2389
PHF	0.946115	0.806818		0.865385	0.961039	0.714286		0.869565	0.842105				



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	1	0	2	3
715-730	0	8	0	1	9
730-745	0	8	0	0	8
745-800	0	15	1	1	17
800-815	1	19	0	0	20
815-830	1	11	1	0	13
830-845	0	12	0	1	13
845-900	0	14	0	1	15
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	0	32	1	4	37
715-815	1	50	1	2	54
730-830	2	53	2	1	58
745-845	2	57	2	2	63
800-900	2	56	1	2	61

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-715	0	0	0	1	1
715-730	0	0	0	0	0
730-745	0	0	0	0	0
745-800	0	0	0	0	0
800-815	0	0	0	0	0
815-830	0	0	0	0	0
830-845	0	0	0	0	0
845-900	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
700-800	0	0	0	1	1
715-815	0	0	0	0	0
730-830	0	0	0	0	0
745-845	0	0	0	0	0
800-900	0	0	0	0	0

WILTEC
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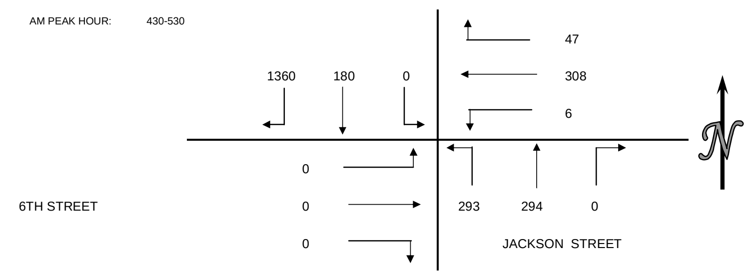
INTERSECTION CAR/PED/BIKE TRAFFIC COUNT RESULTS SUMMARY

CLIENT: DOWLING ASSOCIATES
PROJECT: 1938 BROADWAY TRAFFIC COUNTS
DATE: THURSDAY OCTOBER 23, 2008
PERIOD" 4:00 PM TO 6:00 PM
INTERSECTION: N/S JACKSON STREET
E/W 6TH STREET
CITY: OAKLAND

VEHICLE COUNTS

15 MIN COUNTS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-415	335	42	0	7	101	1	0	60	73	0	0	0	619
415-430	307	29	0	9	67	1	0	52	70	0	0	0	535
430-445	345	45	0	11	97	2	0	79	87	0	0	0	666
445-500	329	43	0	11	53	1	0	82	74	0	0	0	593
500-515	348	49	0	11	99	0	0	76	72	0	0	0	655
515-530	338	43	0	14	59	3	0	57	60	0	0	0	574
530-545	336	48	0	9	83	1	0	56	52	0	0	0	585
545-600	304	52	0	19	83	4	0	59	69	0	0	0	590
HOUR TOTALS	1	2	3	4	5	6	7	8	9	10	11	12	
PERIOD	SBRT	SBTH	SBLT	WBRT	WBTH	WBLT	NBRT	NBTH	NBLT	EBRT	EBTH	EBLT	TOTAL
400-500	1316	159	0	38	318	5	0	273	304	0	0	0	2413
415-515	1329	166	0	42	316	4	0	289	303	0	0	0	2449
430-530	1360	180	0	47	308	6	0	294	293	0	0	0	2488
445-545	1351	183	0	45	294	5	0	271	258	0	0	0	2407
500-600	1326	192	0	53	324	8	0	248	253	0	0	0	2404
PHF	0.977011	0.918367		0.839286	0.777778	0.5		0.896341	0.841954				



PEDESTRIAN COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	11	0	0	11
415-430	0	3	0	0	3
430-445	0	7	0	0	7
445-500	0	3	0	0	3
500-515	0	9	0	0	9
515-530	0	4	0	0	4
530-545	0	6	0	0	6
545-600	0	8	0	0	8
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	0	24	0	0	24
415-515	0	22	0	0	22
430-530	0	23	0	0	23
445-545	0	22	0	0	22
500-600	0	27	0	0	27

BICYCLE COUNTS

15 MIN COUNTS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-415	0	0	0	0	0
415-430	0	0	0	1	1
430-445	0	0	0	0	0
445-500	0	0	0	0	0
500-515	0	2	0	0	2
515-530	0	0	0	0	0
530-545	0	2	0	0	2
545-600	0	0	0	0	0
HOUR TOTALS	NORTH	EAST	SOUTH	WEST	TOTAL
PERIOD	LEG	LEG	LEG	LEG	
400-500	0	0	0	1	1
415-515	0	2	0	1	3
430-530	0	2	0	0	2
445-545	0	4	0	0	4
500-600	0	4	0	0	4

PEAK HOUR ITM SUMMARY

#013 MacArthur Blvd & Harrison Avenue

LOCATION #:	013	QTD PRJ #:	080170	AM PEAK:	800 AM
NORTH / SOUTH:	MacArthur Blvd	DATE:	Wednesday, April 16, 2008	MD PEAK:	1230 PM
EAST / WEST:	Harrison Avenue	VICINITY:	OAKLAND, CA	PM PEAK:	500 PM

MacArthur Blvd

Southbound approach (north leg):

LN	0	0	0
AM	0	0	0
MD	0	0	0
PM	0	0	0
TOTAL	0	0	0

North leg departure:

TOTAL	PM	MD	AM
3327	1023	1025	1279

Harrison Avenue (west leg departure):

TOTAL	PM	MD	AM
2394	650	909	835

Harrison Avenue

Eastbound approach (west leg):

LN	AM	MD	PM	TOTAL
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

NORTH

WEST **SIGNALIZED** EAST

SOUTH

Westbound approach (east leg):

TOTAL	PM	MD	AM	LN
66	25	27	14	0.5
1795	473	622	700	1.5
0	0	0	0	0

Harrison Avenue

East leg departure:

AM	MD	PM	TOTAL
0	0	0	0

South leg departure:

AM	MD	PM	TOTAL
0	0	0	0

MacArthur Blvd

Northbound approach (south leg):

TOTAL	599	3261	0
PM	177	998	0
MD	287	998	0
AM	135	1265	0
LN	1.5	2.5	0

AM COUNT	7:00 AM	TO	9:00 AM	MD COUNT	12:00 PM	TO	2:00 PM	PM COUNT	4:00 PM	TO	6:00 PM

QUALITY TRAFFIC DATA, LLC
11040 Santa Monica Blvd, Suite 207, Los Angeles, CA 90025
Phone: 310-341-0019 Fax: 310-807-9247 Info@QualityTrafficData.com

VEHICLE TURNING MOVEMENT COUNT

#013 MacArthur Blvd & Harrison Avenue - AM PEAK

LOCATION #:	013	QTD PRJ #:	080170
NORTH / SOUTH:	MacArthur Blvd	DATE:	Wednesday, April 16, 2008
EAST / WEST:	Harrison Avenue	VICINITY:	OAKLAND, CA

DIRECTION:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTALS:
LANES:	1.5	2.5	0	0	0	0	0	0	0	0	1.5	0.5	
6:00 AM													
6:15 AM													
6:30 AM													
6:45 AM													
7:00 AM	38	290	0	0	0	0	0	0	0	0	119	5	452
7:15 AM	42	296	0	0	0	0	0	0	0	0	177	3	518
7:30 AM	97	302	0	0	0	0	0	0	0	0	188	8	595
7:45 AM	62	298	0	0	0	0	0	0	0	0	112	6	478
8:00 AM	44	291	0	0	0	0	0	0	0	0	110	2	447
8:15 AM	34	338	0	0	0	0	0	0	0	0	178	3	553
8:30 AM	29	345	0	0	0	0	0	0	0	0	226	5	605
8:45 AM	28	291	0	0	0	0	0	0	0	0	186	4	509
9:00 AM													
9:15 AM													
9:30 AM													
9:45 AM													
10:00 AM													
10:15 AM													
10:30 AM													

VOLUME STATS:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
TOTAL:	374	2451	0	0	0	0	0	0	0	0	1296	36	4157
P.H.V: 1	135	1265	0	0	0	0	0	0	0	0	700	14	2114
P.H.F: 2		0.936			0.000			0.000			0.773		0.874

(1) Peak Hour Volume (Peak Hour Begins At 800 AM)
(2) Peak Hour Factor (directional aggregate)

QUALITY TRAFFIC DATA, LLC
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VEHICLE TURNING MOVEMENT COUNT

#013 MacArthur Blvd & Harrison Avenue - PM PEAK

LOCATION #:	013	QTD PRJ #:	080170
NORTH / SOUTH:	MacArthur Blvd	DATE:	Wednesday, April 16, 2008
EAST / WEST:	Harrison Avenue	VICINITY:	OAKLAND, CA

DIRECTION:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTALS:
LANES:	1.5	2.5	0	0	0	0	0	0	0	0	1.5	0.5	
4:00 PM	34	220	0	0	0	0	0	0	0	0	127	8	389
4:15 PM	41	232	0	0	0	0	0	0	0	0	134	9	416
4:30 PM	55	251	0	0	0	0	0	0	0	0	100	4	410
4:45 PM	51	231	0	0	0	0	0	0	0	0	105	4	391
5:00 PM	57	236	0	0	0	0	0	0	0	0	115	14	422
5:15 PM	46	261	0	0	0	0	0	0	0	0	112	7	426
5:30 PM	38	252	0	0	0	0	0	0	0	0	129	2	421
5:45 PM	36	249	0	0	0	0	0	0	0	0	117	2	404
6:00 PM													
6:15 PM													
6:30 PM													
6:45 PM													

VOLUME STATS:	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	
TOTAL:	358	1932	0	0	0	0	0	0	0	0	939	50	3279
P.H.V: 1	177	998	0	0	0	0	0	0	0	0	473	25	1673
P.H.F: 2		0.957			0.000			0.000			0.950		0.982

(1) Peak Hour Volume (Peak Hour Begins At 500 PM)
(2) Peak Hour Factor (directional aggregate)

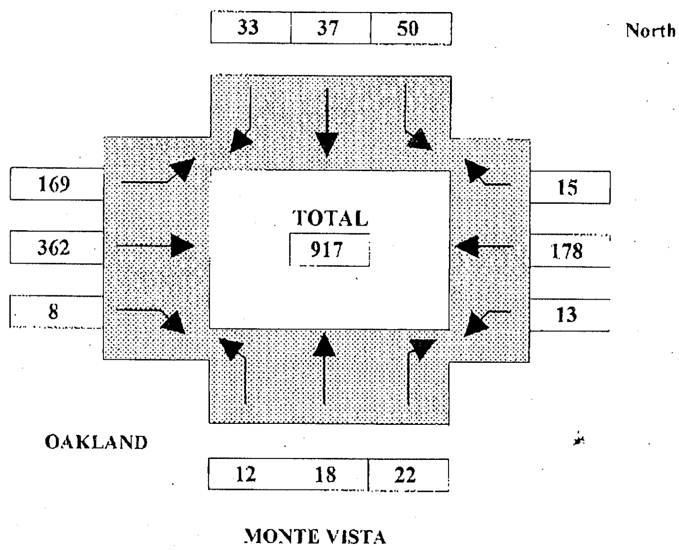
QUALITY TRAFFIC DATA, LLC
11040 Santa Monica Blvd, Suite 207, Los Angeles, CA 90025
Phone: 310-341-0019 Fax: 310-807-9247 Info@QualityTrafficData.com

BAYMETRICS TRAFFIC RESOURCES

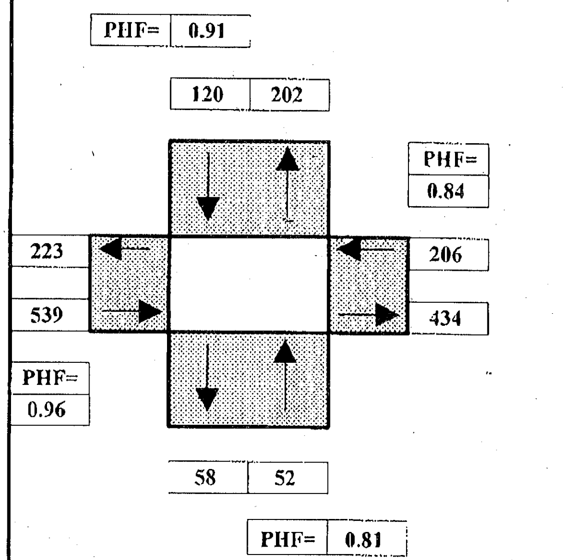
INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT: 412 COURT ST. TS	SURVEY DATE: 7 / 31 / 2007	DAY: TUESDAY	
N-S Approach: MONTE VISTA	SURVEY TIME: 7:00 AM	TO	9:00 AM
E-W Approach: OAKLAND	CITY: OAKLAND	FILE: OLMVOLAM	

PEAK HOUR
08:00 AM TO 09:00 AM



ARRIVAL / DEPARTURE VOLUMES

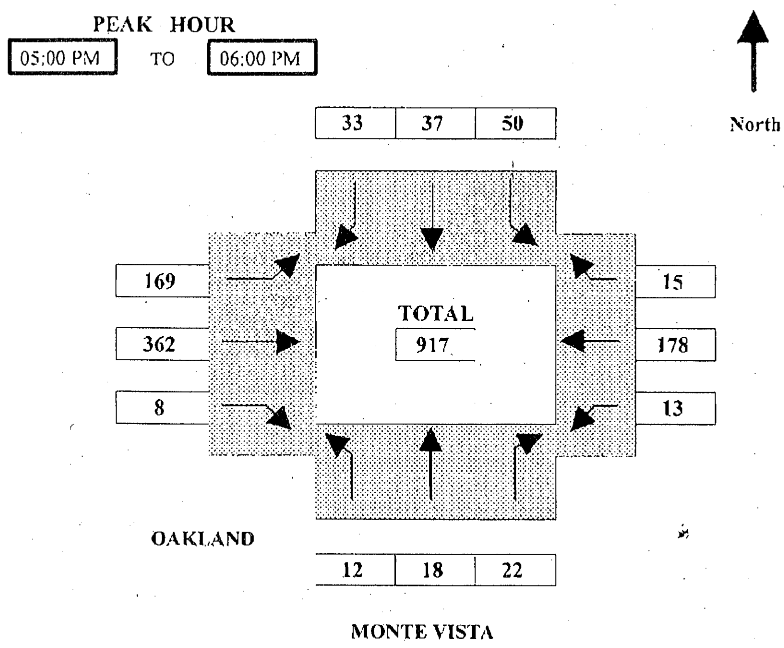


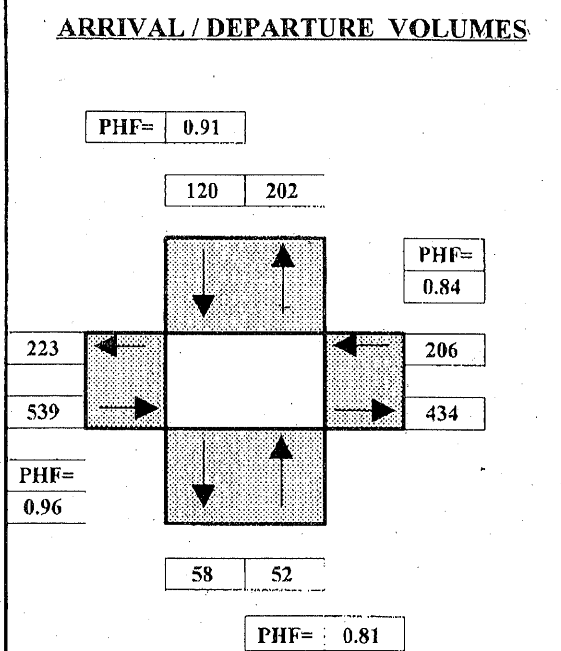
TIME PERIOD From		To	NORTHBOUND Left	NORTHBOUND Thru	NORTHBOUND Right	SOUTHBOUND Left	SOUTHBOUND Thru	SOUTHBOUND Right	EASTBOUND Left	EASTBOUND Thru	EASTBOUND Right	WESTBOUND Left	WESTBOUND Thru	WESTBOUND Right	TOTAL
SURVEY DATA															
07:00 AM	---	07:15 AM	0	1	3	7	5	4	25	59	2	2	56	3	*167*
07:15 AM	---	07:30 AM	2	1	10	17	13	10	55	127	3	5	107	5	*355*
07:30 AM	---	07:45 AM	3	2	15	29	24	15	79	199	3	9	155	10	*543*
07:45 AM	---	08:00 AM	3	4	23	39	33	22	114	284	7	11	207	14	*761*
08:00 AM	---	08:15 AM	7	10	29	53	45	25	156	380	10	15	247	20	*997*
08:15 AM	---	08:30 AM	10	13	36	70	53	33	203	468	13	17	300	22	*1,238*
08:30 AM	---	08:45 AM	13	18	40	81	60	43	241	553	13	20	344	25	*1,451*
08:45 AM	---	09:00 AM	15	22	45	89	70	55	283	646	15	24	385	29	*1,678*
TOTAL BY PERIOD															
07:00 AM	---	07:15 AM	0	1	3	7	5	4	25	59	2	2	56	3	*167*
07:15 AM	---	07:30 AM	2	0	7	10	8	6	30	68	1	3	51	2	*188*
07:30 AM	---	07:45 AM	1	1	5	12	11	5	24	72	0	4	48	5	*188*
07:45 AM	---	08:00 AM	0	2	8	10	9	7	35	85	4	2	52	4	*218*
08:00 AM	---	08:15 AM	4	6	6	14	12	3	42	96	3	4	40	6	*236*
08:15 AM	---	08:30 AM	3	3	7	17	8	8	47	88	3	2	53	2	*241*
08:30 AM	---	08:45 AM	3	5	4	11	7	10	38	85	0	3	44	3	*213*
08:45 AM	---	09:00 AM	2	4	5	8	10	12	42	93	2	4	41	4	*227*
HOURLY TOTALS															
07:00 AM	---	08:00 AM	3	4	23	39	33	22	114	284	7	11	207	14	*761*
07:15 AM	---	08:15 AM	7	9	26	46	40	21	131	321	8	13	191	17	*830*
07:30 AM	---	08:30 AM	8	12	26	53	40	23	148	341	10	12	193	17	*883*
07:45 AM	---	08:45 AM	10	16	25	52	36	28	162	354	10	11	189	15	*908*
08:00 AM	---	09:00 AM	12	18	22	50	37	33	169	362	8	13	178	15	*917*

BAYMETRICS TRAFFIC RESOURCES

INTERSECTION TURNING MOVEMENT SUMMARY

PROJECT: 412 COURT ST. TS	SURVEY DATE: 7 / 31 / 2007		DAY: TUESDAY
N-S Approach: MONTE VISTA	SURVEY TIME: 4:00 PM	TO	6:00 PM
E-W Approach: OAKLAND	CITY: OAKLAND		FILE: OLMVOLPM





TIME PERIOD From		To	NORTHBOUND Left	Thru	Right	SOUTHBOUND Left	Thru	Right	EASTBOUND Left	Thru	Right	WESTBOUND Left	Thru	Right	TOTAL
SURVEY DATA															
04:00 PM	---	04:15 PM	0	1	3	7	5	4	25	59	2	2	56	3	*167*
04:15 PM	---	04:30 PM	2	1	10	17	13	10	55	127	3	5	107	5	*355*
04:30 PM	---	04:45 PM	3	2	15	29	24	15	79	199	3	9	155	10	*543*
04:45 PM	---	05:00 PM	3	4	23	39	33	22	114	284	7	11	207	14	*761*
05:00 PM	---	05:15 PM	7	10	29	53	45	25	156	380	10	15	247	20	*997*
05:15 PM	---	05:30 PM	10	13	36	70	53	33	203	468	13	17	300	22	*1,238*
05:30 PM	---	05:45 PM	13	18	40	81	60	43	241	553	13	20	344	25	*1,451*
05:45 PM	---	06:00 PM	15	22	45	89	70	55	283	646	15	24	385	29	*1,678*
TOTAL BY PERIOD															
04:00 PM	---	04:15 PM	0	1	3	7	5	4	25	59	2	2	56	3	*167*
04:15 PM	---	04:30 PM	2	0	7	10	8	6	30	68	1	3	51	2	*188*
04:30 PM	---	04:45 PM	1	1	5	12	11	5	24	72	0	4	48	5	*188*
04:45 PM	---	05:00 PM	0	2	8	10	9	7	35	85	4	2	52	4	*218*
05:00 PM	---	05:15 PM	4	6	6	14	12	3	42	96	3	4	40	6	*236*
05:15 PM	---	05:30 PM	3	3	7	17	8	8	47	88	3	2	53	2	*241*
05:30 PM	---	05:45 PM	3	5	4	11	7	10	38	85	0	3	44	3	*213*
05:45 PM	---	06:00 PM	2	4	5	8	10	12	42	93	2	4	41	4	*227*
HOURLY TOTALS															
04:00 PM	---	05:00 PM	3	4	23	39	33	22	114	284	7	11	207	14	*761*
04:15 PM	---	05:15 PM	7	9	26	46	40	21	131	321	8	13	191	17	*830*
04:30 PM	---	05:30 PM	8	12	26	53	40	23	148	341	10	12	193	17	*883*
04:45 PM	---	05:45 PM	10	16	25	52	36	28	162	354	10	11	189	15	*908*
05:00 PM	---	06:00 PM	12	18	22	50	37	33	169	362	8	13	178	15	*917*

Appendix B

Level of Service Calculation Worksheets

Existing Conditions AM Peak Hour

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	0	0	459	292	155	1088
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0	4.0
Lane Util. Factor			0.95	1.00	1.00	0.95
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			3539	1583	1770	3539
Flt Permitted			1.00	1.00	0.95	1.00
Satd. Flow (perm)			3539	1583	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	499	317	168	1183
RTOR Reduction (vph)	0	0	0	176	0	0
Lane Group Flow (vph)	0	0	499	141	168	1183
Turn Type				Perm	Prot	
Protected Phases			2		1	2 4
Permitted Phases				2		2 4
Actuated Green, G (s)			35.6	35.6	11.9	60.1
Effective Green, g (s)			35.6	35.6	11.9	60.1
Actuated g/C Ratio			0.44	0.44	0.15	0.75
Clearance Time (s)			4.0	4.0	4.0	
Vehicle Extension (s)			3.0	3.0	3.0	
Lane Grp Cap (vph)			1575	704	263	2659
v/s Ratio Prot			0.14		c0.09	c0.33
v/s Ratio Perm				0.09		
v/c Ratio			0.32	0.20	0.64	0.44
Uniform Delay, d1			14.3	13.5	32.0	3.7
Progression Factor			1.00	1.00	1.26	0.08
Incremental Delay, d2			0.5	0.6	4.3	0.1
Delay (s)			14.9	14.2	44.5	0.4
Level of Service			B	B	D	A
Approach Delay (s)	0.0		14.6			5.9
Approach LOS	A		B			A

Intersection Summary			
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	180	261	0	918	572	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	196	284	0	998	622	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1121	311	622			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1121	311	622			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	2	59	100			
cM capacity (veh/h)	200	685	955			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	196	284	499	499	311	311
Volume Left	196	0	0	0	0	0
Volume Right	0	284	0	0	0	0
cSH	200	685	1700	1700	1700	1700
Volume to Capacity	0.98	0.41	0.29	0.29	0.18	0.18
Queue Length 95th (ft)	207	51	0	0	0	0
Control Delay (s)	106.9	13.9	0.0	0.0	0.0	0.0
Lane LOS	F	B				
Approach Delay (s)	51.9		0.0		0.0	
Approach LOS	F					

Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	395	626	270	0	571	182	277	980	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4895			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4895			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	429	680	293	0	621	198	301	1065	0
RTOR Reduction (vph)	0	0	0	46	0	0	0	165	0	0	0
Lane Group Flow (vph)	0	0	0	1356	0	0	621	33	301	1065	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				34.9			17.5	17.5	40.6	62.1	
Effective Green, g (s)				34.9			17.5	17.5	40.6	62.1	
Actuated g/C Ratio				0.33			0.17	0.17	0.38	0.59	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1612			584	261	678	2073	
v/s Ratio Prot				c0.28			c0.18		0.17	c0.30	
v/s Ratio Perm								0.02			
v/c Ratio				0.84			1.06	0.13	0.44	0.51	
Uniform Delay, d1				33.0			44.3	37.7	24.3	13.0	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				4.2			55.2	1.0	2.1	0.9	
Delay (s)				37.1			99.5	38.7	26.4	13.9	
Level of Service				D			F	D	C	B	
Approach Delay (s)	0.0			37.1			84.8			16.7	
Approach LOS	A			D			F			B	

Intersection Summary			
HCM Average Control Delay	40.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	260	443	196	184	340	259	30	229	31	654
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0			3.5	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95	1.00			1.00	0.95
Frt	1.00	0.99	0.85	0.85	1.00	0.85			1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1610	3177	1441	1583	3539	1583			1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1610	3177	1441	1583	3539	1583			1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	482	213	200	370	282	33	249	34	711
RTOR Reduction (vph)	0	0	0	76	0	3	0	0	0	0
Lane Group Flow (vph)	255	531	192	124	370	312	0	0	283	711
Turn Type	Split		Prot	Perm		Perm		Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4		2				
Actuated Green, G (s)	28.1	28.1	28.1	28.1	43.2	43.2			22.2	68.9
Effective Green, g (s)	28.1	28.1	28.1	28.1	43.2	43.2			22.2	68.9
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.41	0.41			0.21	0.65
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0			3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	427	842	382	420	1442	645			371	2300
v/s Ratio Prot	0.16	c0.17	0.13		0.10				c0.16	0.20
v/s Ratio Perm				0.08		c0.20				
v/c Ratio	0.60	0.63	0.50	0.30	0.26	0.48			0.76	0.31
Uniform Delay, d1	34.0	34.4	33.0	31.1	20.8	23.2			39.4	8.1
Progression Factor	0.75	0.75	0.75	0.59	1.00	1.00			1.00	1.00
Incremental Delay, d2	1.7	1.2	0.8	0.3	0.4	2.6			9.0	0.3
Delay (s)	27.1	26.9	25.4	18.6	21.2	25.8			48.4	8.5
Level of Service	C	C	C	B	C	C			D	A
Approach Delay (s)		25.3			23.3					19.8
Approach LOS		C			C					B

Intersection Summary			
HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Existing AM
Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations					↑↑↑↱			↰↑↑				
Volume (vph)	0	0	0	0	2104	103	381	333	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6363			4953				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6363			4953				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2287	112	414	362	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2391	0	0	775	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3022			2105				
v/s Ratio Prot					c0.38							
v/s Ratio Perm								0.16				
v/c Ratio					0.79			0.37				
Uniform Delay, d1					17.7			15.7				
Progression Factor					1.00			1.16				
Incremental Delay, d2					2.2			0.4				
Delay (s)					19.9			18.6				
Level of Service					B			B				
Approach Delay (s)		0.0			19.9			18.6			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Existing AM
Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations				↰	↰↑↑						↑↱	
Volume (vph)	0	0	0	973	1418	0	0	0	0	0	990	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4755						3523	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4755						3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1058	1541	0	0	0	0	0	1076	33
RTOR Reduction (vph)	0	0	0	5	5	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	630	1959	0	0	0	0	0	1106	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2734						1145	
v/s Ratio Prot											c0.31	
v/s Ratio Perm				c0.41	0.41							
v/c Ratio				0.72	0.72						0.97	
Uniform Delay, d1				12.3	12.3						26.6	
Progression Factor				1.39	1.38						1.00	
Incremental Delay, d2				3.4	1.1						19.6	
Delay (s)				20.6	18.0						46.2	
Level of Service				C	B						D	
Approach Delay (s)		0.0			18.7			0.0			46.2	
Approach LOS		A			B			A			D	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Existing AM
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	74	189	6	9	391	13	9	6	8	18	14	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	205	7	10	425	14	10	7	9	20	15	14

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	80	212	449	25	49
Volume Left (vph)	80	0	10	10	20
Volume Right (vph)	0	7	14	9	14
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.6	5.1	4.6	5.6	5.6
Degree Utilization, x	0.13	0.30	0.57	0.04	0.08
Capacity (veh/h)	627	689	772	555	569
Control Delay (s)	8.2	9.0	13.4	8.8	9.0
Approach Delay (s)	8.8		13.4	8.8	9.0
Approach LOS	A		B	A	A

Intersection Summary			
Delay	11.4		
HCM Level of Service	B		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Existing AM
Kaiser Center Transportation Study

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations	↰↰	↱	↑↑			↑↑
Volume (vph)	443	302	459	0	0	800
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	0.97	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	1583	3539			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	1583	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	482	328	499	0	0	870
RTOR Reduction (vph)	0	169	0	0	0	0
Lane Group Flow (vph)	482	159	499	0	0	870
Turn Type		custom				
Protected Phases	4		2			2
Permitted Phases		2				
Actuated Green, G (s)	20.5	35.6	35.6			35.6
Effective Green, g (s)	20.5	35.6	35.6			35.6
Actuated g/C Ratio	0.26	0.44	0.44			0.44
Clearance Time (s)	4.0	4.0	4.0			4.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	880	704	1575			1575
v/s Ratio Prot	c0.14		0.14			c0.25
v/s Ratio Perm		0.10				
v/c Ratio	0.55	0.23	0.32			0.55
Uniform Delay, d1	25.7	13.7	14.3			16.3
Progression Factor	1.00	1.00	0.13			1.00
Incremental Delay, d2	0.7	0.7	0.5			1.4
Delay (s)	26.4	14.4	2.4			17.7
Level of Service	C	B	A			B
Approach Delay (s)	21.6		2.4			17.7
Approach LOS	C		A			B

Intersection Summary			
HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	23.9
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	471	0	572	262	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	512	0	622	285	0	0

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total (vph)	512	311	311	285
Volume Left (vph)	512	0	0	0
Volume Right (vph)	0	0	0	285
Hadj (s)	0.23	0.03	0.03	-0.67
Departure Headway (s)	4.8	4.9	4.9	3.2
Degree Utilization, x	0.68	0.42	0.42	0.25
Capacity (veh/h)	751	726	727	1112
Control Delay (s)	17.1	10.2	10.2	6.1
Approach Delay (s)	17.1	8.9		
Approach LOS	C	A		

Intersection Summary			
Delay	11.9		
HCM Level of Service	B		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis — Existing PM
45: El Embarcadero (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	0	0	1000	700	235	723
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0	4.0
Lane Util. Factor			0.95	1.00	1.00	0.95
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			3539	1583	1770	3539
Flt Permitted			1.00	1.00	0.95	1.00
Satd. Flow (perm)			3539	1583	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1087	761	255	786
RTOR Reduction (vph)	0	0	0	274	0	0
Lane Group Flow (vph)	0	0	1087	487	255	786
Turn Type				Perm	Prot	
Protected Phases			2		1	2 4
Permitted Phases				2		
Actuated Green, G (s)			37.0	37.0	14.9	57.1
Effective Green, g (s)			37.0	37.0	14.9	57.1
Actuated g/C Ratio			0.46	0.46	0.19	0.71
Clearance Time (s)			4.0	4.0	4.0	
Vehicle Extension (s)			3.0	3.0	3.0	
Lane Grp Cap (vph)			1637	732	330	2526
v/s Ratio Prot			0.31		c0.14	c0.22
v/s Ratio Perm				c0.31		
v/c Ratio			0.66	0.67	0.77	0.31
Uniform Delay, d1			16.7	16.7	30.9	4.2
Progression Factor			1.00	1.00	1.34	0.08
Incremental Delay, d2			2.1	4.7	9.9	0.1
Delay (s)			18.8	21.4	51.3	0.4
Level of Service			B	C	D	A
Approach Delay (s)	0.0		19.9			12.9
Approach LOS	A		B			B

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis — Existing PM
46: El Embarcadero (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	311	623	0	1015	466	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	338	677	0	1103	507	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1058	253	507			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1058	253	507			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	9	100			
cM capacity (veh/h)	220	746	1054			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	338	677	552	552	253	253
Volume Left	338	0	0	0	0	0
Volume Right	0	677	0	0	0	0
cSH	220	746	1700	1700	1700	1700
Volume to Capacity	1.54	0.91	0.32	0.32	0.15	0.15
Queue Length 95th (ft)	521	305	0	0	0	0
Control Delay (s)	303.5	38.0	0.0	0.0	0.0	0.0
Lane LOS	F	E				
Approach Delay (s)	126.4		0.0		0.0	
Approach LOS	F					

Intersection Summary			
Average Delay	48.9		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis — Existing PM
47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	298	768	224	0	696	560	350	738	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4913			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4913			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	324	835	243	0	757	609	380	802	0
RTOR Reduction (vph)	0	0	0	38	0	0	0	106	0	0	0
Lane Group Flow (vph)	0	0	0	1364	0	0	757	503	380	802	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				29.4			21.0	21.0	26.6	51.6	
Effective Green, g (s)				29.4			21.0	21.0	26.6	51.6	
Actuated g/C Ratio				0.33			0.23	0.23	0.30	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1605			826	369	523	2029	
v/s Ratio Prot				c0.28			0.21		c0.21	0.23	
v/s Ratio Perm								c0.32			
v/c Ratio				0.85			0.92	1.36	0.73	0.40	
Uniform Delay, d1				28.2			33.6	34.5	28.4	10.6	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				4.4			16.6	180.3	5.0	0.1	
Delay (s)				32.7			50.2	214.8	33.4	10.7	
Level of Service				C			D	F	C	B	
Approach Delay (s)	0.0			32.7			123.6			18.0	
Approach LOS	A			C			F			B	

Intersection Summary			
HCM Average Control Delay	59.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Existing PM
48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	329	761	424	163	444	483	72	263	19	456
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0			4.0	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95	1.00			1.00	0.95
Frt	1.00	0.99	0.85	0.85	1.00	0.85			1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1610	3164	1441	1583	3539	1583			1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1610	3164	1441	1583	3539	1583			1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	827	461	177	483	525	78	286	21	496
RTOR Reduction (vph)	0	0	0	36	0	6	0	0	0	0
Lane Group Flow (vph)	322	928	396	141	483	597	0	0	307	496
Turn Type	Split		Prot	Perm		Perm		Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4		2				
Actuated Green, G (s)	28.0	28.0	28.0	28.0	37.0	37.0			12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0	28.0	37.0	37.0			12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.41	0.41			0.13	0.59
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	501	984	448	492	1455	651			236	2084
v/s Ratio Prot	0.20	c0.29	0.27		0.14				c0.17	0.14
v/s Ratio Perm				0.09		c0.38				
v/c Ratio	0.64	0.94	0.88	0.29	0.33	0.92			1.30	0.24
Uniform Delay, d1	26.7	30.2	29.5	23.4	18.1	25.1			39.0	8.8
Progression Factor	0.76	0.79	0.78	0.66	1.00	1.00			1.00	1.00
Incremental Delay, d2	2.1	7.6	8.6	0.5	0.6	20.0			162.8	0.3
Delay (s)	22.4	31.6	31.7	16.0	18.7	45.0			201.8	9.1
Level of Service	C	C	C	B	B	D			F	A
Approach Delay (s)		28.5			33.3					82.8
Approach LOS		C			C					F

Intersection Summary			
HCM Average Control Delay	41.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Existing PM
49: Santa Clara Avenue & Oakland Avenue — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1213	172	242	745	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6288			5024				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6288			5024				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1318	187	263	810	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	29	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1477	0	0	1053	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3144			1842				
v/s Ratio Prot					c0.23							
v/s Ratio Perm								0.21				
v/c Ratio					0.47			0.57				
Uniform Delay, d1					9.8			15.2				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.5			1.3				
Delay (s)					10.3			16.5				
Level of Service					B			B				
Approach Delay (s)		0.0			10.3			16.5			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Existing PM
50: Santa Clara Avenue & Harrison Street — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	475	1008	0	0	0	0	0	526	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4782						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4782						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	516	1096	0	0	0	0	0	572	52
RTOR Reduction (vph)	0	0	0	79	21	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	313	1199	0	0	0	0	0	613	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2311						1340	
v/s Ratio Prot											c0.18	
v/s Ratio Perm				0.21	0.25							
v/c Ratio				0.43	0.52						0.46	
Uniform Delay, d1				10.1	10.7						13.8	
Progression Factor				1.89	1.46						1.00	
Incremental Delay, d2				1.6	0.7						1.1	
Delay (s)				20.7	16.3						15.0	
Level of Service				C	B						B	
Approach Delay (s)		0.0			17.4			0.0			15.0	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis — Existing PM
51: Oakland Avenue & Monte Vista Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	362	8	13	178	15	12	18	22	50	37	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	184	393	9	14	193	16	13	20	24	54	40	36

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	184	402	224	57	130
Volume Left (vph)	184	0	14	13	54
Volume Right (vph)	0	9	16	24	36
Hadj (s)	0.53	0.02	0.00	-0.17	-0.05
Departure Headway (s)	5.9	5.3	5.3	5.9	5.8
Degree Utilization, x	0.30	0.60	0.33	0.09	0.21
Capacity (veh/h)	595	661	654	534	562
Control Delay (s)	10.1	14.7	10.8	9.5	10.4
Approach Delay (s)	13.3		10.8	9.5	10.4
Approach LOS	B		B	A	B

Intersection Summary			
Delay	12.1		
HCM Level of Service	B		
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis — Existing PM
145: El Embarcadero (WB) & Grand Avenue — Kaiser Center Transportation Study

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	245	255	1000	0	0	713
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	0.97	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	1583	3539			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	1583	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	277	1087	0	0	775
RTOR Reduction (vph)	0	149	0	0	0	0
Lane Group Flow (vph)	266	128	1087	0	0	775
Turn Type		custom				
Protected Phases	4		2			2
Permitted Phases		2				
Actuated Green, G (s)	16.1	37.0	37.0			37.0
Effective Green, g (s)	16.1	37.0	37.0			37.0
Actuated g/C Ratio	0.20	0.46	0.46			0.46
Clearance Time (s)	4.0	4.0	4.0			4.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	691	732	1637			1637
v/s Ratio Prot	c0.08		c0.31			0.22
v/s Ratio Perm		0.08				
v/c Ratio	0.38	0.18	0.66			0.47
Uniform Delay, d1	27.7	12.6	16.7			14.8
Progression Factor	1.00	1.00	0.19			1.00
Incremental Delay, d2	0.4	0.5	1.6			1.0
Delay (s)	28.0	13.1	4.8			15.8
Level of Service	C	B	A			B
Approach Delay (s)	20.4		4.8			15.8
Approach LOS	C		A			B

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	26.9
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	350	0	466	148	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	380	0	507	161	0	0

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total (vph)	380	253	253	161
Volume Left (vph)	380	0	0	0
Volume Right (vph)	0	0	0	161
Hadj (s)	0.23	0.03	0.03	-0.67
Departure Headway (s)	4.7	4.8	4.8	3.2
Degree Utilization, x	0.49	0.34	0.34	0.14
Capacity (veh/h)	761	739	740	1121
Control Delay (s)	12.2	9.0	9.0	5.5
Approach Delay (s)	12.2	8.2		
Approach LOS	B	A		

Intersection Summary			
Delay	9.6		
HCM Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Near-Term Conditions AM Peak Hour

HCM Signalized Intersection Capacity Analysis — Near-Term AM
47: MacArthur Blvd (EB) & Grand Avenue
Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	213	282	1170	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4931			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4931			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Adj. Flow (vph)	0	0	706	743	233	0	446	224	297	1232	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	187	0	0	0
Lane Group Flow (vph)	0	0	0	1660	0	0	446	37	297	1232	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.34			c0.13		0.17	c0.35	
v/s Ratio Perm								0.02			
v/c Ratio				1.12dl			0.76	0.14	0.46	0.61	
Uniform Delay, d1				34.4			42.3	37.8	25.4	15.0	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				16.7			9.2	1.1	2.3	1.4	
Delay (s)				51.0			51.4	39.0	27.7	16.4	
Level of Service				D			D	D	C	B	
Approach Delay (s)	0.0			51.0			47.3			18.6	
Approach LOS	A			D			D			B	

Intersection Summary			
HCM Average Control Delay	37.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term AM
48: MacArthur Blvd (EB) & Lakeshore Drive
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	490	217	198	341	178	21	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3343				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3343				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95
Adj. Flow (vph)	275	516	228	208	352	184	22	363	49	484
RTOR Reduction (vph)	0	0	81	0	3	0	0	0	0	0
Lane Group Flow (vph)	247	681	218	0	555	0	0	0	412	484
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.3	30.3	30.3		34.9				28.3	66.7
Effective Green, g (s)	30.3	30.3	30.3		34.9				28.3	66.7
Actuated g/C Ratio	0.29	0.29	0.29		0.33				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	460	886	412		1101				473	2227
v/s Ratio Prot	0.15	c0.22	0.15		c0.17				c0.23	0.14
v/s Ratio Perm										
v/c Ratio	0.54	0.77	0.53		0.50				0.87	0.22
Uniform Delay, d1	31.9	34.6	31.9		28.6				37.1	8.4
Progression Factor	0.70	0.71	0.56		1.00				1.00	1.00
Incremental Delay, d2	0.7	2.5	0.8		1.7				16.0	0.2
Delay (s)	23.2	27.1	18.6		30.2				53.1	8.7
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.2			30.2					29.1
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term AM
49: Santa Clara Avenue & Oakland Avenue
Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2572	126	466	407	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6361			4952				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6361			4952				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.95	0.95	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2624	133	491	420	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2748	0	0	911	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3021			2105				
v/s Ratio Prot					c0.43							
v/s Ratio Perm								0.18				
v/c Ratio					0.91			0.43				
Uniform Delay, d1					19.4			16.2				
Progression Factor					1.00			1.13				
Incremental Delay, d2					5.3			0.5				
Delay (s)					24.7			18.8				
Level of Service					C			B				
Approach Delay (s)		0.0			24.7			18.8			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term AM
50: MacArthur Blvd (WB) & Harrison Street
Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1189	1734	0	0	0	0	0	1210	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4757						3523	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4757						3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.99	0.95	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	1201	1825	0	0	0	0	0	1274	39
RTOR Reduction (vph)	0	0	0	2	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	731	2291	0	0	0	0	0	1310	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2735						1145	
v/s Ratio Prot											c0.37	
v/s Ratio Perm				0.48	0.48							
v/c Ratio				0.84	0.84						1.14	
Uniform Delay, d1				13.9	13.9						27.0	
Progression Factor				1.39	1.39						1.00	
Incremental Delay, d2				5.1	1.7						75.7	
Delay (s)				24.5	21.1						102.7	
Level of Service				C	C						F	
Approach Delay (s)		0.0			21.9			0.0			102.7	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	46.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	231	7	11	478	16	11	7	10	22	17	16
Peak Hour Factor	0.98	0.98	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	92	236	7	12	503	17	12	7	11	23	18	17

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	92	243	532	29	58
Volume Left (vph)	92	0	12	12	23
Volume Right (vph)	0	7	17	11	17
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.7	5.2	4.7	5.9	5.9
Degree Utilization, x	0.15	0.35	0.69	0.05	0.09
Capacity (veh/h)	611	669	756	533	543
Control Delay (s)	8.5	9.8	17.4	9.2	9.5
Approach Delay (s)	9.5		17.4	9.2	9.5
Approach LOS	A		C	A	A

Intersection Summary			
Delay	13.9		
HCM Level of Service	B		
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	361	213	521	286	115	1094
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.95		0.95		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1716		3351		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1716		3351		1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	380	224	548	301	121	1152
RTOR Reduction (vph)	38	0	122	0	0	0
Lane Group Flow (vph)	566	0	727	0	121	1152
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	23.1		14.6		10.3	28.9
Effective Green, g (s)	23.1		14.6		10.3	28.9
Actuated g/C Ratio	0.38		0.24		0.17	0.48
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	661		815		304	1705
v/s Ratio Prot	c0.33		c0.22		0.07	c0.33
v/s Ratio Perm						
v/c Ratio	0.86		0.89		0.40	0.68
Uniform Delay, d1	16.9		21.9		22.1	11.9
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	10.6		14.2		3.9	2.2
Delay (s)	27.5		36.1		26.0	14.1
Level of Service	C		D		C	B
Approach Delay (s)	27.5		36.1			15.2
Approach LOS	C		D			B

Intersection Summary			
HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	233	416	206	187	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3363		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3363		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.97	0.97
Adj. Flow (vph)	357	238	438	217	193	205
RTOR Reduction (vph)	0	0	102	0	0	160
Lane Group Flow (vph)	357	238	553	0	193	45
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.0	31.2	13.2		10.9	10.9
Effective Green, g (s)	14.0	31.2	13.2		10.9	10.9
Actuated g/C Ratio	0.28	0.62	0.26		0.22	0.22
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	495	2204	886		385	344
v/s Ratio Prot	c0.20	0.07	c0.16		c0.11	
v/s Ratio Perm						0.03
v/c Ratio	0.72	0.11	0.62		0.50	0.13
Uniform Delay, d1	16.3	3.8	16.3		17.2	15.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.1	0.0	1.4		1.0	0.2
Delay (s)	21.4	3.8	17.6		18.2	16.0
Level of Service	C	A	B		B	B
Approach Delay (s)		14.4	17.6		17.1	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	50.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Near-Term Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis — Near-Term PM

47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	597	490	1038	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4963			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4963			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.97	0.97	0.95	0.95	0.92
Adj. Flow (vph)	0	0	333	1434	149	0	589	615	516	1093	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	56	0	0	0
Lane Group Flow (vph)	0	0	0	1905	0	0	589	559	516	1093	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.6	17.6	29.4	51.0	
Effective Green, g (s)				30.0			17.6	17.6	29.4	51.0	
Actuated g/C Ratio				0.33			0.20	0.20	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			692	310	578	2005	
v/s Ratio Prot				c0.38			0.17		c0.29	0.31	
v/s Ratio Perm								c0.35			
v/c Ratio				1.15			0.85	1.80	0.89	0.55	
Uniform Delay, d1				30.0			34.9	36.2	28.8	12.2	
Progression Factor				1.00			1.24	1.22	1.00	1.00	
Incremental Delay, d2				75.7			1.3	363.3	16.0	0.3	
Delay (s)				105.7			44.6	407.5	44.8	12.5	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			105.7			230.0			22.9	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	109.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term PM

48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1092	609	169	346	475	71	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.91				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3127	1441		3214				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3127	1441		3214				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	436	1149	641	178	364	500	75	346	25	256
RTOR Reduction (vph)	0	0	17	0	7	0	0	0	0	0
Lane Group Flow (vph)	392	1405	590	0	932	0	0	0	371	256
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	973	448		1321				236	2084
v/s Ratio Prot	0.24	c0.45	0.41		c0.29				c0.21	0.07
v/s Ratio Perm										
v/c Ratio	0.78	1.44	1.32		0.86dr				1.57	0.12
Uniform Delay, d1	28.2	31.0	31.0		22.0				39.0	8.2
Progression Factor	0.64	0.65	0.63		1.00				1.00	1.00
Incremental Delay, d2	1.1	200.3	144.6		3.2				276.9	0.1
Delay (s)	19.1	220.6	164.2		25.2				315.9	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		173.5			25.2					190.3
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	141.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term PM

49: Santa Clara Avenue & Oakland Avenue — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1650	234	329	1013	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6285			5024				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6285			5024				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1684	246	346	1066	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	11	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1920	0	0	1405	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3143			1842				
v/s Ratio Prot					c0.31							
v/s Ratio Perm								0.28				
v/c Ratio					0.61			0.76				
Uniform Delay, d1					10.8			16.7				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.9			3.1				
Delay (s)					11.7			19.8				
Level of Service					B			B				
Approach Delay (s)		0.0			11.7			19.8			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term PM

50: Santa Clara Avenue & Harrison Street — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	646	1371	0	0	0	0	0	715	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4778						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4778						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.99	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	680	1385	0	0	0	0	0	753	68
RTOR Reduction (vph)	0	0	0	41	26	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	455	1543	0	0	0	0	0	810	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2309						1340	
v/s Ratio Prot											c0.23	
v/s Ratio Perm				0.30	0.32							
v/c Ratio				0.62	0.67						0.60	
Uniform Delay, d1				11.4	11.8						14.8	
Progression Factor				1.47	1.41						1.00	
Incremental Delay, d2				3.0	1.2						2.0	
Delay (s)				19.8	17.9						16.9	
Level of Service				B	B						B	
Approach Delay (s)		0.0			18.3			0.0			16.9	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	492	11	18	242	20	16	24	30	68	50	45
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	242	518	12	19	255	21	17	25	32	72	53	47

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	242	529	295	74	172
Volume Left (vph)	242	0	19	17	72
Volume Right (vph)	0	12	21	32	47
Hadj (s)	0.53	0.02	0.00	-0.18	-0.05
Departure Headway (s)	6.3	5.8	5.8	6.6	6.4
Degree Utilization, x	0.42	0.85	0.47	0.14	0.31
Capacity (veh/h)	560	617	596	495	521
Control Delay (s)	12.6	31.1	13.9	10.7	12.3
Approach Delay (s)	25.3		13.9	10.7	12.3
Approach LOS	D		B	B	B

Intersection Summary			
Delay	20.2		
HCM Level of Service	C		
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1093	756	149	823
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.94		0.94		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1700		3322		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1700		3322		1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	179	1151	796	157	866
RTOR Reduction (vph)	44	0	105	0	0	0
Lane Group Flow (vph)	337	0	1842	0	157	866
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	23.3		41.5		13.2	58.7
Effective Green, g (s)	23.3		41.5		13.2	58.7
Actuated g/C Ratio	0.26		0.46		0.15	0.65
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	440		1532		260	2308
v/s Ratio Prot	c0.20		c0.55		c0.09	0.24
v/s Ratio Perm						
v/c Ratio	0.76		1.20		0.60	0.38
Uniform Delay, d1	30.8		24.2		36.0	7.2
Progression Factor	1.00		1.00		0.98	0.36
Incremental Delay, d2	7.7		97.5		3.1	0.4
Delay (s)	38.6		121.8		38.4	3.0
Level of Service	D		F		D	A
Approach Delay (s)	38.6		121.8			8.4
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	77.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	254	299	247	109	385	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3376		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3376		1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	267	315	260	115	405	471
RTOR Reduction (vph)	0	0	93	0	0	325
Lane Group Flow (vph)	267	315	282	0	405	146
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.1	25.5	9.4		15.1	15.1
Effective Green, g (s)	12.1	25.5	9.4		15.1	15.1
Actuated g/C Ratio	0.25	0.52	0.19		0.31	0.31
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	441	1857	653		550	492
v/s Ratio Prot	c0.15	0.09	c0.08		c0.23	
v/s Ratio Perm						0.09
v/c Ratio	0.61	0.17	0.43		0.74	0.30
Uniform Delay, d1	16.1	6.0	17.3		15.0	12.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.3	0.0	0.5		5.1	0.3
Delay (s)	18.5	6.1	17.7		20.1	13.1
Level of Service	B	A	B		C	B
Approach Delay (s)		11.8	17.7		16.3	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Cumulative Conditions AM Peak Hour

47: MacArthur Blvd (EB) & Grand Avenue

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	722	760	238	0	490	274	345	1367	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4931			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4931			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.98	0.92	0.98	0.98	0.98	0.98	0.92
Adj. Flow (vph)	0	0	737	776	243	0	500	280	352	1395	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	158	0	0	0
Lane Group Flow (vph)	0	0	0	1734	0	0	500	122	352	1395	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.35			c0.14		0.20	c0.39	
v/s Ratio Perm								0.08			
v/c Ratio				1.17dl			0.86	0.47	0.54	0.69	
Uniform Delay, d1				34.8			43.0	40.0	26.4	16.1	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				27.4			14.9	5.9	3.2	2.0	
Delay (s)				62.2			57.9	46.0	29.6	18.1	
Level of Service				E			E	D	C	B	
Approach Delay (s)	0.0			62.2			53.6			20.4	
Approach LOS	A			E			D			C	

Intersection Summary			
HCM Average Control Delay	43.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

48: MacArthur Blvd (EB) & Lakeshore Drive

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	291	539	239	228	398	208	24	372	50	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3097	1441		3344				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3097	1441		3344				1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	297	550	244	233	406	212	24	380	51	506
RTOR Reduction (vph)	0	0	91	0	3	0	0	0	0	0
Lane Group Flow (vph)	267	734	232	0	639	0	0	0	431	506
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.9	30.9	30.9		33.6				29.0	66.1
Effective Green, g (s)	30.9	30.9	30.9		33.6				29.0	66.1
Actuated g/C Ratio	0.29	0.29	0.29		0.32				0.27	0.62
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	469	903	420		1060				484	2207
v/s Ratio Prot	0.17	c0.24	0.16		c0.19				c0.24	0.14
v/s Ratio Perm										
v/c Ratio	0.57	0.81	0.55		0.60				0.89	0.23
Uniform Delay, d1	31.9	34.9	31.7		30.6				37.0	8.8
Progression Factor	0.75	0.76	0.62		1.00				1.00	1.00
Incremental Delay, d2	0.8	3.1	0.8		2.5				18.2	0.2
Delay (s)	24.7	29.4	20.6		33.1				55.2	9.0
Level of Service	C	C	C		C				E	A
Approach Delay (s)		26.3			33.1					30.2
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	29.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

49: Santa Clara Avenue & Oakland Avenue

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	3040	149	551	481	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6363			4953				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6363			4953				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	3102	152	562	491	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	3246	0	0	1053	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3022			2105				
v/s Ratio Prot					c0.51							
v/s Ratio Perm								0.21				
v/c Ratio					1.07			0.50				
Uniform Delay, d1					21.0			16.8				
Progression Factor					1.00			1.08				
Incremental Delay, d2					40.4			0.5				
Delay (s)					61.4			18.7				
Level of Service					E			B				
Approach Delay (s)		0.0			61.4			18.7			0.0	
Approach LOS		A			E			B			A	

Intersection Summary			
HCM Average Control Delay	51.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	115.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

50: MacArthur Blvd (WB) & Harrison Street

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1406	2049	0	0	0	0	0	1431	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4755						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4755						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	0	0	0	1435	2091	0	0	0	0	0	1460	44
RTOR Reduction (vph)	0	0	0	1	1	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	860	2664	0	0	0	0	0	1501	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2734						1145	
v/s Ratio Prot											c0.43	
v/s Ratio Perm				c0.57	0.56							
v/c Ratio				0.98	0.97						1.31	
Uniform Delay, d1				16.6	16.4						27.0	
Progression Factor				1.38	1.37						1.00	
Incremental Delay, d2				11.8	4.6						146.4	
Delay (s)				34.8	27.0						173.4	
Level of Service				C	C						F	
Approach Delay (s)		0.0			28.9			0.0			173.4	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	72.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	125.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	107	273	9	13	565	19	13	9	12	26	20	19
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	109	279	9	13	577	19	13	9	12	27	20	19

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	109	288	609	35	66
Volume Left (vph)	109	0	13	13	27
Volume Right (vph)	0	9	19	12	19
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.9	5.4	4.8	6.3	6.2
Degree Utilization, x	0.18	0.43	0.82	0.06	0.11
Capacity (veh/h)	594	651	738	520	525
Control Delay (s)	9.0	11.2	25.5	9.7	10.0
Approach Delay (s)	10.6		25.5	9.7	10.0
Approach LOS	B		D	A	B

Intersection Summary			
Delay	18.7		
HCM Level of Service	C		
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	418	250	629	307	124	1229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.95		0.95		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1715		3365		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1715		3365		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	427	255	642	313	127	1254
RTOR Reduction (vph)	37	0	98	0	0	0
Lane Group Flow (vph)	645	0	857	0	127	1254
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	24.8		14.4		8.8	27.2
Effective Green, g (s)	24.8		14.4		8.8	27.2
Actuated g/C Ratio	0.41		0.24		0.15	0.45
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	709		808		260	1604
v/s Ratio Prot	c0.38		c0.25		0.07	c0.35
v/s Ratio Perm						
v/c Ratio	0.91		1.06		0.49	0.78
Uniform Delay, d1	16.5		22.8		23.5	13.9
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	15.6		49.0		6.4	3.9
Delay (s)	32.1		71.8		30.0	17.8
Level of Service	C		E		C	B
Approach Delay (s)	32.1		71.8			18.9
Approach LOS	C		E			B

Intersection Summary			
HCM Average Control Delay	38.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	427	303	466	220	201	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3369		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3369		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	436	309	476	224	205	218
RTOR Reduction (vph)	0	0	94	0	0	171
Lane Group Flow (vph)	436	309	606	0	205	47
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	15.7	33.5	13.8		11.3	11.3
Effective Green, g (s)	15.7	33.5	13.8		11.3	11.3
Actuated g/C Ratio	0.30	0.63	0.26		0.21	0.21
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	526	2245	881		379	339
v/s Ratio Prot	c0.25	0.09	c0.18		c0.12	
v/s Ratio Perm						0.03
v/c Ratio	0.83	0.14	0.69		0.54	0.14
Uniform Delay, d1	17.3	3.9	17.6		18.4	16.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.4	0.0	2.3		1.6	0.2
Delay (s)	27.7	3.9	19.8		20.0	17.0
Level of Service	C	A	B		C	B
Approach Delay (s)		17.8	19.8		18.5	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Cumulative Conditions PM Peak Hour

HCM Signalized Intersection Capacity Analysis — Cumulative PM
47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	340	2180	153	0	615	642	738	1118	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.95			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4973			3539	1583	1770	3539	
Flt Permitted				0.95			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4973			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.98	0.92	0.98	0.98	0.98	0.98	0.92
Adj. Flow (vph)	0	0	347	2224	156	0	628	655	753	1141	0
RTOR Reduction (vph)	0	0	0	8	0	0	0	20	0	0	0
Lane Group Flow (vph)	0	0	0	2719	0	0	628	635	753	1141	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1658			688	308	580	2005	
v/s Ratio Prot				c0.55			0.18		c0.43	0.32	
v/s Ratio Perm								c0.40			
v/c Ratio				1.64			0.91	2.06	1.30	0.57	
Uniform Delay, d1				30.0			35.5	36.2	30.3	12.5	
Progression Factor				1.00			1.27	1.23	1.00	1.00	
Incremental Delay, d2				290.7			2.3	478.6	146.6	0.4	
Delay (s)				320.7			47.3	523.3	176.8	12.8	
Level of Service				F			D	F	F	B	
Approach Delay (s)	0.0			320.7			290.3			78.0	
Approach LOS	A			F			F			E	

Intersection Summary			
HCM Average Control Delay	236.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	119.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	489	1581	881	183	372	511	76	354	26	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.91				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3137	1441		3214				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3137	1441		3214				1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	499	1613	899	187	380	521	78	361	27	267
RTOR Reduction (vph)	0	0	12	0	7	0	0	0	0	0
Lane Group Flow (vph)	449	1915	822	0	972	0	0	0	388	267
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	976	448		1321				236	2084
v/s Ratio Prot	0.28	c0.61	0.57		c0.30				c0.22	0.08
v/s Ratio Perm										
v/c Ratio	0.90	1.96	1.84		0.90dr				1.64	0.13
Uniform Delay, d1	29.6	31.0	31.0		22.4				39.0	8.2
Progression Factor	0.60	0.61	0.59		1.00				1.00	1.00
Incremental Delay, d2	2.6	433.3	376.8		3.7				308.1	0.1
Delay (s)	20.3	452.1	395.2		26.1				347.1	8.4
Level of Service	C	F	F		C				F	A
Approach Delay (s)		376.7			26.1					209.0
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	282.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	107.2%	ICU Level of Service	G
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
49: Santa Clara Avenue & Oakland Avenue — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2086	296	416	1281	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6288			5024				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6288			5024				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2129	302	424	1307	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2427	0	0	1729	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3144			1842				
v/s Ratio Prot					c0.39							
v/s Ratio Perm								0.34				
v/c Ratio					0.77			0.94				
Uniform Delay, d1					12.2			18.3				
Progression Factor					1.00			1.00				
Incremental Delay, d2					1.9			10.8				
Delay (s)					14.1			29.1				
Level of Service					B			C				
Approach Delay (s)		0.0			14.1			29.1			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	20.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis — Cumulative PM
50: Santa Clara Avenue & Harrison Street — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	817	1734	0	0	0	0	0	905	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4782						3494	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4782						3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	0	0	0	834	1769	0	0	0	0	0	923	85
RTOR Reduction (vph)	0	0	0	22	21	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	612	1948	0	0	0	0	0	1004	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2311						1339	
v/s Ratio Prot											c0.29	
v/s Ratio Perm				0.40	0.41							
v/c Ratio				0.83	0.84						0.75	
Uniform Delay, d1				13.4	13.5						16.0	
Progression Factor				1.34	1.33						1.00	
Incremental Delay, d2				6.6	2.4						3.9	
Delay (s)				24.6	20.4						19.9	
Level of Service				C	C						B	
Approach Delay (s)		0.0			21.4			0.0			19.9	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	291	623	14	22	306	26	21	31	38	86	64	57
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	297	636	14	22	312	27	21	32	39	88	65	58

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	297	650	361	92	211
Volume Left (vph)	297	0	22	21	88
Volume Right (vph)	0	14	27	39	58
Hadj (s)	0.53	0.02	0.00	-0.17	-0.05
Departure Headway (s)	6.7	6.2	6.1	7.1	6.8
Degree Utilization, x	0.55	1.12	0.62	0.18	0.40
Capacity (veh/h)	526	584	565	449	499
Control Delay (s)	16.6	96.9	18.5	11.7	14.3
Approach Delay (s)	71.7		18.5	11.7	14.3
Approach LOS	F		C	B	B

Intersection Summary			
Delay	48.8		
HCM Level of Service	E		
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	207	182	1176	808	160	938
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.94		0.94		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1700		3323		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1700		3323		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	211	186	1200	824	163	957
RTOR Reduction (vph)	44	0	106	0	0	0
Lane Group Flow (vph)	353	0	1918	0	163	957
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	24.1		40.4		13.5	57.9
Effective Green, g (s)	24.1		40.4		13.5	57.9
Actuated g/C Ratio	0.27		0.45		0.15	0.64
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	455		1492		266	2277
v/s Ratio Prot	c0.21		c0.58		c0.09	0.27
v/s Ratio Perm						
v/c Ratio	0.78		1.29		0.61	0.42
Uniform Delay, d1	30.5		24.8		35.8	7.8
Progression Factor	1.00		1.00		0.97	0.39
Incremental Delay, d2	8.1		133.8		3.0	0.4
Delay (s)	38.5		158.6		37.7	3.5
Level of Service	D		F		D	A
Approach Delay (s)	38.5		158.6			8.4
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	97.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	273	321	265	118	415	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3376		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3376		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	279	328	270	120	423	488
RTOR Reduction (vph)	0	0	93	0	0	336
Lane Group Flow (vph)	279	328	297	0	423	152
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.4	26.1	9.7		15.4	15.4
Effective Green, g (s)	12.4	26.1	9.7		15.4	15.4
Actuated g/C Ratio	0.25	0.53	0.20		0.31	0.31
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	443	1866	662		551	492
v/s Ratio Prot	c0.16	0.09	c0.09		c0.24	
v/s Ratio Perm						0.10
v/c Ratio	0.63	0.18	0.45		0.77	0.31
Uniform Delay, d1	16.5	6.1	17.5		15.4	13.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.8	0.0	0.5		6.4	0.4
Delay (s)	19.3	6.1	18.0		21.8	13.4
Level of Service	B	A	B		C	B
Approach Delay (s)		12.2	18.0		17.3	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Existing plus Project (Phase I and Phase II) Conditions
AM Peak Hour

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	0	0	461	294	155	1316
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0	4.0
Lane Util. Factor			0.95	1.00	1.00	0.95
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			3539	1583	1770	3539
Flt Permitted			1.00	1.00	0.95	1.00
Satd. Flow (perm)			3539	1583	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	501	320	168	1430
RTOR Reduction (vph)	0	0	0	180	0	0
Lane Group Flow (vph)	0	0	501	140	168	1430
Turn Type				Perm	Prot	
Protected Phases			2		1	2 4
Permitted Phases				2		2 4
Actuated Green, G (s)			35.1	35.1	11.9	60.1
Effective Green, g (s)			35.1	35.1	11.9	60.1
Actuated g/C Ratio			0.44	0.44	0.15	0.75
Clearance Time (s)			4.0	4.0	4.0	
Vehicle Extension (s)			3.0	3.0	3.0	
Lane Grp Cap (vph)			1553	695	263	2659
v/s Ratio Prot			0.14		c0.09	c0.40
v/s Ratio Perm				0.09		
v/c Ratio			0.32	0.20	0.64	0.54
Uniform Delay, d1			14.7	13.8	32.0	4.2
Progression Factor			1.00	1.00	1.27	0.06
Incremental Delay, d2			0.6	0.7	3.8	0.2
Delay (s)			15.2	14.5	44.5	0.4
Level of Service			B	B	D	A
Approach Delay (s)	0.0		14.9			5.0
Approach LOS	A		B			A

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	182	261	0	1937	572	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	198	284	0	2105	622	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1674	311	622			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1674	311	622			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	59	100			
cM capacity (veh/h)	86	685	955			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	198	284	1053	1053	311	311
Volume Left	198	0	0	0	0	0
Volume Right	0	284	0	0	0	0
cSH	86	685	1700	1700	1700	1700
Volume to Capacity	2.29	0.41	0.62	0.62	0.18	0.18
Queue Length 95th (ft)	451	51	0	0	0	0
Control Delay (s)	694.4	13.9	0.0	0.0	0.0	0.0
Lane LOS	F	B				
Approach Delay (s)	293.5		0.0		0.0	
Approach LOS	F					

Intersection Summary			
Average Delay	44.0		
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	395	626	270	0	571	184	277	1208	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4895			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4895			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	429	680	293	0	621	200	301	1313	0
RTOR Reduction (vph)	0	0	0	34	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	0	0	1368	0	0	621	33	301	1313	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				35.0			17.5	17.5	40.5	62.0	
Effective Green, g (s)				35.0			17.5	17.5	40.5	62.0	
Actuated g/C Ratio				0.33			0.17	0.17	0.38	0.58	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1616			584	261	676	2070	
v/s Ratio Prot				c0.28			c0.18		0.17	c0.37	
v/s Ratio Perm								0.02			
v/c Ratio				0.85			1.06	0.13	0.45	0.63	
Uniform Delay, d1				33.0			44.3	37.7	24.4	14.5	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				4.3			55.2	1.0	2.1	1.5	
Delay (s)				37.3			99.5	38.7	26.5	16.0	
Level of Service				D			F	D	C	B	
Approach Delay (s)	0.0			37.3			84.7			18.0	
Approach LOS	A			D			F			B	

Intersection Summary			
HCM Average Control Delay	39.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	260	445	196	184	340	259	32	229	31	654
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0			3.5	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95	1.00			1.00	0.95
Frt	1.00	0.99	0.85	0.85	1.00	0.85			1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1610	3177	1441	1583	3539	1583			1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1610	3177	1441	1583	3539	1583			1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	283	484	213	200	370	282	35	249	34	711
RTOR Reduction (vph)	0	0	0	76	0	4	0	0	0	0
Lane Group Flow (vph)	255	533	192	124	370	313	0	0	283	711
Turn Type	Split		Prot	Perm		Perm		Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4		2				
Actuated Green, G (s)	28.1	28.1	28.1	28.1	43.2	43.2			22.2	68.9
Effective Green, g (s)	28.1	28.1	28.1	28.1	43.2	43.2			22.2	68.9
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.41	0.41			0.21	0.65
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0			3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	427	842	382	420	1442	645			371	2300
v/s Ratio Prot	0.16	c0.17	0.13		0.10				c0.16	0.20
v/s Ratio Perm				0.08		c0.20				
v/c Ratio	0.60	0.63	0.50	0.30	0.26	0.49			0.76	0.31
Uniform Delay, d1	34.0	34.4	33.0	31.1	20.8	23.2			39.4	8.1
Progression Factor	0.74	0.74	0.74	0.58	1.00	1.00			1.00	1.00
Incremental Delay, d2	1.7	1.2	0.8	0.3	0.4	2.6			9.0	0.3
Delay (s)	26.9	26.7	25.2	18.3	21.2	25.8			48.4	8.5
Level of Service	C	C	C	B	C	C			D	A
Approach Delay (s)		25.1			23.3					19.8
Approach LOS		C			C					B

Intersection Summary			
HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2273	103	381	340	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6366			4954				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6366			4954				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2471	112	414	370	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2575	0	0	783	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3024			2105				
v/s Ratio Prot					c0.40							
v/s Ratio Perm								0.16				
v/c Ratio					0.85			0.37				
Uniform Delay, d1					18.5			15.7				
Progression Factor					1.00			1.16				
Incremental Delay, d2					3.3			0.4				
Delay (s)					21.8			18.6				
Level of Service					C			B				
Approach Delay (s)		0.0			21.8			18.6			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	21.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1142	1418	0	0	0	0	0	1032	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4743						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4743						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	1241	1541	0	0	0	0	0	1122	33
RTOR Reduction (vph)	0	0	0	4	4	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	679	2095	0	0	0	0	0	1152	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2727						1145	
v/s Ratio Prot											c0.33	
v/s Ratio Perm				c0.45	0.44							
v/c Ratio				0.78	0.77						1.01	
Uniform Delay, d1				13.0	12.9						27.0	
Progression Factor				1.41	1.42						1.00	
Incremental Delay, d2				4.1	1.3						28.2	
Delay (s)				22.5	19.7						55.2	
Level of Service				C	B						E	
Approach Delay (s)		0.0			20.4			0.0			55.2	
Approach LOS		A			C			A			E	

Intersection Summary			
HCM Average Control Delay	30.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	74	196	6	9	433	13	9	6	8	18	14	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	80	213	7	10	471	14	10	7	9	20	15	14

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	80	220	495	25	49
Volume Left (vph)	80	0	10	10	20
Volume Right (vph)	0	7	14	9	14
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.6	5.1	4.6	5.7	5.7
Degree Utilization, x	0.13	0.31	0.63	0.04	0.08
Capacity (veh/h)	622	683	771	538	552
Control Delay (s)	8.3	9.2	15.0	8.9	9.1
Approach Delay (s)	9.0		15.0	8.9	9.1
Approach LOS	A		C	A	A

Intersection Summary			
Delay	12.4		
HCM Level of Service	B		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	443	302	461	0	0	1028
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	0.97	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	1583	3539			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	1583	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	482	328	501	0	0	1117
RTOR Reduction (vph)	0	171	0	0	0	0
Lane Group Flow (vph)	482	157	501	0	0	1117
Turn Type		custom				
Protected Phases	4		2			2
Permitted Phases		2				
Actuated Green, G (s)	21.0	35.1	35.1			35.1
Effective Green, g (s)	21.0	35.1	35.1			35.1
Actuated g/C Ratio	0.26	0.44	0.44			0.44
Clearance Time (s)	4.0	4.0	4.0			4.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	901	695	1553			1553
v/s Ratio Prot	c0.14		0.14			c0.32
v/s Ratio Perm		0.10				
v/c Ratio	0.53	0.23	0.32			0.72
Uniform Delay, d1	25.3	14.0	14.7			18.4
Progression Factor	1.00	1.00	0.13			1.00
Incremental Delay, d2	0.6	0.8	0.5			2.9
Delay (s)	25.9	14.7	2.5			21.3
Level of Service	C	B	A			C
Approach Delay (s)	21.4		2.5			21.3
Approach LOS	C		A			C

Intersection Summary			
HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	23.9
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	471	0	572	262	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	512	0	622	285	0	0

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total (vph)	512	311	311	285
Volume Left (vph)	512	0	0	0
Volume Right (vph)	0	0	0	285
Hadj (s)	0.23	0.03	0.03	-0.67
Departure Headway (s)	4.8	4.9	4.9	3.2
Degree Utilization, x	0.68	0.42	0.42	0.25
Capacity (veh/h)	751	726	727	1112
Control Delay (s)	17.1	10.2	10.2	6.1
Approach Delay (s)	17.1	8.9		
Approach LOS	C	A		

Intersection Summary			
Delay	11.9		
HCM Level of Service	B		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Existing plus Project (Phase I and Phase II) Conditions
PM Peak Hour

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	0	0	1069	772	235	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0	4.0	4.0	4.0
Lane Util. Factor			0.95	1.00	1.00	0.95
Frt			1.00	0.85	1.00	1.00
Flt Protected			1.00	1.00	0.95	1.00
Satd. Flow (prot)			3539	1583	1770	3539
Flt Permitted			1.00	1.00	0.95	1.00
Satd. Flow (perm)			3539	1583	1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1162	839	255	837
RTOR Reduction (vph)	0	0	0	284	0	0
Lane Group Flow (vph)	0	0	1162	556	255	837
Turn Type				Perm	Prot	
Protected Phases			2		1	2 4
Permitted Phases				2		
Actuated Green, G (s)			36.8	36.8	14.8	57.2
Effective Green, g (s)			36.8	36.8	14.8	57.2
Actuated g/C Ratio			0.46	0.46	0.18	0.72
Clearance Time (s)			4.0	4.0	4.0	
Vehicle Extension (s)			3.0	3.0	3.0	
Lane Grp Cap (vph)			1628	728	327	2530
v/s Ratio Prot			0.33		c0.14	c0.24
v/s Ratio Perm				c0.35		
v/c Ratio			0.71	0.76	0.78	0.33
Uniform Delay, d1			17.4	18.0	31.0	4.3
Progression Factor			1.00	1.00	1.34	0.08
Incremental Delay, d2			2.7	7.4	10.2	0.1
Delay (s)			20.1	25.4	51.8	0.4
Level of Service			C	C	D	A
Approach Delay (s)	0.0		22.3			12.4
Approach LOS	A		C			B

Intersection Summary			
HCM Average Control Delay	18.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	383	623	0	1937	466	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	416	677	0	2105	507	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1559	253	507			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1559	253	507			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	9	100			
cM capacity (veh/h)	103	746	1054			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	416	677	1053	1053	253	253
Volume Left	416	0	0	0	0	0
Volume Right	0	677	0	0	0	0
cSH	103	746	1700	1700	1700	1700
Volume to Capacity	4.04	0.91	0.62	0.62	0.15	0.15
Queue Length 95th (ft)	Err	305	0	0	0	0
Control Delay (s)	Err	38.0	0.0	0.0	0.0	0.0
Lane LOS	F	E				
Approach Delay (s)	3830.3		0.0		0.0	
Approach LOS	F					

Intersection Summary			
Average Delay	1130.3		
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	298	768	224	0	696	629	350	785	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4913			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4913			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	324	835	243	0	757	684	380	853	0
RTOR Reduction (vph)	0	0	0	38	0	0	0	106	0	0	0
Lane Group Flow (vph)	0	0	0	1364	0	0	757	578	380	853	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				29.4			21.0	21.0	26.6	51.6	
Effective Green, g (s)				29.4			21.0	21.0	26.6	51.6	
Actuated g/C Ratio				0.33			0.23	0.23	0.30	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1605			826	369	523	2029	
v/s Ratio Prot				c0.28			0.21		c0.21	0.24	
v/s Ratio Perm								c0.37			
v/c Ratio				0.85			0.92	1.57	0.73	0.42	
Uniform Delay, d1				28.2			33.6	34.5	28.4	10.8	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				4.4			16.6	268.0	5.0	0.1	
Delay (s)				32.7			50.2	302.5	33.4	10.9	
Level of Service				C			D	F	C	B	
Approach Delay (s)	0.0			32.7			170.0			17.9	
Approach LOS	A			C			F			B	

Intersection Summary			
HCM Average Control Delay	76.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	329	830	424	163	444	483	144	263	19	456
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0			4.0	4.0
Lane Util. Factor	0.91	0.86	0.91	1.00	0.95	1.00			1.00	0.95
Frt	1.00	0.99	0.85	0.85	1.00	0.85			1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1610	3176	1441	1583	3539	1583			1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1610	3176	1441	1583	3539	1583			1770	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	902	461	177	483	525	157	286	21	496
RTOR Reduction (vph)	0	0	0	34	0	12	0	0	0	0
Lane Group Flow (vph)	322	984	415	143	483	670	0	0	307	496
Turn Type	Split		Prot	Perm		Perm		Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases				4		2				
Actuated Green, G (s)	28.0	28.0	28.0	28.0	37.0	37.0			12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0	28.0	37.0	37.0			12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.41	0.41			0.13	0.59
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	501	988	448	492	1455	651			236	2084
v/s Ratio Prot	0.20	c0.31	0.29		0.14				c0.17	0.14
v/s Ratio Perm				0.09		c0.42				
v/c Ratio	0.64	1.00	0.93	0.29	0.33	1.03			1.30	0.24
Uniform Delay, d1	26.7	30.9	30.0	23.5	18.1	26.5			39.0	8.8
Progression Factor	0.77	0.80	0.79	0.67	1.00	1.00			1.00	1.00
Incremental Delay, d2	0.6	7.7	4.1	0.1	0.6	43.0			162.8	0.3
Delay (s)	21.1	32.6	27.8	15.9	18.7	69.5			201.8	9.1
Level of Service	C	C	C	B	B	E			F	A
Approach Delay (s)		28.0			48.5					82.8
Approach LOS		C			D					F

Intersection Summary			
HCM Average Control Delay	45.6	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1240	172	242	820	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6291			5028				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6291			5028				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1348	187	263	891	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	21	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1515	0	0	1136	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3146			1844				
v/s Ratio Prot					c0.24							
v/s Ratio Perm								0.23				
v/c Ratio					0.48			0.62				
Uniform Delay, d1					9.9			15.5				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.5			1.6				
Delay (s)					10.4			17.1				
Level of Service					B			B				
Approach Delay (s)		0.0			10.4			17.1			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	502	1008	0	0	0	0	0	533	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4778						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4778						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	546	1096	0	0	0	0	0	579	52
RTOR Reduction (vph)	0	0	0	78	26	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	322	1217	0	0	0	0	0	620	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2309						1340	
v/s Ratio Prot											c0.18	
v/s Ratio Perm				0.21	0.25							
v/c Ratio				0.44	0.53						0.46	
Uniform Delay, d1				10.2	10.7						13.9	
Progression Factor				1.88	1.47						1.00	
Incremental Delay, d2				1.7	0.8						1.2	
Delay (s)				20.7	16.5						15.0	
Level of Service				C	B						B	
Approach Delay (s)		0.0			17.5			0.0			15.0	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	169	437	8	13	185	15	12	18	22	50	37	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	184	475	9	14	201	16	13	20	24	54	40	36

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	184	484	232	57	130
Volume Left (vph)	184	0	14	13	54
Volume Right (vph)	0	9	16	24	36
Hadj (s)	0.53	0.02	0.00	-0.17	-0.05
Departure Headway (s)	5.9	5.4	5.4	6.1	6.0
Degree Utilization, x	0.30	0.72	0.35	0.10	0.22
Capacity (veh/h)	593	653	640	528	543
Control Delay (s)	10.2	19.9	11.2	9.7	10.7
Approach Delay (s)	17.2		11.2	9.7	10.7
Approach LOS	C		B	A	B

Intersection Summary			
Delay	14.8		
HCM Level of Service	B		
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	245	255	1069	0	0	760
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	0.97	1.00	0.95			0.95
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	3433	1583	3539			3539
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	3433	1583	3539			3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	277	1162	0	0	826
RTOR Reduction (vph)	0	150	0	0	0	0
Lane Group Flow (vph)	266	127	1162	0	0	826
Turn Type		custom				
Protected Phases	4		2			2
Permitted Phases		2				
Actuated Green, G (s)	16.4	36.8	36.8			36.8
Effective Green, g (s)	16.4	36.8	36.8			36.8
Actuated g/C Ratio	0.20	0.46	0.46			0.46
Clearance Time (s)	4.0	4.0	4.0			4.0
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	704	728	1628			1628
v/s Ratio Prot	c0.08		c0.33			0.23
v/s Ratio Perm		0.08				
v/c Ratio	0.38	0.18	0.71			0.51
Uniform Delay, d1	27.4	12.7	17.4			15.2
Progression Factor	1.00	1.00	0.22			1.00
Incremental Delay, d2	0.3	0.5	1.9			1.1
Delay (s)	27.7	13.2	5.6			16.3
Level of Service	C	B	A			B
Approach Delay (s)	20.3		5.6			16.3
Approach LOS	C		A			B

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	26.8
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	350	0	466	148	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	380	0	507	161	0	0

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total (vph)	380	253	253	161
Volume Left (vph)	380	0	0	0
Volume Right (vph)	0	0	0	161
Hadj (s)	0.23	0.03	0.03	-0.67
Departure Headway (s)	4.7	4.8	4.8	3.2
Degree Utilization, x	0.49	0.34	0.34	0.14
Capacity (veh/h)	761	739	740	1121
Control Delay (s)	12.2	9.0	9.0	5.5
Approach Delay (s)	12.2	8.2		
Approach LOS	B	A		

Intersection Summary			
Delay	9.6		
HCM Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Existing plus Project (Phase I and Phase II) Conditions Mitigated

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	395	626	270	0	571	184	277	1208	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	0.88	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4895			3539	2787	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4895			3539	2787	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	429	680	293	0	621	200	301	1313	0
RTOR Reduction (vph)	0	0	0	34	0	0	0	167	0	0	0
Lane Group Flow (vph)	0	0	0	1368	0	0	621	33	301	1313	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				35.0			17.5	17.5	40.5	62.0	
Effective Green, g (s)				35.0			17.5	17.5	40.5	62.0	
Actuated g/C Ratio				0.33			0.17	0.17	0.38	0.58	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1616			584	460	676	2070	
v/s Ratio Prot				c0.28			c0.18		0.17	c0.37	
v/s Ratio Perm								0.01			
v/c Ratio				0.85			1.06	0.07	0.45	0.63	
Uniform Delay, d1				33.0			44.3	37.4	24.4	14.5	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				4.3			55.2	0.3	2.1	1.5	
Delay (s)				37.3			99.5	37.7	26.5	16.0	
Level of Service				D			F	D	C	B	
Approach Delay (s)	0.0			37.3			84.4			18.0	
Approach LOS	A			D			F			B	

Intersection Summary			
HCM Average Control Delay	39.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	298	768	224	0	696	629	350	785	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	0.88	1.00	0.95	
Frt				0.97			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4913			3539	2787	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4913			3539	2787	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	324	835	243	0	757	684	380	853	0
RTOR Reduction (vph)	0	0	0	38	0	0	0	186	0	0	0
Lane Group Flow (vph)	0	0	0	1364	0	0	757	498	380	853	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				29.4			21.0	21.0	26.6	51.6	
Effective Green, g (s)				29.4			21.0	21.0	26.6	51.6	
Actuated g/C Ratio				0.33			0.23	0.23	0.30	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1605			826	650	523	2029	
v/s Ratio Prot				c0.28			c0.21		c0.21	0.24	
v/s Ratio Perm								0.18			
v/c Ratio				0.85			0.92	0.77	0.73	0.42	
Uniform Delay, d1				28.2			33.6	32.2	28.4	10.8	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				4.4			16.6	8.4	5.0	0.1	
Delay (s)				32.7			50.2	40.6	33.4	10.9	
Level of Service				C			D	D	C	B	
Approach Delay (s)	0.0			32.7			45.7			17.9	
Approach LOS	A			C			D			B	

Intersection Summary			
HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Near-Term (2015) plus Project (Phase I) Conditions
AM Peak Hour

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	213	282	1299	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4931			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4931			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Adj. Flow (vph)	0	0	706	743	233	0	446	224	297	1367	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	187	0	0	0
Lane Group Flow (vph)	0	0	0	1660	0	0	446	37	297	1367	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.34			0.13		0.17	c0.39	
v/s Ratio Perm								0.02			
v/c Ratio				1.12dl			0.76	0.14	0.46	0.68	
Uniform Delay, d1				34.4			42.3	37.8	25.4	15.9	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				16.7			9.2	1.1	2.3	1.8	
Delay (s)				51.0			51.4	39.0	27.7	17.8	
Level of Service				D			D	D	C	B	
Approach Delay (s)	0.0			51.0			47.3			19.5	
Approach LOS	A			D			D			B	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	490	217	198	341	178	21	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3343				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3343				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95
Adj. Flow (vph)	275	516	228	208	352	184	22	363	49	484
RTOR Reduction (vph)	0	0	81	0	3	0	0	0	0	0
Lane Group Flow (vph)	247	681	218	0	555	0	0	0	412	484
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.3	30.3	30.3		34.9				28.3	66.7
Effective Green, g (s)	30.3	30.3	30.3		34.9				28.3	66.7
Actuated g/C Ratio	0.29	0.29	0.29		0.33				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	460	886	412		1101				473	2227
v/s Ratio Prot	0.15	c0.22	0.15		c0.17				c0.23	0.14
v/s Ratio Perm										
v/c Ratio	0.54	0.77	0.53		0.50				0.87	0.22
Uniform Delay, d1	31.9	34.6	31.9		28.6				37.1	8.4
Progression Factor	0.70	0.71	0.56		1.00				1.00	1.00
Incremental Delay, d2	0.7	2.5	0.8		1.7				16.0	0.2
Delay (s)	23.2	27.1	18.6		30.2				53.1	8.7
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.2			30.2					29.1
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2615	126	466	409	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6362			4952				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6362			4952				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.95	0.95	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2668	133	491	422	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2792	0	0	913	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3022			2105				
v/s Ratio Prot					c0.44							
v/s Ratio Perm								0.18				
v/c Ratio					0.92			0.43				
Uniform Delay, d1					19.6			16.2				
Progression Factor					1.00			1.13				
Incremental Delay, d2					6.1			0.5				
Delay (s)					25.8			18.8				
Level of Service					C			B				
Approach Delay (s)		0.0			25.8			18.8			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1232	1734	0	0	0	0	0	1228	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4755						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4755						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.99	0.95	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	1244	1825	0	0	0	0	0	1293	39
RTOR Reduction (vph)	0	0	0	2	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	744	2321	0	0	0	0	0	1329	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2734						1145	
v/s Ratio Prot											c0.38	
v/s Ratio Perm				c0.49	0.49							
v/c Ratio				0.85	0.85						1.16	
Uniform Delay, d1				14.1	14.1						27.0	
Progression Factor				1.39	1.39						1.00	
Incremental Delay, d2				5.4	1.8						82.4	
Delay (s)				25.2	21.5						109.4	
Level of Service				C	C						F	
Approach Delay (s)		0.0			22.4			0.0			109.4	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	48.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	233	7	11	496	16	11	7	10	22	17	16
Peak Hour Factor	0.98	0.98	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	92	238	7	12	522	17	12	7	11	23	18	17

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	92	245	551	29	58
Volume Left (vph)	92	0	12	12	23
Volume Right (vph)	0	7	17	11	17
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.8	5.2	4.7	6.0	5.9
Degree Utilization, x	0.15	0.36	0.72	0.05	0.10
Capacity (veh/h)	609	667	756	534	537
Control Delay (s)	8.6	9.9	18.6	9.3	9.5
Approach Delay (s)	9.6		18.6	9.3	9.5
Approach LOS	A		C	A	A

Intersection Summary			
Delay	14.7		
HCM Level of Service	B		
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	361	213	521	286	115	1223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.95		0.95		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1716		3351		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1716		3351		1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	380	224	548	301	121	1287
RTOR Reduction (vph)	38	0	122	0	0	0
Lane Group Flow (vph)	566	0	727	0	121	1287
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	23.1		14.6		10.3	28.9
Effective Green, g (s)	23.1		14.6		10.3	28.9
Actuated g/C Ratio	0.38		0.24		0.17	0.48
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	661		815		304	1705
v/s Ratio Prot	c0.33		c0.22		0.07	c0.36
v/s Ratio Perm						
v/c Ratio	0.86		0.89		0.40	0.75
Uniform Delay, d1	16.9		21.9		22.1	12.7
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	10.6		14.2		3.9	3.2
Delay (s)	27.5		36.1		26.0	15.8
Level of Service	C		D		C	B
Approach Delay (s)	27.5		36.1			16.7
Approach LOS	C		D			B

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	233	416	206	187	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3363		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3363		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.97	0.97
Adj. Flow (vph)	357	238	438	217	193	205
RTOR Reduction (vph)	0	0	102	0	0	160
Lane Group Flow (vph)	357	238	553	0	193	45
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.0	31.2	13.2		10.9	10.9
Effective Green, g (s)	14.0	31.2	13.2		10.9	10.9
Actuated g/C Ratio	0.28	0.62	0.26		0.22	0.22
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	495	2204	886		385	344
v/s Ratio Prot	c0.20	0.07	c0.16		c0.11	
v/s Ratio Perm						0.03
v/c Ratio	0.72	0.11	0.62		0.50	0.13
Uniform Delay, d1	16.3	3.8	16.3		17.2	15.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.1	0.0	1.4		1.0	0.2
Delay (s)	21.4	3.8	17.6		18.2	16.0
Level of Service	C	A	B		B	B
Approach Delay (s)		14.4	17.6		17.1	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	50.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Near-Term (2015) plus Project (Phase I) Conditions
PM Peak Hour

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	628	490	1062	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4963			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4963			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.97	0.97	0.95	0.95	0.92
Adj. Flow (vph)	0	0	333	1434	149	0	589	647	516	1118	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	56	0	0	0
Lane Group Flow (vph)	0	0	0	1905	0	0	589	591	516	1118	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	308	580	2005	
v/s Ratio Prot				c0.38			0.17		c0.29	0.32	
v/s Ratio Perm								c0.37			
v/c Ratio				1.15			0.86	1.92	0.89	0.56	
Uniform Delay, d1				30.0			35.0	36.2	28.7	12.4	
Progression Factor				1.00			1.24	1.23	1.00	1.00	
Incremental Delay, d2				75.7			1.4	415.2	15.4	0.3	
Delay (s)				105.7			45.0	459.8	44.1	12.7	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			105.7			262.1			22.6	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	117.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1123	609	169	346	475	102	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.91				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3132	1441		3207				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3132	1441		3207				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	436	1182	641	178	364	500	107	346	25	256
RTOR Reduction (vph)	0	0	16	0	11	0	0	0	0	0
Lane Group Flow (vph)	392	1425	604	0	960	0	0	0	371	256
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	974	448		1318				236	2084
v/s Ratio Prot	0.24	c0.45	0.42		c0.30				c0.21	0.07
v/s Ratio Perm										
v/c Ratio	0.78	1.46	1.35		0.90dr				1.57	0.12
Uniform Delay, d1	28.2	31.0	31.0		22.3				39.0	8.2
Progression Factor	0.64	0.66	0.64		1.00				1.00	1.00
Incremental Delay, d2	1.1	208.9	158.2		3.6				276.9	0.1
Delay (s)	19.2	229.3	178.0		25.8				315.9	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		182.4			25.8					190.3
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	146.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1658	234	329	1045	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6286			5025				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6286			5025				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1692	246	346	1100	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1929	0	0	1440	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3143			1843				
v/s Ratio Prot					c0.31							
v/s Ratio Perm								0.29				
v/c Ratio					0.61			0.78				
Uniform Delay, d1					10.8			16.9				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.9			3.4				
Delay (s)					11.7			20.2				
Level of Service					B			C				
Approach Delay (s)		0.0			11.7			20.2			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	654	1371	0	0	0	0	0	718	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4778						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4778						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.99	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	688	1385	0	0	0	0	0	756	68
RTOR Reduction (vph)	0	0	0	41	26	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	461	1545	0	0	0	0	0	813	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2309						1340	
v/s Ratio Prot											c0.23	
v/s Ratio Perm				0.30	0.32							
v/c Ratio				0.63	0.67						0.61	
Uniform Delay, d1				11.5	11.8						14.9	
Progression Factor				1.47	1.41						1.00	
Incremental Delay, d2				3.1	1.2						2.0	
Delay (s)				20.1	17.9						16.9	
Level of Service				C	B						B	
Approach Delay (s)		0.0			18.4			0.0			16.9	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	524	11	18	245	20	16	24	30	68	50	45
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	242	552	12	19	258	21	17	25	32	72	53	47

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	242	563	298	74	172
Volume Left (vph)	242	0	19	17	72
Volume Right (vph)	0	12	21	32	47
Hadj (s)	0.53	0.02	0.00	-0.18	-0.05
Departure Headway (s)	6.3	5.8	5.8	6.7	6.5
Degree Utilization, x	0.42	0.90	0.48	0.14	0.31
Capacity (veh/h)	559	618	582	494	522
Control Delay (s)	12.6	38.9	14.1	10.8	12.4
Approach Delay (s)	31.0		14.1	10.8	12.4
Approach LOS	D		B	B	B

Intersection Summary			
Delay	23.8		
HCM Level of Service	C		
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1124	787	149	847
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.94		0.94		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1700		3321		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1700		3321		1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	179	1183	828	157	892
RTOR Reduction (vph)	44	0	106	0	0	0
Lane Group Flow (vph)	337	0	1905	0	157	892
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	23.3		41.5		13.2	58.7
Effective Green, g (s)	23.3		41.5		13.2	58.7
Actuated g/C Ratio	0.26		0.46		0.15	0.65
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	440		1531		260	2308
v/s Ratio Prot	c0.20		c0.57		c0.09	0.25
v/s Ratio Perm						
v/c Ratio	0.76		1.24		0.60	0.39
Uniform Delay, d1	30.8		24.2		36.0	7.3
Progression Factor	1.00		1.00		1.00	0.36
Incremental Delay, d2	7.7		115.6		3.1	0.4
Delay (s)	38.6		139.8		39.1	3.0
Level of Service	D		F		D	A
Approach Delay (s)	38.6		139.8			8.4
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	88.5	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	254	299	247	109	416	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3376		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3376		1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	267	315	260	115	438	471
RTOR Reduction (vph)	0	0	93	0	0	321
Lane Group Flow (vph)	267	315	282	0	438	150
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.2	25.5	9.3		15.6	15.6
Effective Green, g (s)	12.2	25.5	9.3		15.6	15.6
Actuated g/C Ratio	0.25	0.52	0.19		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	440	1838	639		562	503
v/s Ratio Prot	c0.15	0.09	c0.08		c0.25	
v/s Ratio Perm						0.09
v/c Ratio	0.61	0.17	0.44		0.78	0.30
Uniform Delay, d1	16.3	6.2	17.6		15.2	12.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.4	0.0	0.5		6.8	0.3
Delay (s)	18.7	6.3	18.1		21.9	13.0
Level of Service	B	A	B		C	B
Approach Delay (s)		12.0	18.1		17.3	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Near-Term (2015) plus Project (Phase I and Phase II) Conditions
AM Peak Hour

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	215	282	1398	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4931			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4931			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Adj. Flow (vph)	0	0	706	743	233	0	446	226	297	1472	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	189	0	0	0
Lane Group Flow (vph)	0	0	0	1660	0	0	446	37	297	1472	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.34			0.13		0.17	c0.42	
v/s Ratio Perm								0.02			
v/c Ratio				1.12dl			0.76	0.14	0.46	0.73	
Uniform Delay, d1				34.4			42.3	37.8	25.4	16.7	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				16.7			9.2	1.1	2.3	2.3	
Delay (s)				51.0			51.4	39.0	27.7	19.1	
Level of Service				D			D	D	C	B	
Approach Delay (s)	0.0			51.0			47.3			20.5	
Approach LOS	A			D			D			C	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	492	217	198	341	178	23	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3342				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3342				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95
Adj. Flow (vph)	275	518	228	208	352	184	24	363	49	484
RTOR Reduction (vph)	0	0	81	0	3	0	0	0	0	0
Lane Group Flow (vph)	247	683	218	0	557	0	0	0	412	484
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.3	30.3	30.3		34.9				28.3	66.7
Effective Green, g (s)	30.3	30.3	30.3		34.9				28.3	66.7
Actuated g/C Ratio	0.29	0.29	0.29		0.33				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	460	886	412		1100				473	2227
v/s Ratio Prot	0.15	c0.22	0.15		c0.17				c0.23	0.14
v/s Ratio Perm										
v/c Ratio	0.54	0.77	0.53		0.51				0.87	0.22
Uniform Delay, d1	31.9	34.7	31.9		28.6				37.1	8.4
Progression Factor	0.70	0.71	0.56		1.00				1.00	1.00
Incremental Delay, d2	0.7	2.6	0.8		1.7				16.0	0.2
Delay (s)	23.2	27.2	18.6		30.3				53.1	8.7
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.3			30.3					29.1
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2741	126	466	414	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6364			4953				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6364			4953				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.95	0.95	0.97	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2797	133	491	427	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2922	0	0	918	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3023			2105				
v/s Ratio Prot					c0.46							
v/s Ratio Perm								0.19				
v/c Ratio					0.97			0.44				
Uniform Delay, d1					20.4			16.2				
Progression Factor					1.00			1.13				
Incremental Delay, d2					10.2			0.5				
Delay (s)					30.6			18.8				
Level of Service					C			B				
Approach Delay (s)		0.0			30.6			18.8			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1358	1734	0	0	0	0	0	1252	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4748						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4748						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.99	0.95	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	1372	1825	0	0	0	0	0	1318	39
RTOR Reduction (vph)	0	0	0	2	2	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	780	2413	0	0	0	0	0	1354	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2730						1145	
v/s Ratio Prot											c0.38	
v/s Ratio Perm				c0.51	0.51							
v/c Ratio				0.89	0.88						1.18	
Uniform Delay, d1				14.8	14.7						27.0	
Progression Factor				1.40	1.40						1.00	
Incremental Delay, d2				6.5	2.1						91.4	
Delay (s)				27.3	22.7						118.4	
Level of Service				C	C						F	
Approach Delay (s)		0.0			23.8			0.0			118.4	
Approach LOS		A			C			A			F	

Intersection Summary			
HCM Average Control Delay	52.0	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	90	238	7	11	520	16	11	7	10	22	17	16
Peak Hour Factor	0.98	0.98	0.98	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	92	243	7	12	547	17	12	7	11	23	18	17

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	92	250	576	29	58
Volume Left (vph)	92	0	12	12	23
Volume Right (vph)	0	7	17	11	17
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	5.8	5.3	4.7	6.0	6.0
Degree Utilization, x	0.15	0.37	0.75	0.05	0.10
Capacity (veh/h)	606	663	755	533	535
Control Delay (s)	8.6	10.1	20.5	9.3	9.6
Approach Delay (s)	9.7		20.5	9.3	9.6
Approach LOS	A		C	A	A

Intersection Summary			
Delay	15.9		
HCM Level of Service	C		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	361	213	523	288	115	1322
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.95		0.95		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1716		3351		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1716		3351		1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	380	224	551	303	121	1392
RTOR Reduction (vph)	38	0	123	0	0	0
Lane Group Flow (vph)	566	0	731	0	121	1392
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	23.1		14.6		10.3	28.9
Effective Green, g (s)	23.1		14.6		10.3	28.9
Actuated g/C Ratio	0.38		0.24		0.17	0.48
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	661		815		304	1705
v/s Ratio Prot	c0.33		0.22		0.07	c0.39
v/s Ratio Perm						
v/c Ratio	0.86		0.90		0.40	0.82
Uniform Delay, d1	16.9		22.0		22.1	13.3
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	10.6		14.7		3.9	4.5
Delay (s)	27.5		36.6		26.0	17.7
Level of Service	C		D		C	B
Approach Delay (s)	27.5		36.6			18.4
Approach LOS	C		D			B

Intersection Summary			
HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	350	233	416	206	189	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3363		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3363		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.97	0.97
Adj. Flow (vph)	357	238	438	217	195	205
RTOR Reduction (vph)	0	0	102	0	0	160
Lane Group Flow (vph)	357	238	553	0	195	45
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	14.0	31.2	13.2		11.0	11.0
Effective Green, g (s)	14.0	31.2	13.2		11.0	11.0
Actuated g/C Ratio	0.28	0.62	0.26		0.22	0.22
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	494	2200	884		388	347
v/s Ratio Prot	c0.20	0.07	c0.16		c0.11	
v/s Ratio Perm						0.03
v/c Ratio	0.72	0.11	0.63		0.50	0.13
Uniform Delay, d1	16.3	3.9	16.3		17.2	15.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	5.2	0.0	1.4		1.0	0.2
Delay (s)	21.5	3.9	17.7		18.2	15.9
Level of Service	C	A	B		B	B
Approach Delay (s)		14.5	17.7		17.0	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Near-Term (2015) plus Project (Phase I and Phase II) Conditions
PM Peak Hour

47: MacArthur Blvd (EB) & Grand Avenue

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	666	490	1085	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4963			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4963			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.97	0.97	0.95	0.95	0.92
Adj. Flow (vph)	0	0	333	1434	149	0	589	687	516	1142	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	56	0	0	0
Lane Group Flow (vph)	0	0	0	1905	0	0	589	631	516	1142	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	308	580	2005	
v/s Ratio Prot				c0.38			0.17		c0.29	0.32	
v/s Ratio Perm								c0.40			
v/c Ratio				1.15			0.86	2.05	0.89	0.57	
Uniform Delay, d1				30.0			35.0	36.2	28.7	12.5	
Progression Factor				1.00			1.25	1.25	1.00	1.00	
Incremental Delay, d2				75.7			1.4	473.5	15.4	0.4	
Delay (s)				105.7			45.2	518.7	44.1	12.9	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			105.7			300.1			22.6	
Approach LOS	A			F			F			C	

Intersection Summary			
HCM Average Control Delay	128.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

48: MacArthur Blvd (EB) & Lakeshore Drive

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1161	609	169	346	475	143	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3138	1441		3199				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3138	1441		3199				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	436	1222	641	178	364	500	151	346	25	256
RTOR Reduction (vph)	0	0	16	0	16	0	0	0	0	0
Lane Group Flow (vph)	392	1452	617	0	999	0	0	0	371	256
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	976	448		1315				236	2084
v/s Ratio Prot	0.24	c0.46	0.43		c0.31				c0.21	0.07
v/s Ratio Perm										
v/c Ratio	0.78	1.49	1.38		0.96dr				1.57	0.12
Uniform Delay, d1	28.2	31.0	31.0		22.7				39.0	8.2
Progression Factor	0.65	0.66	0.64		1.00				1.00	1.00
Incremental Delay, d2	1.1	220.0	171.2		4.2				276.9	0.1
Delay (s)	19.4	240.5	191.1		26.9				315.9	8.3
Level of Service	B	F	F		C				F	A
Approach Delay (s)		192.9			26.9					190.3
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	151.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

49: Santa Clara Avenue & Oakland Avenue

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	1677	234	329	1088	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6287			5027				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6287			5027				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	1711	246	346	1145	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1950	0	0	1485	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3144			1843				
v/s Ratio Prot					c0.31							
v/s Ratio Perm								0.30				
v/c Ratio					0.62			0.81				
Uniform Delay, d1					10.9			17.1				
Progression Factor					1.00			1.00				
Incremental Delay, d2					0.9			3.9				
Delay (s)					11.8			21.0				
Level of Service					B			C				
Approach Delay (s)		0.0			11.8			21.0			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

50: Santa Clara Avenue & Harrison Street

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	673	1371	0	0	0	0	0	722	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4776						3496	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4776						3496	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.99	0.92	0.92	0.92	0.92	0.92	0.95	0.95
Adj. Flow (vph)	0	0	0	708	1385	0	0	0	0	0	760	68
RTOR Reduction (vph)	0	0	0	40	28	0	0	0	0	0	11	0
Lane Group Flow (vph)	0	0	0	470	1555	0	0	0	0	0	817	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2308						1340	
v/s Ratio Prot											c0.23	
v/s Ratio Perm				0.31	0.33							
v/c Ratio				0.64	0.67						0.61	
Uniform Delay, d1				11.6	11.9						14.9	
Progression Factor				1.48	1.42						1.00	
Incremental Delay, d2				3.2	1.2						2.1	
Delay (s)				20.3	18.1						17.0	
Level of Service				C	B						B	
Approach Delay (s)		0.0			18.6			0.0			17.0	
Approach LOS		A			B			A			B	

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	567	11	18	249	20	16	24	30	68	50	45
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	242	597	12	19	262	21	17	25	32	72	53	47

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	242	608	302	74	172
Volume Left (vph)	242	0	19	17	72
Volume Right (vph)	0	12	21	32	47
Hadj (s)	0.53	0.02	0.00	-0.18	-0.05
Departure Headway (s)	6.3	5.8	5.9	6.8	6.6
Degree Utilization, x	0.42	0.98	0.49	0.14	0.32
Capacity (veh/h)	558	608	601	492	521
Control Delay (s)	12.7	53.9	14.5	10.9	12.6
Approach Delay (s)	42.1		14.5	10.9	12.6
Approach LOS	E		B	B	B

Intersection Summary			
Delay	30.9		
HCM Level of Service	D		
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	192	170	1162	828	149	870
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.94		0.94		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1700		3318		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1700		3318		1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	202	179	1223	872	157	916
RTOR Reduction (vph)	44	0	108	0	0	0
Lane Group Flow (vph)	337	0	1987	0	157	916
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	23.3		41.5		13.2	58.7
Effective Green, g (s)	23.3		41.5		13.2	58.7
Actuated g/C Ratio	0.26		0.46		0.15	0.65
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	440		1530		260	2308
v/s Ratio Prot	c0.20		c0.60		c0.09	0.26
v/s Ratio Perm						
v/c Ratio	0.76		1.30		0.60	0.40
Uniform Delay, d1	30.8		24.2		36.0	7.3
Progression Factor	1.00		1.00		1.02	0.35
Incremental Delay, d2	7.7		139.3		3.0	0.4
Delay (s)	38.6		163.5		39.7	3.0
Level of Service	D		F		D	A
Approach Delay (s)	38.6		163.5			8.3
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	103.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	254	299	247	109	457	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3376		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3376		1770	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	267	315	260	115	481	471
RTOR Reduction (vph)	0	0	93	0	0	317
Lane Group Flow (vph)	267	315	282	0	481	154
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.2	25.5	9.3		16.2	16.2
Effective Green, g (s)	12.2	25.5	9.3		16.2	16.2
Actuated g/C Ratio	0.25	0.51	0.19		0.33	0.33
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	434	1816	632		577	516
v/s Ratio Prot	c0.15	0.09	c0.08		c0.27	
v/s Ratio Perm						0.10
v/c Ratio	0.62	0.17	0.45		0.83	0.30
Uniform Delay, d1	16.7	6.5	17.9		15.5	12.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.6	0.0	0.5		10.0	0.3
Delay (s)	19.3	6.5	18.4		25.5	12.8
Level of Service	B	A	B		C	B
Approach Delay (s)		12.4	18.4		19.2	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	49.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Near-Term (2015) plus Project (Phase I and Phase II) Conditions Mitigated

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) AM
47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	671	706	221	0	424	215	282	1398	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4931			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4931			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Adj. Flow (vph)	0	0	706	743	233	0	446	226	297	1472	0
RTOR Reduction (vph)	0	0	0	22	0	0	0	189	0	0	0
Lane Group Flow (vph)	0	0	0	1660	0	0	446	37	297	1472	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.34			0.13		0.17	c0.42	
v/s Ratio Perm								0.02			
v/c Ratio				1.12dl			0.76	0.14	0.46	0.73	
Uniform Delay, d1				34.4			42.3	37.8	25.4	16.7	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				16.7			9.2	1.1	2.3	2.3	
Delay (s)				51.0			51.4	39.0	27.7	19.1	
Level of Service				D			D	D	C	B	
Approach Delay (s)	0.0			51.0			47.3			20.5	
Approach LOS	A			D			D			C	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) AM
48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	261	492	217	198	341	178	23	345	47	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3101	1441		3342				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3101	1441		3342				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.97	0.97	0.97	0.95	0.95	0.95
Adj. Flow (vph)	275	518	228	208	352	184	24	363	49	484
RTOR Reduction (vph)	0	0	81	0	3	0	0	0	0	0
Lane Group Flow (vph)	247	683	218	0	557	0	0	0	412	484
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	30.3	30.3	30.3		34.9				28.3	66.7
Effective Green, g (s)	30.3	30.3	30.3		34.9				28.3	66.7
Actuated g/C Ratio	0.29	0.29	0.29		0.33				0.27	0.63
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	460	886	412		1100				473	2227
v/s Ratio Prot	0.15	c0.22	0.15		c0.17				c0.23	0.14
v/s Ratio Perm										
v/c Ratio	0.54	0.77	0.53		0.51				0.87	0.22
Uniform Delay, d1	31.9	34.7	31.9		28.6				37.1	8.4
Progression Factor	0.70	0.71	0.56		1.00				1.00	1.00
Incremental Delay, d2	0.7	2.6	0.8		1.7				16.0	0.2
Delay (s)	23.2	27.2	18.6		30.3				53.1	8.7
Level of Service	C	C	B		C				D	A
Approach Delay (s)		24.3			30.3					29.1
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	27.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM MIT
47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	316	1362	142	0	571	666	490	1085	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	0.88	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4963			3539	2787	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4963			3539	2787	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.92	0.97	0.97	0.95	0.95	0.92
Adj. Flow (vph)	0	0	333	1434	149	0	589	687	516	1142	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	98	0	0	0
Lane Group Flow (vph)	0	0	0	1905	0	0	589	589	516	1142	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1654			688	542	580	2005	
v/s Ratio Prot				c0.38			0.17		c0.29	0.32	
v/s Ratio Perm								c0.21			
v/c Ratio				1.15			0.86	1.09	0.89	0.57	
Uniform Delay, d1				30.0			35.0	36.2	28.7	12.5	
Progression Factor				1.00			1.21	1.22	1.00	1.00	
Incremental Delay, d2				75.7			6.9	53.6	15.4	0.4	
Delay (s)				105.7			49.3	97.9	44.1	12.9	
Level of Service				F			D	F	D	B	
Approach Delay (s)	0.0			105.7			75.5			22.6	
Approach LOS	A			F			E			C	

Intersection Summary			
HCM Average Control Delay	69.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Near-Term plus Project (I+II) PM MIT
48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	414	1161	609	169	346	475	143	329	24	243
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3138	1441		3199				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3138	1441		3199				1770	3539
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	436	1222	641	178	364	500	151	346	25	256
RTOR Reduction (vph)	0	0	16	0	16	0	0	0	0	0
Lane Group Flow (vph)	392	1452	617	0	999	0	0	0	371	256
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	37.0	37.0	37.0		24.0				16.0	44.0
Effective Green, g (s)	37.0	37.0	37.0		24.0				16.0	44.0
Actuated g/C Ratio	0.41	0.41	0.41		0.27				0.18	0.49
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	662	1290	592		853				315	1730
v/s Ratio Prot	0.24	c0.46	0.43		c0.31				c0.21	0.07
v/s Ratio Perm										
v/c Ratio	0.59	1.13	1.04		1.46dr				1.18	0.15
Uniform Delay, d1	20.6	26.5	26.5		33.0				37.0	12.7
Progression Factor	0.71	0.77	0.75		1.00				1.00	1.00
Incremental Delay, d2	0.4	57.6	24.4		89.4				108.0	0.2
Delay (s)	15.0	78.1	44.3		122.4				145.0	12.9
Level of Service	B	E	D		F				F	B
Approach Delay (s)		59.5			122.4					91.1
Approach LOS		E			F					F

Intersection Summary			
HCM Average Control Delay	79.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Cumulative (2030) plus Project (Phase I and Phase II) Conditions
AM Peak Hour

HCM Signalized Intersection Capacity Analysis
47: MacArthur Blvd (EB) & Grand Avenue

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	722	760	238	0	490	276	345	1595	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4931			3539	1583	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4931			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.98	0.92	0.98	0.98	0.98	0.98	0.92
Adj. Flow (vph)	0	0	737	776	243	0	500	282	352	1628	0
RTOR Reduction (vph)	0	0	0	15	0	0	0	158	0	0	0
Lane Group Flow (vph)	0	0	0	1741	0	0	500	124	352	1628	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				36.5			17.5	17.5	39.0	60.5	
Effective Green, g (s)				36.5			17.5	17.5	39.0	60.5	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1698			584	261	651	2020	
v/s Ratio Prot				c0.35			0.14		0.20	c0.46	
v/s Ratio Perm								0.08			
v/c Ratio				1.18dl			0.86	0.48	0.54	0.81	
Uniform Delay, d1				34.8			43.0	40.1	26.4	18.1	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				28.5			14.9	6.1	3.2	3.6	
Delay (s)				63.3			57.9	46.2	29.6	21.6	
Level of Service				E			E	D	C	C	
Approach Delay (s)	0.0			63.3			53.7			23.1	
Approach LOS	A			E			D			C	

Intersection Summary			
HCM Average Control Delay	44.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
48: MacArthur Blvd (EB) & Lakeshore Drive

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	291	541	239	228	398	208	26	372	50	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3097	1441		3343				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3097	1441		3343				1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	297	552	244	233	406	212	27	380	51	506
RTOR Reduction (vph)	0	0	91	0	3	0	0	0	0	0
Lane Group Flow (vph)	267	736	232	0	642	0	0	0	431	506
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	31.0	31.0	31.0		33.5				29.0	66.0
Effective Green, g (s)	31.0	31.0	31.0		33.5				29.0	66.0
Actuated g/C Ratio	0.29	0.29	0.29		0.32				0.27	0.62
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	471	906	421		1057				484	2204
v/s Ratio Prot	0.17	c0.24	0.16		c0.19				c0.24	0.14
v/s Ratio Perm										
v/c Ratio	0.57	0.81	0.55		0.61				0.89	0.23
Uniform Delay, d1	31.8	34.8	31.6		30.7				37.0	8.8
Progression Factor	0.74	0.75	0.62		1.00				1.00	1.00
Incremental Delay, d2	0.8	3.0	0.8		2.6				18.2	0.2
Delay (s)	24.5	29.2	20.4		33.3				55.2	9.0
Level of Service	C	C	C		C				E	A
Approach Delay (s)		26.1			33.3					30.3
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
49: Santa Clara Avenue & Oakland Avenue

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	3209	149	551	488	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6365			4954				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6365			4954				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	3274	152	562	498	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	3418	0	0	1060	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					38.0			34.0				
Effective Green, g (s)					38.0			34.0				
Actuated g/C Ratio					0.48			0.42				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3023			2105				
v/s Ratio Prot					c0.54							
v/s Ratio Perm								0.21				
v/c Ratio					1.13			0.50				
Uniform Delay, d1					21.0			16.8				
Progression Factor					1.00			1.08				
Incremental Delay, d2					63.6			0.5				
Delay (s)					84.6			18.7				
Level of Service					F			B				
Approach Delay (s)		0.0			84.6			18.7			0.0	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	69.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	119.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
50: MacArthur Blvd (WB) & Harrison Street

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1575	2049	0	0	0	0	0	1473	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4746						3524	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4746						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	0	0	0	1607	2091	0	0	0	0	0	1503	44
RTOR Reduction (vph)	0	0	0	1	1	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	0	0	899	2797	0	0	0	0	0	1544	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2729						1145	
v/s Ratio Prot											c0.44	
v/s Ratio Perm				c0.59	0.59							
v/c Ratio				1.03	1.02						1.35	
Uniform Delay, d1				17.0	17.0						27.0	
Progression Factor				1.39	1.37						1.00	
Incremental Delay, d2				17.4	13.3						162.8	
Delay (s)				41.0	36.6						189.8	
Level of Service				D	D						F	
Approach Delay (s)		0.0			37.7			0.0			189.8	
Approach LOS		A			D			A			F	

Intersection Summary			
HCM Average Control Delay	82.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	129.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	107	280	9	13	607	19	13	9	12	26	20	19
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	109	286	9	13	619	19	13	9	12	27	20	19

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	109	295	652	35	66
Volume Left (vph)	109	0	13	13	27
Volume Right (vph)	0	9	19	12	19
Hadj (s)	0.53	0.01	0.02	-0.10	-0.06
Departure Headway (s)	6.0	5.4	4.8	6.4	6.3
Degree Utilization, x	0.18	0.45	0.88	0.06	0.12
Capacity (veh/h)	580	645	737	518	524
Control Delay (s)	9.1	11.5	32.0	9.8	10.2
Approach Delay (s)	10.9		32.0	9.8	10.2
Approach LOS	B		D	A	B

Intersection Summary			
Delay	22.7		
HCM Level of Service	C		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations						
Volume (vph)	418	250	631	309	124	1457
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.95		0.95		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1715		3365		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1715		3365		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	427	255	644	315	127	1487
RTOR Reduction (vph)	37	0	99	0	0	0
Lane Group Flow (vph)	645	0	860	0	127	1487
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	24.8		14.4		8.8	27.2
Effective Green, g (s)	24.8		14.4		8.8	27.2
Actuated g/C Ratio	0.41		0.24		0.15	0.45
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	709		808		260	1604
v/s Ratio Prot	c0.38		0.26		0.07	c0.42
v/s Ratio Perm						
v/c Ratio	0.91		1.06		0.49	0.93
Uniform Delay, d1	16.5		22.8		23.5	15.5
Progression Factor	1.00		1.00		1.00	1.00
Incremental Delay, d2	15.6		50.3		6.4	10.7
Delay (s)	32.1		73.1		30.0	26.2
Level of Service	C		E		C	C
Approach Delay (s)	32.1		73.1			26.5
Approach LOS	C		E			C

Intersection Summary			
HCM Average Control Delay	41.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Volume (vph)	427	303	466	220	203	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3369		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3369		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	436	309	476	224	207	218
RTOR Reduction (vph)	0	0	94	0	0	171
Lane Group Flow (vph)	436	309	606	0	207	47
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	15.7	33.5	13.8		11.3	11.3
Effective Green, g (s)	15.7	33.5	13.8		11.3	11.3
Actuated g/C Ratio	0.30	0.63	0.26		0.21	0.21
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	526	2245	881		379	339
v/s Ratio Prot	c0.25	0.09	c0.18		c0.12	
v/s Ratio Perm						0.03
v/c Ratio	0.83	0.14	0.69		0.55	0.14
Uniform Delay, d1	17.3	3.9	17.6		18.5	16.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	10.4	0.0	2.3		1.6	0.2
Delay (s)	27.7	3.9	19.8		20.1	17.0
Level of Service	C	A	B		C	B
Approach Delay (s)		17.8	19.8		18.5	
Approach LOS		B	B		B	

Intersection Summary			
HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Cumulative (2030) plus Project (Phase I and Phase II) Conditions
PM Peak Hour

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	340	2180	153	0	615	711	738	1165	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.94			0.95	1.00	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.95			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				4973			3539	1583	1770	3539	
Flt Permitted				0.95			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				4973			3539	1583	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.98	0.92	0.98	0.98	0.98	0.98	0.92
Adj. Flow (vph)	0	0	347	2224	156	0	628	726	753	1189	0
RTOR Reduction (vph)	0	0	0	8	0	0	0	20	0	0	0
Lane Group Flow (vph)	0	0	0	2719	0	0	628	706	753	1189	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				1658			688	308	580	2005	
v/s Ratio Prot				c0.55			0.18		c0.43	0.34	
v/s Ratio Perm								c0.45			
v/c Ratio				1.64			0.91	2.29	1.30	0.59	
Uniform Delay, d1				30.0			35.5	36.2	30.3	12.7	
Progression Factor				1.00			1.28	1.25	1.00	1.00	
Incremental Delay, d2				290.7			2.3	582.2	146.6	0.5	
Delay (s)				320.7			47.6	627.6	176.8	13.2	
Level of Service				F			D	F	F	B	
Approach Delay (s)	0.0			320.7			358.6			76.7	
Approach LOS	A			F			F			E	

Intersection Summary			
HCM Average Control Delay	250.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	119.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	489	1650	881	183	372	511	148	354	26	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.98	0.85		0.90				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3143	1441		3200				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3143	1441		3200				1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	499	1684	899	187	380	521	151	361	27	267
RTOR Reduction (vph)	0	0	11	0	15	0	0	0	0	0
Lane Group Flow (vph)	449	1968	841	0	1037	0	0	0	388	267
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	28.0	28.0	28.0		37.0				12.0	53.0
Effective Green, g (s)	28.0	28.0	28.0		37.0				12.0	53.0
Actuated g/C Ratio	0.31	0.31	0.31		0.41				0.13	0.59
Clearance Time (s)	5.0	5.0	5.0		4.0				4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	501	978	448		1316				236	2084
v/s Ratio Prot	0.28	c0.63	0.58		c0.32				c0.22	0.08
v/s Ratio Perm										
v/c Ratio	0.90	2.01	1.88		0.99dr				1.64	0.13
Uniform Delay, d1	29.6	31.0	31.0		23.1				39.0	8.2
Progression Factor	0.60	0.61	0.60		1.00				1.00	1.00
Incremental Delay, d2	2.6	455.9	395.5		4.8				308.1	0.1
Delay (s)	20.5	474.9	414.1		27.9				347.1	8.4
Level of Service	C	F	F		C				F	A
Approach Delay (s)		396.7			27.9					209.0
Approach LOS		F			C					F

Intersection Summary			
HCM Average Control Delay	294.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	110.8%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2113	296	416	1356	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6290			5026				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6290			5026				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2156	302	424	1384	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2455	0	0	1806	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3145			1843				
v/s Ratio Prot					c0.39							
v/s Ratio Perm								0.36				
v/c Ratio					0.78			0.98				
Uniform Delay, d1					12.3			18.8				
Progression Factor					1.00			1.00				
Incremental Delay, d2					2.0			16.7				
Delay (s)					14.3			35.5				
Level of Service					B			D				
Approach Delay (s)		0.0			14.3			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	844	1734	0	0	0	0	0	912	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.95	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4779						3495	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4779						3495	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	0	0	0	861	1769	0	0	0	0	0	931	85
RTOR Reduction (vph)	0	0	0	22	22	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	615	1971	0	0	0	0	0	1012	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2310						1340	
v/s Ratio Prot											c0.29	
v/s Ratio Perm				0.40	0.41							
v/c Ratio				0.84	0.85						0.75	
Uniform Delay, d1				13.4	13.6						16.1	
Progression Factor				1.35	1.34						1.00	
Incremental Delay, d2				6.6	2.5						4.0	
Delay (s)				24.7	20.8						20.0	
Level of Service				C	C						C	
Approach Delay (s)		0.0			21.7			0.0			20.0	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
51: Oakland Avenue & Monte Vista Avenue

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			✥			✥			✥	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	291	698	14	22	313	26	21	31	38	86	64	57
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	297	712	14	22	319	27	21	32	39	88	65	58

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	297	727	368	92	211
Volume Left (vph)	297	0	22	21	88
Volume Right (vph)	0	14	27	39	58
Hadj (s)	0.53	0.02	0.00	-0.17	-0.05
Departure Headway (s)	6.7	6.2	6.1	7.2	6.8
Degree Utilization, x	0.56	1.25	0.63	0.18	0.40
Capacity (veh/h)	525	588	565	447	497
Control Delay (s)	16.6	147.7	19.0	11.8	14.3
Approach Delay (s)	109.7		19.0	11.8	14.3
Approach LOS	F		C	B	B

Intersection Summary			
Delay	72.8		
HCM Level of Service	F		
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
145: El Embarcadero (WB) & Grand Avenue

Movement	NWL	NWR	NET	NER	SWL	SWT
Lane Configurations	↰↱		↑↱		↰	↑↑
Volume (vph)	207	182	1245	880	160	985
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0		4.0	4.0
Lane Util. Factor	1.00		0.95		1.00	0.95
Frt	0.94		0.94		1.00	1.00
Flt Protected	0.97		1.00		0.95	1.00
Satd. Flow (prot)	1700		3319		1770	3539
Flt Permitted	0.97		1.00		0.95	1.00
Satd. Flow (perm)	1700		3319		1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	211	186	1270	898	163	1005
RTOR Reduction (vph)	44	0	110	0	0	0
Lane Group Flow (vph)	353	0	2058	0	163	1005
Turn Type					Prot	
Protected Phases	4		6		5	2
Permitted Phases						
Actuated Green, G (s)	24.1		40.4		13.5	57.9
Effective Green, g (s)	24.1		40.4		13.5	57.9
Actuated g/C Ratio	0.27		0.45		0.15	0.64
Clearance Time (s)	4.0		4.0		4.0	4.0
Vehicle Extension (s)	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	455		1490		266	2277
v/s Ratio Prot	c0.21		c0.62		c0.09	0.28
v/s Ratio Perm						
v/c Ratio	0.78		1.38		0.61	0.44
Uniform Delay, d1	30.5		24.8		35.8	8.0
Progression Factor	1.00		1.00		1.00	0.37
Incremental Delay, d2	8.1		175.9		2.9	0.4
Delay (s)	38.5		200.7		38.7	3.4
Level of Service	D		F		D	A
Approach Delay (s)	38.5		200.7			8.3
Approach LOS	D		F			A

Intersection Summary			
HCM Average Control Delay	123.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
146: Lakeshore Drive & El Embarcadero (WB)

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations	↰	↑↑	↑↱		↰	↱
Volume (vph)	273	321	265	118	487	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.95		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	3539	3376		1770	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	3539	3376		1770	1583
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	279	328	270	120	497	488
RTOR Reduction (vph)	0	0	94	0	0	331
Lane Group Flow (vph)	279	328	296	0	497	157
Turn Type	Prot					Perm
Protected Phases	7	4	8		6	
Permitted Phases						6
Actuated Green, G (s)	12.5	26.1	9.6		16.2	16.2
Effective Green, g (s)	12.5	26.1	9.6		16.2	16.2
Actuated g/C Ratio	0.25	0.52	0.19		0.32	0.32
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	440	1836	644		570	510
v/s Ratio Prot	c0.16	0.09	c0.09		c0.28	
v/s Ratio Perm						0.10
v/c Ratio	0.63	0.18	0.46		0.87	0.31
Uniform Delay, d1	16.9	6.4	18.1		16.1	12.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.0	0.0	0.5		13.7	0.3
Delay (s)	19.8	6.5	18.6		29.8	13.2
Level of Service	B	A	B		C	B
Approach Delay (s)		12.6	18.6		21.6	
Approach LOS		B	B		C	

Intersection Summary			
HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	50.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Cumulative (2030) plus Project (Phase I and Phase II) Conditions Mitigated

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM MIT
47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	722	760	238	0	490	276	345	1595	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.91			0.95	0.88	1.00	0.95	
Frt				0.98			1.00	0.85	1.00	1.00	
Flt Protected				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				6365			3539	2787	1770	3539	
Flt Permitted				0.96			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				6365			3539	2787	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.98	0.92	0.98	0.98	0.98	0.98	0.92
Adj. Flow (vph)	0	0	737	776	243	0	500	282	352	1628	0
RTOR Reduction (vph)	0	0	0	15	0	0	0	235	0	0	0
Lane Group Flow (vph)	0	0	0	1741	0	0	500	47	352	1628	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				35.9			17.5	17.5	39.6	61.1	
Effective Green, g (s)				35.9			17.5	17.5	39.6	61.1	
Actuated g/C Ratio				0.34			0.17	0.17	0.37	0.58	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				2156			584	460	661	2040	
v/s Ratio Prot				c0.27			0.14		0.20	c0.46	
v/s Ratio Perm								0.02			
v/c Ratio				1.20dl			0.86	0.10	0.53	0.80	
Uniform Delay, d1				31.9			43.0	37.6	26.0	17.6	
Progression Factor				1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2				2.3			14.9	0.4	3.1	3.4	
Delay (s)				34.2			57.9	38.0	29.0	21.0	
Level of Service				C			E	D	C	C	
Approach Delay (s)	0.0			34.2			50.8			22.4	
Approach LOS	A			C			D			C	

Intersection Summary			
HCM Average Control Delay	31.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM MIT
48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	291	541	239	228	398	208	26	372	50	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Lane Util. Factor	0.91	0.86	0.91		0.95				1.00	0.95
Frt	1.00	0.97	0.85		0.94				1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (prot)	1610	3097	1441		3343				1770	3539
Flt Permitted	0.95	1.00	1.00		1.00				0.95	1.00
Satd. Flow (perm)	1610	3097	1441		3343				1770	3539
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	297	552	244	233	406	212	27	380	51	506
RTOR Reduction (vph)	0	0	91	0	3	0	0	0	0	0
Lane Group Flow (vph)	267	736	232	0	642	0	0	0	431	506
Turn Type	Split		Prot					Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases										
Actuated Green, G (s)	31.0	31.0	31.0		33.5				29.0	66.0
Effective Green, g (s)	31.0	31.0	31.0		33.5				29.0	66.0
Actuated g/C Ratio	0.29	0.29	0.29		0.32				0.27	0.62
Clearance Time (s)	5.0	5.0	5.0		4.0				3.5	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0				3.0	3.0
Lane Grp Cap (vph)	471	906	421		1057				484	2204
v/s Ratio Prot	0.17	c0.24	0.16		c0.19				c0.24	0.14
v/s Ratio Perm										
v/c Ratio	0.57	0.81	0.55		0.61				0.89	0.23
Uniform Delay, d1	31.8	34.8	31.6		30.7				37.0	8.8
Progression Factor	0.76	0.78	0.64		1.00				1.00	1.00
Incremental Delay, d2	1.2	4.3	1.2		2.6				18.2	0.2
Delay (s)	25.4	31.6	21.4		33.3				55.2	9.0
Level of Service	C	C	C		C				E	A
Approach Delay (s)		27.9			33.3					30.3
Approach LOS		C			C					C

Intersection Summary			
HCM Average Control Delay	29.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	106.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM MIT
49: Santa Clara Avenue & Oakland Avenue — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	3209	149	551	488	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.97				
Satd. Flow (prot)					6365			4954				
Flt Permitted					1.00			0.97				
Satd. Flow (perm)					6365			4954				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	3274	152	562	498	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	3418	0	0	1060	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					44.0			28.0				
Effective Green, g (s)					44.0			28.0				
Actuated g/C Ratio					0.55			0.35				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3501			1734				
v/s Ratio Prot					c0.54							
v/s Ratio Perm								0.21				
v/c Ratio					0.98			0.91dl				
Uniform Delay, d1					17.5			21.5				
Progression Factor					1.00			0.89				
Incremental Delay, d2					10.6			1.0				
Delay (s)					28.1			20.1				
Level of Service					C			C				
Approach Delay (s)		0.0			28.1			20.1			0.0	
Approach LOS		A			C			C			A	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	106.4%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM MIT
50: MacArthur Blvd (WB) & Harrison Street — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	1575	2049	0	0	0	0	0	1473	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.91	
Frt				1.00	1.00						1.00	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4746						5064	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4746						5064	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	0	0	0	1607	2091	0	0	0	0	0	1503	44
RTOR Reduction (vph)	0	0	0	1	1	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	899	2797	0	0	0	0	0	1543	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.0	46.0						26.0	
Effective Green, g (s)				46.0	46.0						26.0	
Actuated g/C Ratio				0.57	0.57						0.32	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				875	2729						1646	
v/s Ratio Prot											c0.30	
v/s Ratio Perm				c0.59	0.59							
v/c Ratio				1.03	1.02						0.94	
Uniform Delay, d1				17.0	17.0						26.2	
Progression Factor				1.11	1.09						1.00	
Incremental Delay, d2				26.0	17.7						11.6	
Delay (s)				44.9	36.2						37.8	
Level of Service				D	D						D	
Approach Delay (s)		0.0			38.3			0.0			37.8	
Approach LOS		A			D			A			D	

Intersection Summary			
HCM Average Control Delay	38.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) AM MIT
51: Oakland Avenue & Monte Vista Avenue — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	280	9	13	607	19	13	9	12	26	20	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			0.95			0.96	
Flt Protected	0.95	1.00			1.00			0.98			0.98	
Satd. Flow (prot)	1770	1854			1854			1741			1754	
Flt Permitted	0.31	1.00			0.99			0.93			0.91	
Satd. Flow (perm)	582	1854			1840			1644			1636	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	109	286	9	13	619	19	13	9	12	27	20	19
RTOR Reduction (vph)	0	3	0	0	3	0	0	7	0	0	11	0
Lane Group Flow (vph)	109	292	0	0	648	0	0	27	0	0	55	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.0	16.0			16.0			16.0			16.0	
Effective Green, g (s)	16.0	16.0			16.0			16.0			16.0	
Actuated g/C Ratio	0.40	0.40			0.40			0.40			0.40	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)	233	742			736			658			654	
v/s Ratio Prot		0.16										
v/s Ratio Perm	0.19				c0.35			0.02			c0.03	
v/c Ratio	0.47	0.39			0.88			0.04			0.08	
Uniform Delay, d1	8.9	8.5			11.1			7.3			7.4	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	6.6	1.6			14.2			0.1			0.3	
Delay (s)	15.5	10.1			25.4			7.4			7.7	
Level of Service	B	B			C			A			A	
Approach Delay (s)		11.6			25.4			7.4			7.7	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) PM MIT
47: MacArthur Blvd (EB) & Grand Avenue — Kaiser Center Transportation Study

Movement	WBL	WBR	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Volume (vph)	0	0	340	2180	153	0	615	711	738	1165	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5			4.5	4.5	4.0	4.0	
Lane Util. Factor				0.91			0.95	0.88	1.00	0.95	
Frt				0.99			1.00	0.85	1.00	1.00	
Flt Protected				0.95			1.00	1.00	0.95	1.00	
Satd. Flow (prot)				6420			3539	2787	1770	3539	
Flt Permitted				0.95			1.00	1.00	0.95	1.00	
Satd. Flow (perm)				6420			3539	2787	1770	3539	
Peak-hour factor, PHF	0.92	0.92	0.98	0.98	0.98	0.92	0.98	0.98	0.98	0.98	0.92
Adj. Flow (vph)	0	0	347	2224	156	0	628	726	753	1189	0
RTOR Reduction (vph)	0	0	0	11	0	0	0	35	0	0	0
Lane Group Flow (vph)	0	0	0	2716	0	0	628	691	753	1189	0
Turn Type			Split					Perm	Prot		
Protected Phases			4	4			2		1	1 2	
Permitted Phases								2			
Actuated Green, G (s)				30.0			17.5	17.5	29.5	51.0	
Effective Green, g (s)				30.0			17.5	17.5	29.5	51.0	
Actuated g/C Ratio				0.33			0.19	0.19	0.33	0.57	
Clearance Time (s)				4.5			4.5	4.5	4.0		
Vehicle Extension (s)				3.0			3.0	3.0	3.0		
Lane Grp Cap (vph)				2140			688	542	580	2005	
v/s Ratio Prot				c0.42			0.18		c0.43	0.34	
v/s Ratio Perm								c0.25			
v/c Ratio				1.27			0.91	1.27	1.30	0.59	
Uniform Delay, d1				30.0			35.5	36.2	30.3	12.7	
Progression Factor				1.00			1.24	1.22	1.00	1.00	
Incremental Delay, d2				125.0			8.9	129.2	146.6	0.5	
Delay (s)				155.0			53.0	173.4	176.8	13.2	
Level of Service				F			D	F	F	B	
Approach Delay (s)	0.0			155.0			117.6			76.7	
Approach LOS	A			F			F			E	

Intersection Summary			
HCM Average Control Delay	121.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) PM MIT
48: MacArthur Blvd (EB) & Lakeshore Drive — Kaiser Center Transportation Study

Movement	EBL	EBT	EBR	EBR2	NET	NER	NER2	SWL2	SWL	SWT
Lane Configurations										
Volume (vph)	489	1650	881	183	372	511	148	354	26	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.0	4.0			4.0	4.0
Lane Util. Factor	0.91	0.86	0.91		1.00	0.88			0.97	1.00
Frt	1.00	0.98	0.85		1.00	0.85			1.00	1.00
Flt Protected	0.95	1.00	1.00		1.00	1.00			0.95	1.00
Satd. Flow (prot)	1610	3143	1441		1863	2787			3433	1863
Flt Permitted	0.95	1.00	1.00		1.00	1.00			0.95	1.00
Satd. Flow (perm)	1610	3143	1441		1863	2787			3433	1863
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	499	1684	899	187	380	521	151	361	27	267
RTOR Reduction (vph)	0	0	11	0	0	26	0	0	0	0
Lane Group Flow (vph)	449	1968	841	0	380	646	0	0	388	267
Turn Type	Split		Prot			Perm		Prot	Prot	
Protected Phases	4	4	4		2			1	1	6
Permitted Phases						2				
Actuated Green, G (s)	39.0	39.0	39.0		23.5	23.5			14.5	42.0
Effective Green, g (s)	39.0	39.0	39.0		23.5	23.5			14.5	42.0
Actuated g/C Ratio	0.43	0.43	0.43		0.26	0.26			0.16	0.47
Clearance Time (s)	5.0	5.0	5.0		4.0	4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	698	1362	624		486	728			553	869
v/s Ratio Prot	0.28	c0.63	0.58		0.20				c0.11	0.14
v/s Ratio Perm						c0.23				
v/c Ratio	0.64	1.44	1.35		0.78	0.89			1.27dl	0.31
Uniform Delay, d1	20.0	25.5	25.5		30.9	32.0			35.7	14.9
Progression Factor	0.67	0.74	0.73		1.00	1.00			1.00	1.00
Incremental Delay, d2	0.4	200.6	157.3		11.8	15.0			4.0	0.9
Delay (s)	13.8	219.5	175.9		42.7	47.0			39.7	15.9
Level of Service	B	F	F		D	D			D	B
Approach Delay (s)		179.9			45.5					30.0
Approach LOS		F			D					C

Intersection Summary			
HCM Average Control Delay	131.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis — Cumulative plus Project (I+II) PM MIT
49: Santa Clara Avenue & Oakland Avenue — Kaiser Center Transportation Study

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	0	0	0	2113	296	416	1356	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.86			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					6290			5026				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					6290			5026				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.98	0.98	0.98	0.98	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	2156	302	424	1384	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2455	0	0	1806	0	0	0	0
Turn Type							Perm					
Protected Phases					2			4				
Permitted Phases							4					
Actuated Green, G (s)					30.0			22.0				
Effective Green, g (s)					30.0			22.0				
Actuated g/C Ratio					0.50			0.37				
Clearance Time (s)					4.0			4.0				
Lane Grp Cap (vph)					3145			1843				
v/s Ratio Prot					c0.39							
v/s Ratio Perm								0.36				
v/c Ratio					0.78			0.98				
Uniform Delay, d1					12.3			18.8				
Progression Factor					1.00			1.00				
Incremental Delay, d2					2.0			16.7				
Delay (s)					14.3			35.5				
Level of Service					B			D				
Approach Delay (s)		0.0			14.3			35.5			0.0	
Approach LOS		A			B			D			A	

Intersection Summary			
HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations				↰	↰↑↑						↑↑↱	
Volume (vph)	0	0	0	844	1734	0	0	0	0	0	912	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.86	0.86						0.91	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.99						1.00	
Satd. Flow (prot)				1522	4779						5021	
Flt Permitted				0.95	0.99						1.00	
Satd. Flow (perm)				1522	4779						5021	
Peak-hour factor, PHF	0.92	0.92	0.92	0.98	0.98	0.92	0.92	0.92	0.92	0.92	0.98	0.98
Adj. Flow (vph)	0	0	0	861	1769	0	0	0	0	0	931	85
RTOR Reduction (vph)	0	0	0	22	22	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	0	0	615	1971	0	0	0	0	0	1012	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				29.0	29.0						23.0	
Effective Green, g (s)				29.0	29.0						23.0	
Actuated g/C Ratio				0.48	0.48						0.38	
Clearance Time (s)				4.0	4.0						4.0	
Lane Grp Cap (vph)				736	2310						1925	
v/s Ratio Prot											c0.20	
v/s Ratio Perm				0.40	0.41							
v/c Ratio				0.84	0.85						0.53	
Uniform Delay, d1				13.4	13.6						14.3	
Progression Factor				1.35	1.34						1.00	
Incremental Delay, d2				6.6	2.5						1.0	
Delay (s)				24.7	20.8						15.3	
Level of Service				C	C						B	
Approach Delay (s)		0.0			21.7			0.0			15.3	
Approach LOS		A			C			A			B	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱			✥			✥			✥	
Volume (vph)	291	698	14	22	313	26	21	31	38	86	64	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			0.99			0.94			0.96	
Flt Protected	0.95	1.00			1.00			0.99			0.98	
Satd. Flow (prot)	1770	1857			1839			1736			1757	
Flt Permitted	0.56	1.00			0.91			0.92			0.84	
Satd. Flow (perm)	1035	1857			1674			1608			1514	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	297	712	14	22	319	27	21	32	39	88	65	58
RTOR Reduction (vph)	0	2	0	0	7	0	0	26	0	0	34	0
Lane Group Flow (vph)	297	724	0	0	361	0	0	66	0	0	177	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	19.0	19.0			19.0			13.0			13.0	
Effective Green, g (s)	19.0	19.0			19.0			13.0			13.0	
Actuated g/C Ratio	0.48	0.48			0.48			0.32			0.32	
Clearance Time (s)	4.0	4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)	492	882			795			523			492	
v/s Ratio Prot		c0.39										
v/s Ratio Perm	0.29				0.22			0.04			c0.12	
v/c Ratio	0.60	0.82			0.45			0.13			0.36	
Uniform Delay, d1	7.7	9.0			7.0			9.5			10.3	
Progression Factor	1.00	1.00			1.00			1.00			1.00	
Incremental Delay, d2	5.4	8.5			1.9			0.5			2.0	
Delay (s)	13.1	17.5			8.9			10.0			12.3	
Level of Service	B	B			A			A			B	
Approach Delay (s)		16.3			8.9			10.0			12.3	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix D

Queue Calculation Worksheets

Existing Conditions

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1402	621	198	301	1065
v/c Ratio	0.85	1.06	0.46	0.44	0.51
Control Delay	36.8	98.2	9.5	27.5	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	36.8	98.2	9.5	27.5	14.1
Queue Length 50th (ft)	290	~245	0	154	217
Queue Length 95th (ft)	348	#359	63	234	272
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1731	584	427	678	2090
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.81	1.06	0.46	0.44	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1402	757	609	380	802
v/c Ratio	0.85	0.92	1.28	0.73	0.39
Control Delay	33.2	53.4	168.1	36.8	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	53.4	168.1	36.8	11.1
Queue Length 50th (ft)	248	~260	~413	183	123
Queue Length 95th (ft)	306	#374	#621	283	162
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1675	826	475	580	2049
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	0.92	1.28	0.66	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Near-Term (2015) Conditions

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1682	446	224	297	1232
v/c Ratio	1.12dl	0.76	0.50	0.46	0.60
Control Delay	51.3	51.9	9.5	28.3	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	51.9	9.5	28.3	16.2
Queue Length 50th (ft)	390	153	0	151	269
Queue Length 95th (ft)	#502	210	65	230	334
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1720	584	448	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.98	0.76	0.50	0.46	0.60

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	247	681	299	558	412	484
v/c Ratio	0.54	0.77	0.61	0.50	0.87	0.22
Control Delay	25.2	28.5	14.4	31.8	56.7	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	28.5	14.4	31.8	56.7	9.1
Queue Length 50th (ft)	100	176	39	164	261	70
Queue Length 95th (ft)	m131	m212	m79	230	#401	100
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	966	526	1106	526	2228
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.70	0.57	0.50	0.78	0.22

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	604	849	121	1152
v/c Ratio	0.86	0.91	0.40	0.68
Control Delay	29.0	34.7	28.0	15.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.0	34.7	28.0	15.3
Queue Length 50th (ft)	165	130	41	168
Queue Length 95th (ft)	#326	#240	87	244
Internal Link Dist (ft)	513	307		413
Turn Bay Length (ft)			100	
Base Capacity (vph)	779	934	305	1702
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.91	0.40	0.68

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1916	589	615	516	1093
v/c Ratio	1.15	0.85	1.68	0.89	0.54
Control Delay	104.7	45.2	336.4	49.0	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	104.7	45.2	336.4	49.0	13.2
Queue Length 50th (ft)	~459	147	~477	275	187
Queue Length 95th (ft)	#553	m167	m#420	#462	242
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	693	365	580	1998
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.15	0.85	1.68	0.89	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	392	1405	607	939	371	256
v/c Ratio	0.78	1.45	1.31	0.86dr	1.57	0.12
Control Delay	20.5	223.5	161.0	25.3	306.7	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.5	223.5	161.0	25.3	306.7	8.4
Queue Length 50th (ft)	162	~629	~471	224	~302	31
Queue Length 95th (ft)	m126	m#487	m#354	296	#473	48
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	972	465	1328	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	1.45	1.31	0.71	1.57	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	381	1947	157	866
v/c Ratio	0.79	1.19	0.61	0.37
Control Delay	37.3	114.6	42.7	3.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	37.3	114.6	42.7	3.4
Queue Length 50th (ft)	171	~679	69	0
Queue Length 95th (ft)	241	#964	m85	m0
Internal Link Dist (ft)	560	322		429
Turn Bay Length (ft)			100	
Base Capacity (vph)	734	1640	308	2310
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.52	1.19	0.51	0.37

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Cumulative (2030) Conditions

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1756	500	280	352	1395
v/c Ratio	1.17dl	0.86	0.67	0.54	0.68
Control Delay	61.5	58.5	22.8	30.2	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	61.5	58.5	22.8	30.2	18.0
Queue Length 50th (ft)	~445	175	55	186	327
Queue Length 95th (ft)	#540	#261	148	278	406
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1720	584	419	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.02	0.86	0.67	0.54	0.68

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	267	734	323	642	431	506
v/c Ratio	0.57	0.81	0.63	0.61	0.89	0.23
Control Delay	26.5	30.6	15.0	34.7	58.1	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	30.6	15.0	34.7	58.1	9.4
Queue Length 50th (ft)	120	211	41	204	271	77
Queue Length 95th (ft)	m157	m249	m100	270	#431	104
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	964	537	1060	526	2206
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.76	0.60	0.61	0.82	0.23

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWT	NET
Lane Group Flow (vph)	3254	1053
v/c Ratio	1.07	0.50
Control Delay	62.5	18.9
Queue Delay	111.8	0.3
Total Delay	174.4	19.2
Queue Length 50th (ft)	~534	179
Queue Length 95th (ft)	#610	m204
Internal Link Dist (ft)	378	334
Turn Bay Length (ft)		
Base Capacity (vph)	3031	2105
Starvation Cap Reductn	0	0
Spillback Cap Reductn	576	448
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.33	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NWT	SWT
Lane Group Flow (vph)	861	2665	1504
v/c Ratio	0.98	0.97	1.31
Control Delay	36.2	27.7	172.4
Queue Delay	127.4	145.2	0.0
Total Delay	163.6	172.9	172.4
Queue Length 50th (ft)	384	396	~521
Queue Length 95th (ft)	m375	m379	#655
Internal Link Dist (ft)		191	1680
Turn Bay Length (ft)			
Base Capacity (vph)	876	2734	1148
Starvation Cap Reductn	216	733	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.30	1.33	1.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	682	955	127	1254
v/c Ratio	0.91	1.05	0.49	0.78
Control Delay	34.6	68.0	31.4	18.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	34.6	68.0	31.4	18.9
Queue Length 50th (ft)	196	~189	44	198
Queue Length 95th (ft)	#397	#299	#94	#278
Internal Link Dist (ft)	513	307		413
Turn Bay Length (ft)			100	
Base Capacity (vph)	780	907	260	1607
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.87	1.05	0.49	0.78

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	2727	628	655	753	1141
v/c Ratio	1.64	0.91	2.00	1.30	0.56
Control Delay	315.1	47.8	475.0	175.3	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	315.1	47.8	475.0	175.3	13.5
Queue Length 50th (ft)	~811	160	~567	~553	200
Queue Length 95th (ft)	#904	m173	m#477	#770	257
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	688	328	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.64	0.91	2.00	1.30	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	449	1915	834	979	388	267
v/c Ratio	0.90	1.96	1.81	0.90dr	1.64	0.13
Control Delay	22.9	453.2	386.9	26.2	336.9	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	453.2	386.9	26.2	336.9	8.4
Queue Length 50th (ft)	193	~980	~775	238	~323	32
Queue Length 95th (ft)	m86	m#478	m#309	314	#497	50
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	976	460	1328	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	1.96	1.81	0.74	1.64	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	NWT	NET
Lane Group Flow (vph)	2431	1731
v/c Ratio	0.77	0.94
Control Delay	14.3	30.6
Queue Delay	0.6	32.0
Total Delay	14.9	62.5
Queue Length 50th (ft)	191	214
Queue Length 95th (ft)	237	#319
Internal Link Dist (ft)	566	394
Turn Bay Length (ft)		
Base Capacity (vph)	3147	1844
Starvation Cap Reductn	0	0
Spillback Cap Reductn	323	226
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.86	1.07

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	NWL	NWT	SWT
Lane Group Flow (vph)	634	1969	1008
v/c Ratio	0.84	0.84	0.75
Control Delay	25.4	20.7	20.2
Queue Delay	31.7	49.8	0.0
Total Delay	57.1	70.5	20.2
Queue Length 50th (ft)	261	279	159
Queue Length 95th (ft)	m#383	m334	225
Internal Link Dist (ft)		236	402
Turn Bay Length (ft)			
Base Capacity (vph)	758	2332	1343
Starvation Cap Reductn	155	553	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.05	1.11	0.75

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	397	2024	163	957
v/c Ratio	0.79	1.27	0.62	0.42
Control Delay	37.1	149.1	41.4	3.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	37.1	149.1	41.4	3.9
Queue Length 50th (ft)	179	~744	69	0
Queue Length 95th (ft)	249	#1031	m89	m0
Internal Link Dist (ft)	560	322		429
Turn Bay Length (ft)			100	
Base Capacity (vph)	734	1598	311	2275
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.54	1.27	0.52	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Existing plus Project (Phase I and Phase II) Conditions

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1402	621	200	301	1313
v/c Ratio	0.85	1.06	0.47	0.45	0.63
Control Delay	37.4	98.2	9.5	27.5	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	37.4	98.2	9.5	27.5	16.2
Queue Length 50th (ft)	295	~245	0	154	297
Queue Length 95th (ft)	353	#359	63	234	368
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1720	584	428	676	2086
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.82	1.06	0.47	0.45	0.63

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1402	757	684	380	853
v/c Ratio	0.85	0.92	1.44	0.73	0.42
Control Delay	33.2	53.4	234.2	36.8	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	53.4	234.2	36.8	11.4
Queue Length 50th (ft)	248	~260	~505	183	133
Queue Length 95th (ft)	306	#374	#720	283	175
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1675	826	475	580	2049
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	0.92	1.44	0.66	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Existing plus Project (Phase I and Phase II) Conditions Mitigated

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1402	757	684	380	853
v/c Ratio	0.85	0.92	0.82	0.73	0.42
Control Delay	33.2	53.4	31.6	36.8	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	53.4	31.6	36.8	11.4
Queue Length 50th (ft)	248	~260	146	183	133
Queue Length 95th (ft)	306	#374	#265	283	175
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1675	826	837	580	2049
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	0.92	0.82	0.66	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Near-Term (2015) plus Project (Phase I) Conditions

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1682	446	224	297	1367
v/c Ratio	1.12dl	0.76	0.50	0.46	0.67
Control Delay	51.3	51.9	9.5	28.3	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	51.9	9.5	28.3	17.6
Queue Length 50th (ft)	390	153	0	151	317
Queue Length 95th (ft)	#502	210	65	230	393
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1720	584	448	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.98	0.76	0.50	0.46	0.67

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	247	681	299	558	412	484
v/c Ratio	0.54	0.77	0.61	0.50	0.87	0.22
Control Delay	25.2	28.5	14.4	31.8	56.7	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	28.5	14.4	31.8	56.7	9.1
Queue Length 50th (ft)	100	176	39	164	261	70
Queue Length 95th (ft)	m131	m212	m79	230	#401	100
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	966	526	1106	526	2228
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.70	0.57	0.50	0.78	0.22

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	604	849	121	1287
v/c Ratio	0.86	0.91	0.40	0.76
Control Delay	29.0	34.7	28.0	17.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.0	34.7	28.0	17.7
Queue Length 50th (ft)	165	130	41	199
Queue Length 95th (ft)	#326	#240	87	#301
Internal Link Dist (ft)	513	307		413
Turn Bay Length (ft)			100	
Base Capacity (vph)	779	934	305	1702
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.91	0.40	0.76

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1916	589	647	516	1118
v/c Ratio	1.15	0.86	1.78	0.89	0.55
Control Delay	104.7	45.6	379.2	48.5	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	104.7	45.6	379.2	48.5	13.3
Queue Length 50th (ft)	~459	147	~515	275	194
Queue Length 95th (ft)	#553	m162	m#435	#462	250
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	688	363	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.15	0.86	1.78	0.89	0.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	392	1425	620	971	371	256
v/c Ratio	0.78	1.46	1.34	0.90dr	1.57	0.12
Control Delay	20.6	231.4	174.8	25.8	306.7	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	231.4	174.8	25.8	306.7	8.4
Queue Length 50th (ft)	164	~643	~490	234	~302	31
Queue Length 95th (ft)	m126	m#487	m#363	309	#473	48
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	974	464	1329	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	1.46	1.34	0.73	1.57	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	381	2011	157	892
v/c Ratio	0.79	1.23	0.61	0.39
Control Delay	37.3	131.1	43.3	3.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	37.3	131.1	43.3	3.4
Queue Length 50th (ft)	171	~720	69	0
Queue Length 95th (ft)	241	#1005	m88	m0
Internal Link Dist (ft)	560	322		429
Turn Bay Length (ft)			100	
Base Capacity (vph)	734	1640	308	2310
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.52	1.23	0.51	0.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Near-Term (2015) plus Project (Phase I and Phase II) Conditions

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1682	446	226	297	1472
v/c Ratio	1.12dl	0.76	0.50	0.46	0.72
Control Delay	51.3	51.9	9.5	28.3	19.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	51.9	9.5	28.3	19.0
Queue Length 50th (ft)	390	153	0	151	359
Queue Length 95th (ft)	#502	210	66	230	443
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1720	584	450	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.98	0.76	0.50	0.46	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Queues
48: MacArthur Blvd (EB) & Lakeshore Drive

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	247	683	299	560	412	484
v/c Ratio	0.54	0.77	0.61	0.51	0.87	0.22
Control Delay	25.2	28.5	14.4	31.8	56.7	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.2	28.5	14.4	31.8	56.7	9.1
Queue Length 50th (ft)	98	176	39	165	261	70
Queue Length 95th (ft)	m131	m214	m78	231	#401	100
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	966	526	1103	526	2226
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.71	0.57	0.51	0.78	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues
145: El Embarcadero (WB) & Grand Avenue

Near-Term plus Project (I+II) AM
Kaiser Center Transportation Study

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	604	854	121	1392
v/c Ratio	0.86	0.91	0.40	0.82
Control Delay	29.0	35.4	28.0	20.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	29.0	35.4	28.0	20.1
Queue Length 50th (ft)	165	131	41	226
Queue Length 95th (ft)	#326	#242	87	#374
Internal Link Dist (ft)	513	307		413
Turn Bay Length (ft)			100	
Base Capacity (vph)	779	934	305	1702
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.91	0.40	0.82

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
47: MacArthur Blvd (EB) & Grand Avenue

Near-Term plus Project (I+II) PM
Kaiser Center Transportation Study

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1916	589	687	516	1142
v/c Ratio	1.15	0.86	1.89	0.89	0.56
Control Delay	104.7	45.8	427.7	48.5	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	104.7	45.8	427.7	48.5	13.5
Queue Length 50th (ft)	~459	147	~563	275	200
Queue Length 95th (ft)	#553	m157	m#452	#462	258
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	688	363	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.15	0.86	1.89	0.89	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	392	1452	633	1015	371	256
v/c Ratio	0.78	1.49	1.36	0.96dr	1.57	0.12
Control Delay	20.7	242.5	187.3	26.7	306.7	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.7	242.5	187.3	26.7	306.7	8.4
Queue Length 50th (ft)	167	~661	~507	247	~302	31
Queue Length 95th (ft)	m124	m#488	m#364	326	#473	48
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	976	464	1331	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.78	1.49	1.36	0.76	1.57	0.12

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	381	2095	157	916
v/c Ratio	0.79	1.28	0.61	0.40
Control Delay	37.3	152.4	43.8	3.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	37.3	152.4	43.8	3.3
Queue Length 50th (ft)	171	~773	70	0
Queue Length 95th (ft)	241	#1057	m89	m0
Internal Link Dist (ft)	560	322		429
Turn Bay Length (ft)			100	
Base Capacity (vph)	734	1642	308	2310
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.52	1.28	0.51	0.40

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Cumulative (2030) plus Project (Phase I and Phase II) Conditions

47: MacArthur Blvd (EB) & Grand Avenue

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1756	500	282	352	1628
v/c Ratio	1.18dl	0.86	0.67	0.54	0.80
Control Delay	62.8	58.5	23.1	30.2	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	62.8	58.5	23.1	30.2	21.5
Queue Length 50th (ft)	~448	175	57	186	430
Queue Length 95th (ft)	#543	#261	150	278	530
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1713	584	419	651	2037
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.03	0.86	0.67	0.54	0.80

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

48: MacArthur Blvd (EB) & Lakeshore Drive

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	267	736	323	645	431	506
v/c Ratio	0.57	0.81	0.63	0.61	0.89	0.23
Control Delay	26.3	30.5	14.9	34.8	58.1	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.3	30.5	14.9	34.8	58.1	9.4
Queue Length 50th (ft)	120	212	34	206	271	77
Queue Length 95th (ft)	m156	m250	m98	271	#431	104
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	964	537	1059	526	2205
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.76	0.60	0.61	0.82	0.23

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

49: Santa Clara Avenue & Oakland Avenue

Lane Group	NWT	NET
Lane Group Flow (vph)	3426	1060
v/c Ratio	1.13	0.50
Control Delay	86.1	18.9
Queue Delay	144.0	0.3
Total Delay	230.1	19.2
Queue Length 50th (ft)	~588	180
Queue Length 95th (ft)	#663	m205
Internal Link Dist (ft)	378	334
Turn Bay Length (ft)		
Base Capacity (vph)	3030	2105
Starvation Cap Reductn	0	0
Spillback Cap Reductn	671	448
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.45	0.64

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

50: MacArthur Blvd (WB) & Harrison Street

Lane Group	NWL	NWT	SWT
Lane Group Flow (vph)	900	2798	1547
v/c Ratio	1.03	1.02	1.35
Control Delay	42.3	37.1	188.5
Queue Delay	143.4	163.3	0.0
Total Delay	185.7	200.5	188.5
Queue Length 50th (ft)	~416	~430	~545
Queue Length 95th (ft)	m373	m379	#680
Internal Link Dist (ft)		191	1680
Turn Bay Length (ft)			
Base Capacity (vph)	876	2731	1148
Starvation Cap Reductn	217	729	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.37	1.40	1.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	682	959	127	1487
v/c Ratio	0.91	1.06	0.49	0.93
Control Delay	34.6	69.1	31.4	28.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	34.6	69.1	31.4	28.6
Queue Length 50th (ft)	196	~191	44	262
Queue Length 95th (ft)	#397	#301	#94	#415
Internal Link Dist (ft)	513	307		413
Turn Bay Length (ft)			100	
Base Capacity (vph)	780	908	260	1607
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.87	1.06	0.49	0.93

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	2727	628	726	753	1189
v/c Ratio	1.64	0.91	2.21	1.30	0.59
Control Delay	315.1	48.2	570.3	175.3	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	315.1	48.2	570.3	175.3	13.9
Queue Length 50th (ft)	~811	159	~653	~553	212
Queue Length 95th (ft)	#904	m163	m#508	#770	273
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	1665	688	328	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.64	0.91	2.21	1.30	0.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	449	1968	852	1052	388	267
v/c Ratio	0.90	2.01	1.86	0.99dr	1.64	0.13
Control Delay	23.0	475.6	406.2	27.9	336.9	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	475.6	406.2	27.9	336.9	8.4
Queue Length 50th (ft)	197	~1018	~801	262	~323	32
Queue Length 95th (ft)	m86	m#484	m#320	344	#497	50
Internal Link Dist (ft)		1206		1205		1978
Turn Bay Length (ft)						
Base Capacity (vph)	501	978	459	1330	236	2084
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	2.01	1.86	0.79	1.64	0.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	NWT	NET
Lane Group Flow (vph)	2458	1808
v/c Ratio	0.78	0.98
Control Delay	14.5	37.5
Queue Delay	0.9	48.1
Total Delay	15.4	85.6
Queue Length 50th (ft)	194	230
Queue Length 95th (ft)	241	#342
Internal Link Dist (ft)	566	394
Turn Bay Length (ft)		
Base Capacity (vph)	3150	1844
Starvation Cap Reductn	0	0
Spillback Cap Reductn	386	226
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.89	1.12

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	NWL	NWT	SWT
Lane Group Flow (vph)	637	1993	1016
v/c Ratio	0.84	0.85	0.76
Control Delay	25.7	21.1	20.4
Queue Delay	35.2	56.9	0.0
Total Delay	60.9	77.9	20.4
Queue Length 50th (ft)	266	286	161
Queue Length 95th (ft)	m#376	m337	227
Internal Link Dist (ft)		236	402
Turn Bay Length (ft)			
Base Capacity (vph)	757	2331	1343
Starvation Cap Reductn	157	557	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	1.06	1.12	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	NWL	NET	SWL	SWT
Lane Group Flow (vph)	397	2168	163	1005
v/c Ratio	0.79	1.36	0.62	0.44
Control Delay	37.1	187.3	42.3	3.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	37.1	187.3	42.3	3.9
Queue Length 50th (ft)	179	~834	70	0
Queue Length 95th (ft)	249	#1121	m92	m0
Internal Link Dist (ft)	560	322		429
Turn Bay Length (ft)			100	
Base Capacity (vph)	734	1600	311	2275
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.54	1.36	0.52	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Cumulative (2030) plus Project (Phase I and Phase II) Conditions Mitigated

47: MacArthur Blvd (EB) & Grand Avenue

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	1756	500	282	352	1628
v/c Ratio	1.20dl	0.86	0.41	0.53	0.79
Control Delay	35.0	58.5	6.6	29.8	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	58.5	6.6	29.8	21.0
Queue Length 50th (ft)	289	175	0	186	430
Queue Length 95th (ft)	334	#261	39	278	530
Internal Link Dist (ft)	1105	413			511
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	2207	584	696	661	2057
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.80	0.86	0.41	0.53	0.79

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

48: MacArthur Blvd (EB) & Lakeshore Drive

Lane Group	EBL	EBT	EBR	NET	SWL	SWT
Lane Group Flow (vph)	267	736	323	645	431	506
v/c Ratio	0.57	0.81	0.63	0.61	0.89	0.23
Control Delay	27.9	33.4	16.6	34.8	58.1	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.9	33.4	16.6	34.8	58.1	9.4
Queue Length 50th (ft)	126	245	47	206	271	77
Queue Length 95th (ft)	m191	323	m143	271	#431	104
Internal Link Dist (ft)		774		703		185
Turn Bay Length (ft)						
Base Capacity (vph)	501	964	537	1059	526	2205
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.76	0.60	0.61	0.82	0.23

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

49: Santa Clara Avenue & Oakland Avenue

Lane Group	NWT	NET
Lane Group Flow (vph)	3426	1060
v/c Ratio	0.98	0.91dl
Control Delay	29.0	20.3
Queue Delay	58.6	1.4
Total Delay	87.6	21.8
Queue Length 50th (ft)	447	184
Queue Length 95th (ft)	#586	m209
Internal Link Dist (ft)	378	334
Turn Bay Length (ft)		
Base Capacity (vph)	3508	1734
Starvation Cap Reductn	0	0
Spillback Cap Reductn	495	448
Storage Cap Reductn	0	0
Reduced v/c Ratio	1.14	0.82

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

51: Oakland Avenue & Monte Vista Avenue

Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	109	295	651	34	66
v/c Ratio	0.47	0.40	0.88	0.05	0.10
Control Delay	17.2	10.4	29.2	6.2	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	10.4	29.2	6.2	6.4
Queue Length 50th (ft)	17	43	125	3	6
Queue Length 95th (ft)	#58	86	#292	13	21
Internal Link Dist (ft)		613	231	516	579
Turn Bay Length (ft)	50				
Base Capacity (vph)	233	744	739	665	666
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.40	0.88	0.05	0.10

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	SEL	NET	NER	SWL	SWT
Lane Group Flow (vph)	2727	628	726	753	1189
v/c Ratio	1.27	0.91	1.26	1.30	0.59
Control Delay	153.1	53.6	157.6	175.3	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	153.1	53.6	157.6	175.3	13.9
Queue Length 50th (ft)	~545	155	~276	~553	212
Queue Length 95th (ft)	#617	m218	m#330	#770	273
Internal Link Dist (ft)	1276	429			958
Turn Bay Length (ft)			200	150	
Base Capacity (vph)	2150	688	577	580	2025
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.27	0.91	1.26	1.30	0.59

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	NET	NER	SWL	SWT
Lane Group Flow (vph)	449	1968	852	380	672	388	267
v/c Ratio	0.64	1.44	1.34	0.78	0.89	1.27dl	0.31
Control Delay	14.3	222.4	175.3	44.4	47.0	43.0	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	222.4	175.3	44.4	47.0	43.0	16.2
Queue Length 50th (ft)	158	~915	~707	203	201	107	91
Queue Length 95th (ft)	m102	m#613	m#457	#355	#328	154	145
Internal Link Dist (ft)		1206		1205			1978
Turn Bay Length (ft)					75		
Base Capacity (vph)	698	1362	636	487	755	610	869
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.64	1.44	1.34	0.78	0.89	0.64	0.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Lane Group	NWT	NET
Lane Group Flow (vph)	2458	1808
v/c Ratio	0.78	0.98
Control Delay	14.5	37.5
Queue Delay	0.9	48.1
Total Delay	15.4	85.6
Queue Length 50th (ft)	194	230
Queue Length 95th (ft)	241	#342
Internal Link Dist (ft)	566	394
Turn Bay Length (ft)		
Base Capacity (vph)	3150	1844
Starvation Cap Reductn	0	0
Spillback Cap Reductn	386	226
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.89	1.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	297	726	368	92	211
v/c Ratio	0.60	0.82	0.46	0.17	0.40
Control Delay	14.7	20.1	9.1	7.4	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	14.7	20.1	9.1	7.4	10.8
Queue Length 50th (ft)	43	124	47	8	26
Queue Length 95th (ft)	#112	#299	94	29	65
Internal Link Dist (ft)		614	268	355	512
Turn Bay Length (ft)	50				
Base Capacity (vph)	491	884	803	549	526
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.82	0.46	0.17	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX G.12

Harrison Street-Oakland Avenue Study

Harrison-Oakland Avenue Community-Based Transportation Plan (CBTP) Study Comparison

The Harrison-Oakland Avenue Community-Based Transportation Plan (CBTP) Study is a planning effort that proposes a series of multi-modal improvements (bulbouts, sidewalks, improved crossings), bicycle improvements, transit improvements (bus bulbouts, bus stop relocations), as well as possible roadway closures and road diets. . However, the Harrison-Oakland Avenue Study was not included in the DEIR's assumptions of planned transportation network changes. The Harrison-Oakland couplet has not undergone environmental review, has not been approved by the City, is not a funded project, and did not have final designs at the time of preparation of the DEIR. Consistent with City practice, this study was therefore not assumed as part of the planned transportation network changes and was not assumed in the analysis.

However, the City has examined the potential effects of the Kaiser Center Office Project on a street network that would include the Harrison-Oakland couplet scheme. Those results and conclusions are as follows:

The DEIR evaluated seven intersections that were also evaluated in the CBTP Study. These intersections include[1]:

1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (*unsignalized*) (CBTP Study #4)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (CBTP Study #5)
3. Harrison Street / 27th Street / 24th Street / Bay Place (CBTP Study #10)
12. Harrison Street / Grand Avenue (within Downtown Oakland) (CBTP Study #11)
49. Oakland Avenue / MacArthur Boulevard (Westbound) / Santa Clara Avenue / I-580 Westbound Off-Ramp (CBTP Study #3)
50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (CBTP Study #2)
51. Oakland Avenue / Monte Vista Avenue / Vernon Street (*unsignalized*) (CBTP Study #1)

The findings from this DEIR and the CBTP Study are summarized below and in Table 1.

Reasons for Different Findings

There are several reasons that the two studies would have different results:

- This DEIR analyzes future forecasted conditions based on ACCMA Model year 2030. The CBTP Study analyzed future forecasted conditions based on ACCMA Model year 2035.
- The Harrison-Oakland Avenue Study has assumed fundamental shifts in traffic patterns by converting one-directional traffic flow on Harrison Street and Oakland Avenue to two-way traffic flow north of I-580 and reduced travel lane capacity on these streets south of I-580.

1 Numbers shown (e.g., 1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp) identify the location of the intersection on Figure IV.L-2 in Chapter IV.L, Transportation and Circulation, in this~~e~~ DEIR. Numbers of the corresponding intersections in the CBTP Study are shown in parentheses. All intersection on located in Downtown Oakland unless otherwise noted.

- The two studies collected existing traffic data at different times. The existing traffic data is used as the basis for developing the 2030 traffic forecasts. So, using different existing traffic assumptions will result in different forecasts.
- The signal timing parameters between the two studies were different in the 2030 and 2035 scenarios. This EIR analysis held existing signal timing unchanged under future scenarios (as is proper), whereas the Harrison-Oakland corridor study optimized the timing for their future scenarios. The technical analyst doing the intersection analyses must make determinations regarding several signal timing parameters such as green time allocation to each traffic movement. These parameters are different between the two studies but both are within standard engineering practice.

However, even with these differences the intersection analysis results are similar, indicating that conclusions drawn from the CBTP Study would also be applicable to this DEIR analysis.

Summary of Findings

#1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp (*unsignalized*) (CBTP Intersection #4)

The CBTP Study recommended changes at this intersection to include realigning the off-I-580 Off-Ramp as a "hard" right-turn onto Harrison Street, signalization, and addition of a travel lane along the off-ramp. Southbound Harrison Street would be modified from three travel lanes to two travel lanes and a bike lane, with a new crosswalk across the north leg of the intersection. The Stanley Place approach at the intersection would be closed off, with bollards providing fire truck access in case of emergency.

This DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would not adversely impact this intersection. Although the side-street service level at this unsignalized intersection would operate at LOS F during the AM peak hour, the intersection would not satisfy the California MUTCD peak-hour signal warrant. As a result, no mitigation measures were explored for this intersection.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study assumes major changes which would substantially improve the operations of this intersection, including the following items:

- **Signalization of the intersection.** Signalizing the intersection would provide a dedicated gap in southbound Harrison Street traffic, improving off-ramp serviceability.
- **Additional off-ramp lane.** The additional off-ramp lane would increase vehicle storage capacity and off-ramp serviceability.
- **Stanley Place closure.** The closure of Stanley Place would eliminate conflicts with off-ramp traffic,

As a result, the LOS presented in the CBTP is substantially better than for the DEIR, as shown in **Table 1**.

#2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (CBTP Study Intersection #5)

The CBTP Study recommended changes at this intersection to include reducing the one-directional northbound travel lanes on Oakland Avenue from three lanes to two lanes by converting a current through lane to a right-turn only lane. Other recommended improvements include construction of a new pedestrian staircase connecting Harrison Street to Oakland Avenue and a new pedestrian refuge island on Perry Place. The Study also recommended increasing the signal cycle length at this intersection from 80 seconds to 120 seconds, which would improve the delay time in the PM.

Impact TRANS-7a in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would adversely impact this intersection. Recommended mitigation measures include optimizing the signal timing for the PM peak hour, and coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group. However, improvements considered would have adverse effects on pedestrian and bicyclist safety, remove existing bicycle lanes, or are precluded by physical constraints, and therefore, the DEIR concluded that there are no feasible mitigation measures to completely mitigate the Project's impacts and the Project impacts at this intersection are significant and unavoidable.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study assumes signal optimization and a longer cycle length (100 seconds compared to 90 seconds), which generally improves intersection operations when all other variables such as traffic volumes and lane geometry are held constant.

#3. Harrison Street / 27th Street / 24th Street / Bay Place (CBTP Study Intersection #10)

The CBTP Study recommended removal of the existing channelized right-turn lane at the northeast corner of the intersection and closure of the 24th Street leg (access only provided via right-turns from 27th Street. The additional space freed up by these modifications would be converted to pedestrian plaza and street landscaping.

Impact TRANS-7b in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would adversely impact this intersection. Recommended mitigation measures include optimizing the signal timing for the PM peak hour, coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group, and prohibiting westbound left turns during the AM and PM peak hours.

After implementation of the mitigation measueres, this intersection would operate at an acceptable LOS D in the AM peak hour. In the PM peak hour, this intersection would operate at an unacceptable LOS E, but the average delay for the overall intersection and for critical movements would be reduced to a level that would mitigate the Project's impacts at this intersection in 2030.

Although the changes proposed under the CBTP Study would generally improve pedestrian conditions at this intersection, they would generally not improve traffic operations, as removal of the channelized right-turn from southbound Harrison Street to westbound 27th Street and closure of the 24th Street leg would restrict available vehicle movements at the intersection and increase delay. An additional reason for the difference in LOS presented in this DEIR is the proposed mitigation measure of prohibition of westbound left turns during the AM and PM peak hours—without mitigation, this DEIR indicates the intersection would operate similar to the CBTP Study (LOS F with over 120 seconds of intersection average delay).

#12. Harrison Street / Grand Avenue (CBTP Study Intersection #11)

The CBTP Study recommended only minor changes at this intersection, including addition of a bulbout on the northeast corner of the intersection and relocation of the nearside bus stop on the west side of Harrison Street to a farside location.

Impact TRANS-7d in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would increase the average intersection delay by more than two seconds during AM peak hour, which currently operates at LOS F under cumulative conditions without the Project. During the PM peak hour, the intersection would operate at LOS F under cumulative conditions without the Project, and the addition of Project-generated traffic would increase the v/c ratio by more than three percent.

Recommended mitigation measures include optimizing the signal timing for the PM peak hour, coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group, and prohibiting southbound left turns during the AM peak hours (this movement is already prohibited in the PM peak period) with extinguishable message signs installed on the northbound and southbound approaches to enforce this prohibition.

After implementation of the mitigation measures, the intersection would operate at LOS E during the AM peak hour and LOS F during the PM peak hour. As a result, the impact would still remain significant because these measures alone would not be sufficient to completely mitigate the Project's impacts in 2030.

The difference in LOS and delay between the DEIR and the CBTP Study is primarily due to different volumes as a result of the use of different ACCMA travel demand models. In particular, there are substantial differences in baseline volumes on the northbound left-turn, eastbound right-turn, and westbound left-turn and through movements which stem from the use of different versions of the ACCMA model.

#49. Oakland Avenue/West MacArthur Boulevard/Santa Clara Avenue (CBTP Study Intersection #3)

The CBTP Study recommended changes at this intersection to include converting Oakland Avenue north of the West MacArthur Boulevard - Santa Clara Avenue intersection from one-way northbound to two-way travel. The two-way conversion requires a median on Oakland Avenue north of the intersection to facilitate the 1-way to 2-way conversion, widening of Oakland Avenue under the I-580 overpass to accommodate the 2-way conversion and bicycle lanes, and improved sidewalks. The Study also recommends a split-phase intersection signal to direct the new traffic movements. These modifications would degrade intersection operations to LOS D during both peak hours in 2035.

Impact TRANS-7k in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would adversely impact in the PM peak hour because the maximum increase in v/c ratio would exceed the three percent threshold of significance. Recommended mitigation measures include optimizing the signal timing for the PM peak hour, coordinating the signal timing change with the adjacent intersections that are in the same signal coordination group, and restriping the northeast Oakland Avenue approach from the current configuration of one shared through-left lane and two through lanes to one exclusive left-turn lane, one shared through-left lane, and one through lane.

After implementation of the mitigation measures, in the AM peak hour, this intersection would operate at an unacceptable LOS E, but the average delay for the overall intersection and for critical movements would be reduced to a level that would mitigate the Project's impacts at this intersection in 2030. During the PM peak hour, the intersection would operate at LOS D after implementation of the mitigation measure.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study proposed substantial changes for this intersection, including conversion to two-way traffic along Oakland Avenue and fundamential shifts in traffic patterns to accommodate these changes in the roadway network. In particular, there would only be one northbound through lane along Oakland Avenue, and two new southbound right-turn lanes at this intersection. As a result, although the PM peak hour LOS results in the CBTP Study are similar to those presented in this DEIR, there are differences in AM peak hour LOS results.

#50. Harrison Street/ MacArthur Boulevard (Westbound) /Santa Clara Avenue (CBTP Study Intersection #2)

The CBTP Study recommended changes at this intersection to include converting Harrison Street north of the West MacArthur Boulevard - Santa Clara Avenue intersection from one-way southbound to two-way travel. The two-way conversion allows for a center median island with a pedestrian refuge at the Santa Clara intersection. The Study also recommended increasing the signal cycle length at this intersection to 100 seconds, which would improve the LOS in the AM from LOS E to LOS D. The CBTP Study concluded that in 2035 the intersection could operate at an acceptable LOS C during the PM peak hour,

Impact TRANS-7l in this DEIR identifies that Project-generated traffic, when added to other cumulative traffic by year 2030, would increase the average intersection delay by more than two seconds during AM peak hour, which currently operates at LOS F under cumulative conditions without the Project.

After implementation of the mitigation measures, the intersection would continue to operate at LOS F during the AM peak hour. As a result, the impact would still remain significant because these measures alone would not be sufficient to completely mitigate the Project's impacts in 2030.

The LOS results presented in the CBTP Study are not directly comparable to those presented in this DEIR because the CBTP Study proposed substantial changes for this intersection, including conversion to two-way traffic along Oakland Avenue and fundamential shifts in traffic patterns to accommodate these changes in the roadway network. In particular, there would be a new northbound travel lane along Harrison Street north of the intersection. As a result, although the PM peak hour LOS results in the CBTP Study are similar to those presented in this DEIR, there are some differences in AM peak hour LOS results.

#51. Oakland Avenue / Monte Vista Avenue (unsignalized) (CBTP Study Intersection #1)

The CBTP Study recommended changes at this intersection to including conversion of the westbound Oakland Avenue approach from a single all-movement lane to one exclusive left-turn lane, one exclusive through-lane, and one exclusive right-turn lane, which would result in LOS C during the AM peak hour and LOS F during the PM peak hour.

This DEIR identifies that the intersection would operate at LOS D during the AM peak hour and LOS F during the PM peak hour under cumulative conditions in 2030 with the Project. However, because the intersection would already meet peak hour traffic signal warrants under baseline conditions without the Project, the Project would not result in an impact at this intersection.

The difference in LOS between the CBTP Study and this DEIR is primarily a result of changes proposed by the CBTP Study to the westbound Oakland Avenue approach at this intersection. The DEIR assumes that the existing configuration of only one lane would remain in 2030, restricting the serviceability of this approach, but the CBTP Study stripes additional lanes on the approach, improving serviceability and reducing overall intersection average delay.

TABLE 1

PROPOSED PROJECT YEAR 2030 (WITH MITIGATION) AND HARRISON/OAKLAND CORRIDOR YEAR 2035 (WITH IMPROVEMENTS) LOS COMPARISON

Intersection	Traffic Control	Peak Hour	Kaiser Center Cumulative LOS (2030)		Harrison/Oakland Cumulative LOS (2035)	
			Delay(s)[1]	LOS[1]	Delay(s)[1]	LOS[1]
1. Harrison Street / Stanley Place / I-580 Eastbound Off-Ramp	TWSC	AM	>120	F	20	C
		PM	22	C	10	B
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps	Signal	AM	84	F	32	C
		PM	>120	F	138	F
3. Harrison Street / 27th Street / 24th Street / Bay Place	Signal	AM	54	D	137	F
		PM	66	E	248	F
12. Harrison Street / Grand Avenue	Signal	AM	80	E	46	D
		PM	>120	F	95	F
49. Oakland Avenue/ MacArthur Boulevard (WB) /Santa Clara Avenue	Signal	AM	70	E	49	D
		PM	36	D	37	D
50. Harrison Street/ MacArthur Boulevard/Santa Clara Avenue	Signal	AM	99	F	44	D
		PM	22	C	22	C
51. Oakland Avenue / Monte Vista Avenue	AWSC	AM	29	D	19	C
		PM	89	F	85	F

NOTES:

1 LOS assuming optimized signal timing.

2 The Harrison/Oakland Study assumed that the right turn movement onto Perry Place was a slow speed right turn.

SOURCES: Dowling Associates, Harrison Street/Oakland Avenue Corridor CBTP (P08-090) Concept Plan Analysis Memorandum, September 2009;; Design, Community and Environment, Harrison Street/Oakland Avenue Corridor CTP, February 2010; AECOM, 2010.

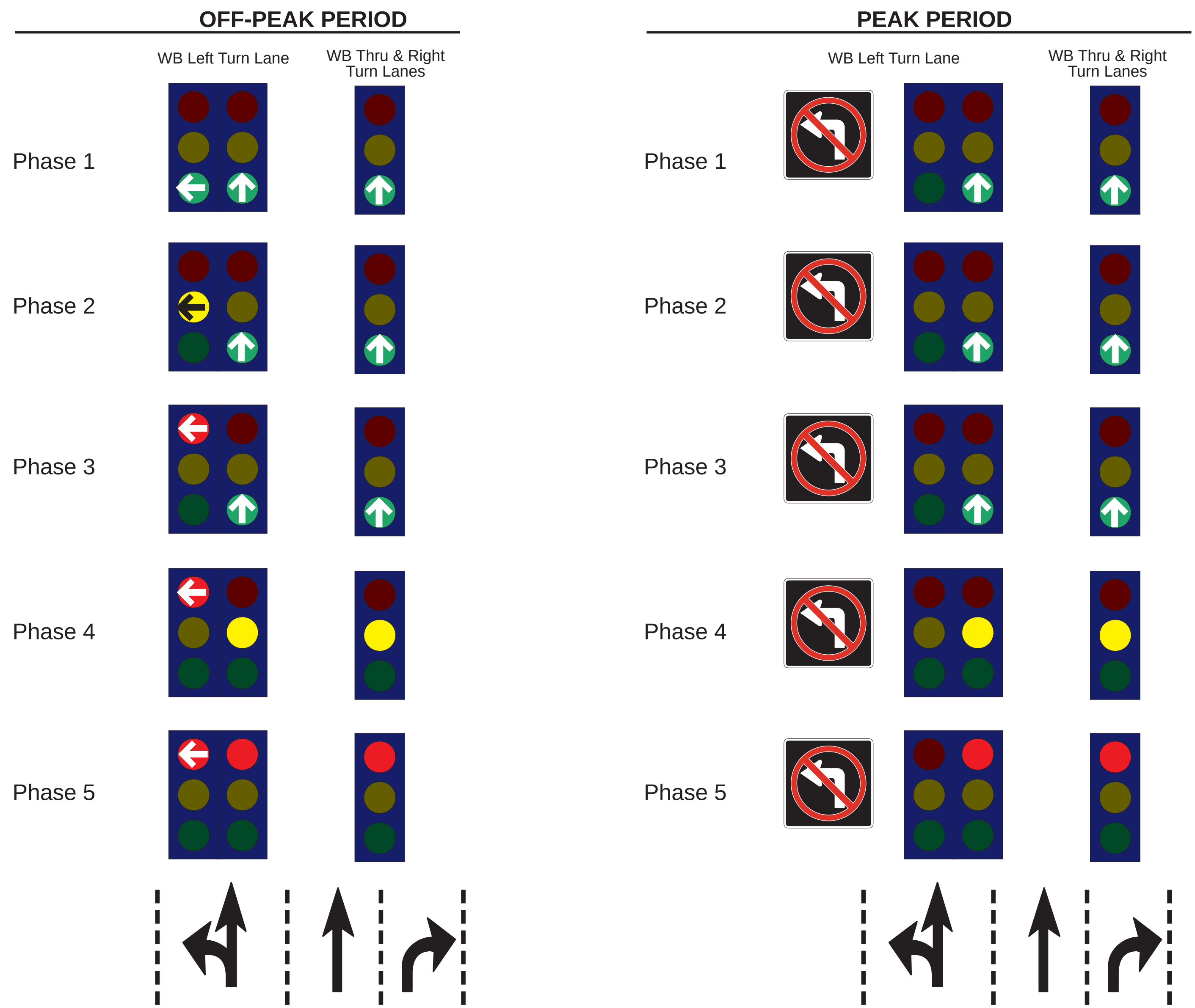
Conclusion

In conclusion, while the two studies utilized different model years and have different intersection analysis results, traffic generated by the proposed project would not substantially change the characterization of traffic operations in Year 2030 as presented in this DEIR, or in Year 2035 as presented in the CBTP Study. Furthermore, this project is not responsible for implementing any of the Harrison/Oakland Avenue Study improvements for the reasons stated above.

APPENDIX G.13

Proposed Westbound Signal Phase Sequence for Intersection #3 (Harrison Street / 27th Street / 24th Street)

AECOM



WB Signal Phasing.ai

KAISER CENTER TRANSPORTATION STUDY

PROPOSED WESTBOUND SIGNAL PHASE SEQUENCE

APPENDIX H

Phase 1 (South Tower Only) Transportation Analysis

Phase 1 (South Tower) Only Analysis

The Phase 1 (South Tower) Only analysis in this appendix has been prepared to analyze the potential environmental transportation impacts that would occur if only Phase 1 of the Proposed Project was developed.

Existing plus South Tower Conditions

Intersection Impacts

Impact TRANS-12: Phase I of the proposed Project, when added to existing traffic levels, would worsen level of service at area intersections. (Significant at intersections described below under Impacts TRANS-12a through TRANS-12d)

Existing plus South Tower Conditions traffic volumes are illustrated in **Figure 1a** through **Figure 1d**. **Table 1** summarizes the peak-hour LOS at the 51 study intersections under Existing plus Phase South Tower Conditions.

Average delay at some intersections would decrease under Existing plus South Tower Conditions due to greater growth on movements that are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in **Table 1**, the following intersections would operate at unacceptable conditions under Existing plus South Tower Conditions:

Outside Downtown Area

2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in PM peak hour)
3. Harrison Street / 27th Street / 24th Street (LOS E in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS F in PM peak hour)

Within Downtown Area

42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)
44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in PM peak hour)

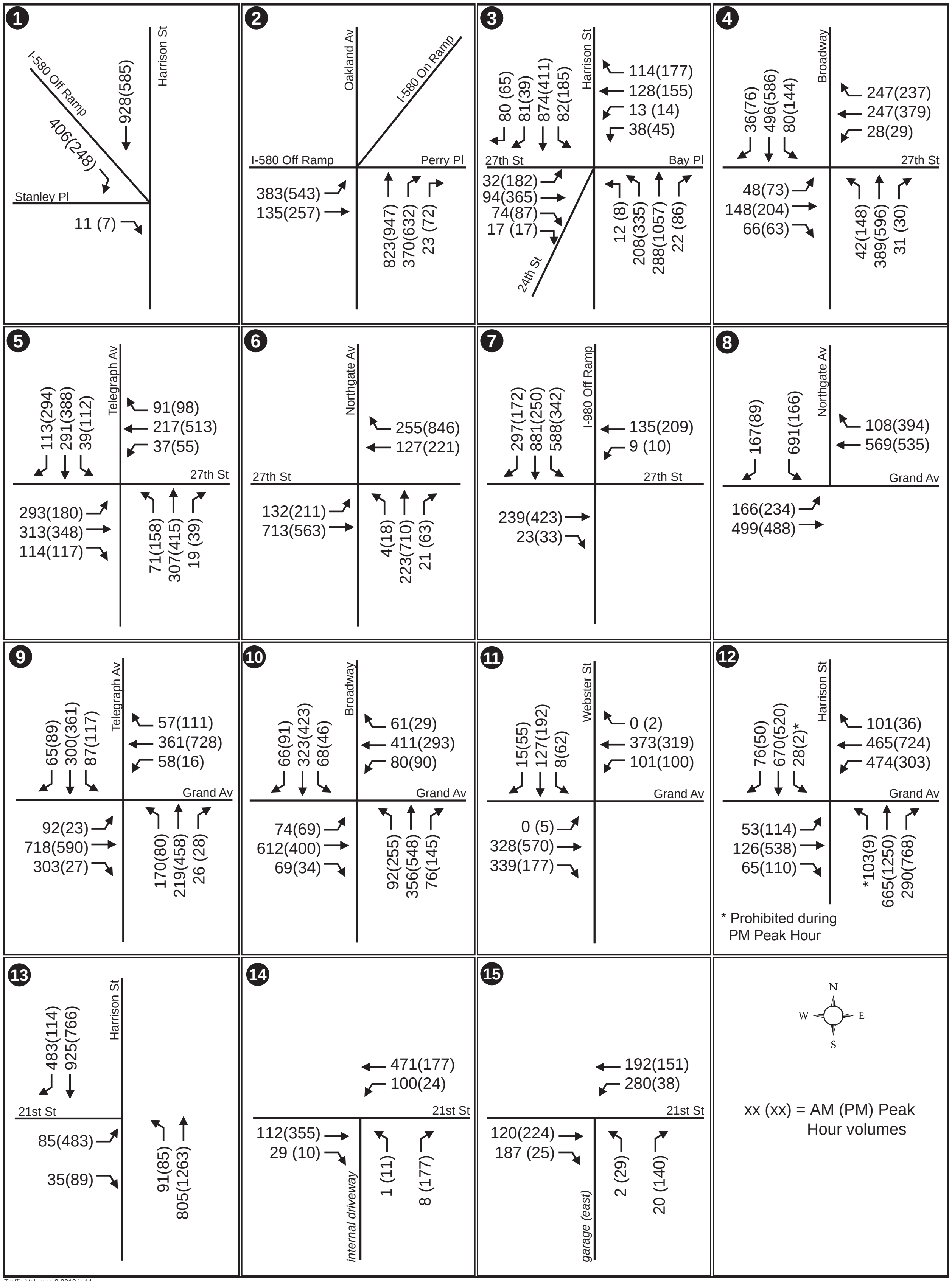
The Project would not result in a significant impact at the following intersection:

- *#42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)*. Although the intersection would operate at LOS F during both the AM and PM peak hours under both Existing Conditions and Existing plus South Tower Conditions, the addition of South Tower-generated traffic would cause an increase in v/c ratio not above the three percent threshold.

- *#44: Oak Street / 5th Street / I-880 SB On-Ramp (PM)*. Although the intersection would operate at LOS F during the PM peak hour under both Existing Conditions and Existing plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

Impacts due to the South Tower at the remaining intersections above are discussed below.

AECOM



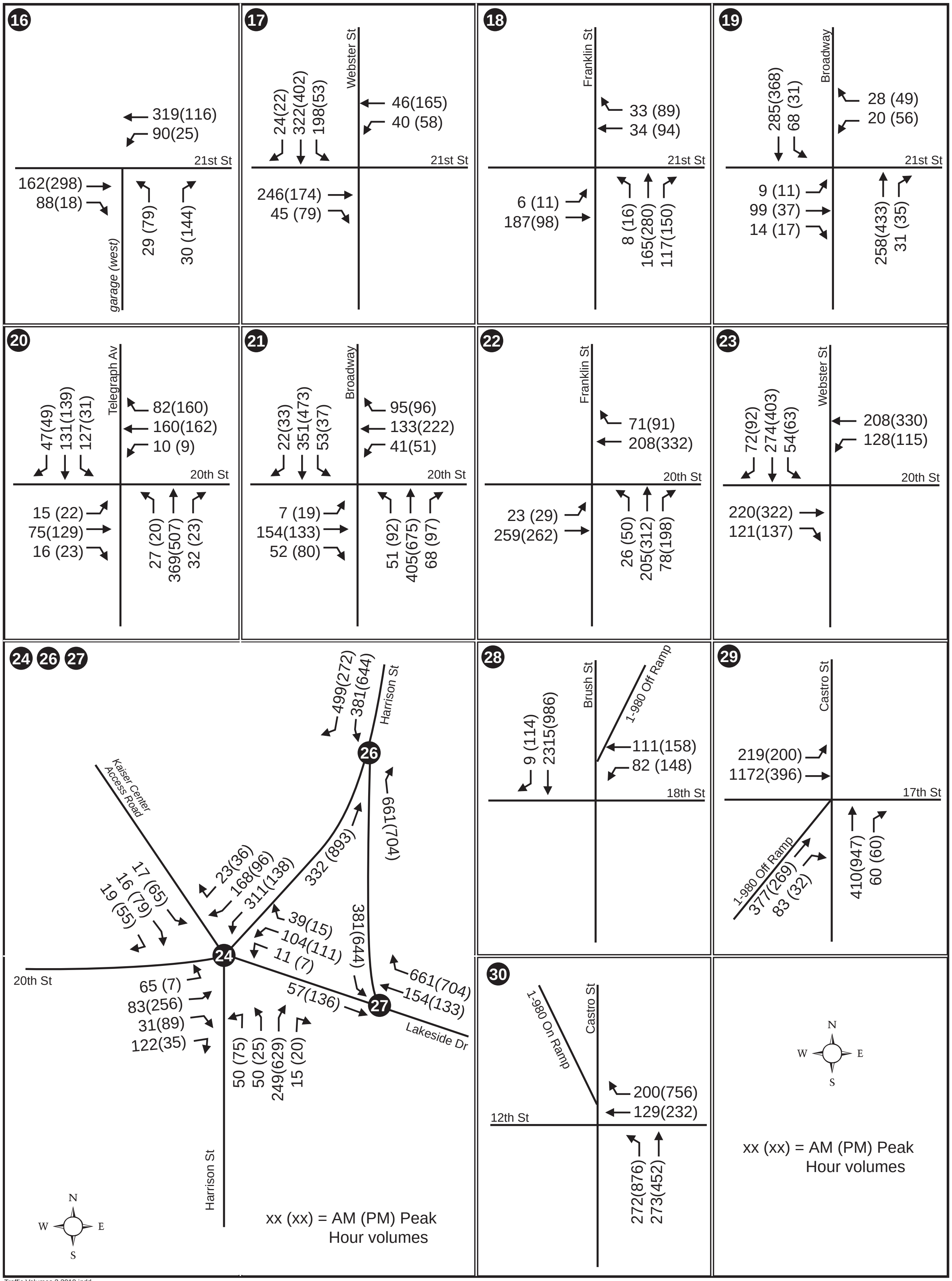
Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 1a

EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour



Traffic Volumes 2 2010.indd

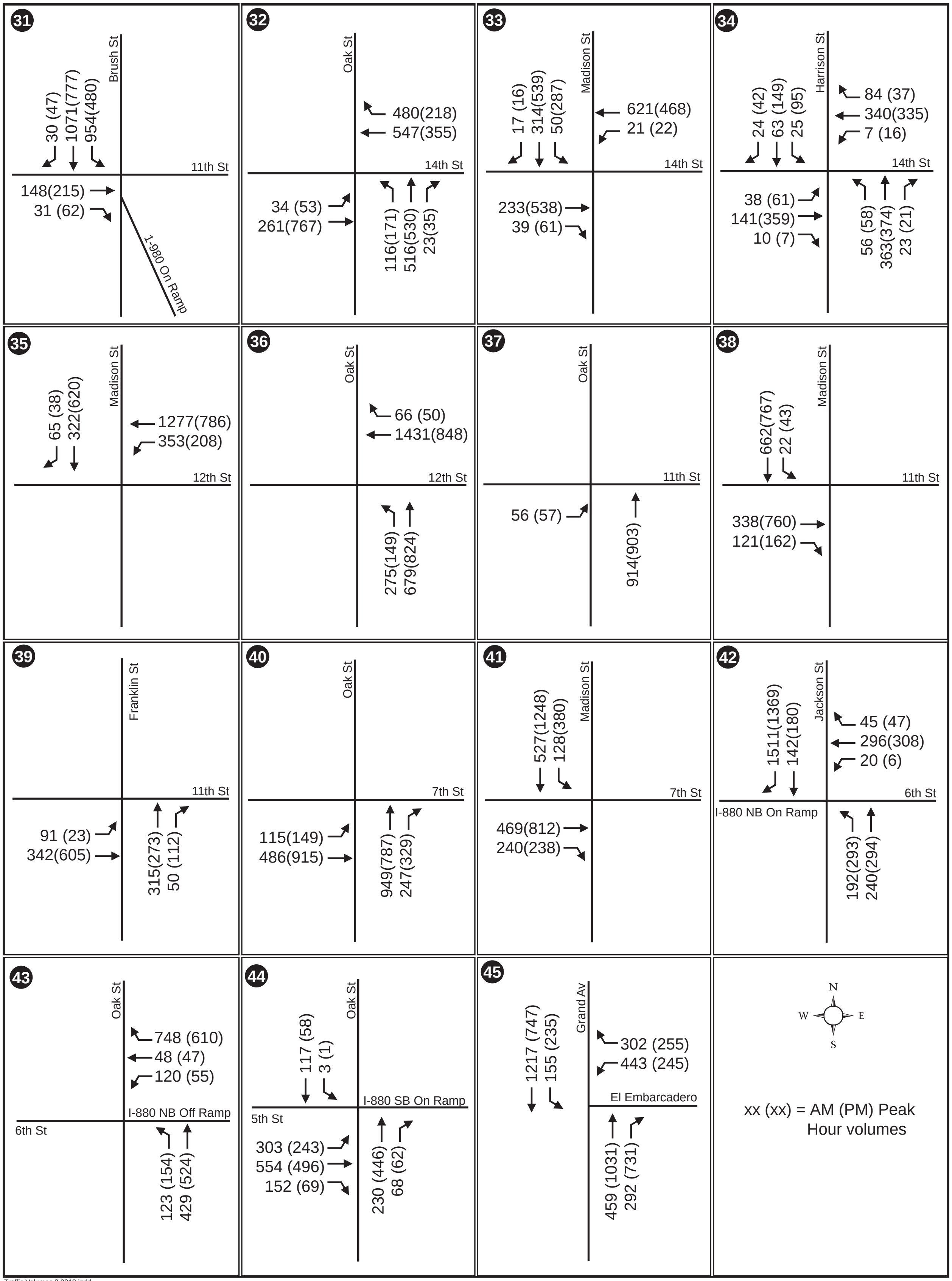
KAISER CENTER TRANSPORTATION STUDY

Figure 1b

EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour

AECOM

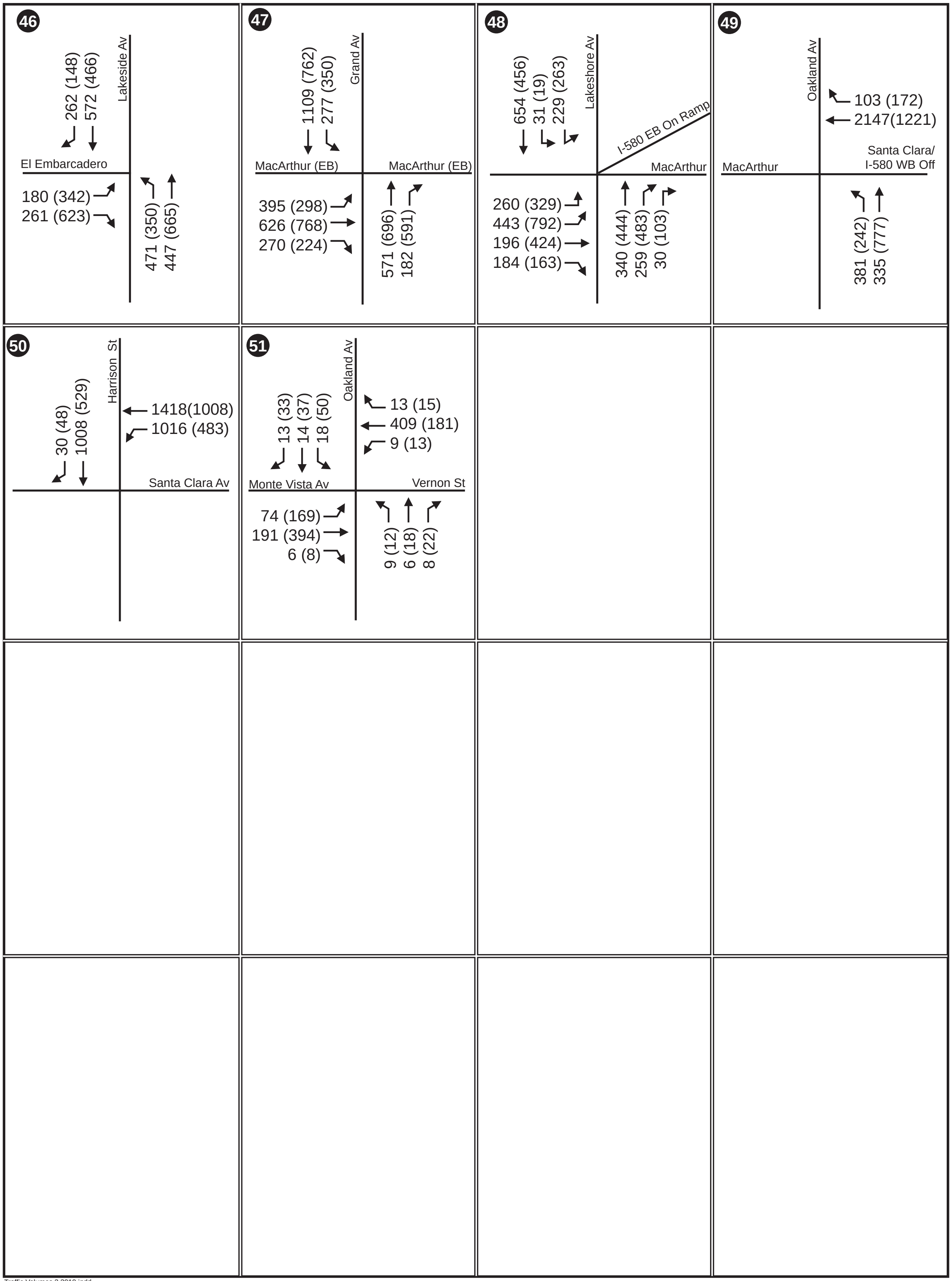


KAISER CENTER TRANSPORTATION STUDY

Figure 1c

EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 1d

EXISTING PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour

TABLE 1
EXISTING WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE (LOS)

			Existing Conditions				Existing plus South Tower Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	SSSC	C	16.9	B	11.9	C	18.5	B	12.0
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	B	18.1	F	>120	C	21.1	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	C	27.6	D	49.2	C	28.3	**E**	**65.8**
4	Broadway / 27th Street	Signal	B	15.3	B	18.0	B	15.4	B	18.4
5	Telegraph Ave. / 27th St.	Signal	B	18.8	C	25.0	B	18.8	C	25.7
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	A	8.9	B	10.9	A	9.0	B	11.6
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	12.0	B	11.0	B	12.2	B	11.0
45	Grand Avenue / El Embarcadero	Signal	C	25.7	F	90.9	C	25.5	**F**	**103.4**
46	Lakeshore Avenue / El Embarcadero	Signal	C	32.5	C	24.5	C	32.5	C	25.5
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	D	41.9	E	76.2	D	41.8	**F**	**85.1**
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	C	23.9	D	49.2	C	23.8	D	48.2
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	C	22.8	B	12.1	C	23.9	B	14.9
50	Harrison Street / MacArthur Blvd. (WB)	Signal	C	26.1	B	16.5	C	27.1	B	16.4
51	Oakland Avenue / Monte Vista Avenue	AWSC	B	12.7	B	12.8	B	13.3	B	13.8
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	21.3	B	17.7	C	21.7	B	17.9
9	Telegraph Avenue / West Grand Avenue	Signal	C	24.9	C	27.1	D	47.4	C	30.0
10	Broadway / Grand Ave.	Signal	C	20.9	B	17.0	C	21.1	B	17.3
11	Webster St. / Grand Ave.	Signal	C	29.2	C	23.7	C	31.6	C	24.0
12	Harrison St. / Grand Ave.	Signal	C	27.8	D	39.0	C	32.9	D	49.2
13	Harrison St. / 21st Street	Signal	A	6.9	B	13.7	A	8.4	C	20.7
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	11.6	B	10.9	B	10.5	B	14.3
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	12.5	B	11.4	B	12.3	B	14.3
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	11.5	B	10.8	B	13.6	B	11.7
17	Webster St. / 21st Street	Signal	B	13.8	B	18.2	B	14.4	B	18.5
18	Franklin St. / 21st Street	Signal	B	10.1	B	10.8	A	9.8	B	10.5

See next page for table footnotes.

TABLE 1 (*continued*)
EXISTING WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE (LOS)

			Existing Conditions				Existing plus South Tower Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
Within Downtown										
19	Broadway / 21st Street	Signal	A	10.0	B	10.6	B	10.3	B	10.6
20	Telegraph Ave. / 20th St.	Signal	B	11.6	B	12.5	B	11.8	B	12.4
21	Broadway / 20th St.	Signal	B	13.3	B	17.0	B	13.4	B	17.1
22	Franklin St. / 20th St.	Signal	B	13.0	B	15.1	B	14.2	B	14.4
23	Webster St. / 20th St.	Signal	C	20.8	C	21.0	C	22.9	C	22.4
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	Signal	C	24.2	C	27.2	D	36.9	E	68.2
25	Kaiser Ctr. Access Rd. / 20th St.[c]	SSSC	B	14.7	B	14.8	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	A	6.2	B	13.8	A	9.2	C	20.1
27	Lakeside Dr. / 20th St.	Signal	B	11.6	B	10.1	B	11.6	B	15.2
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	5.9	A	9.5	A	5.9	A	9.6
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	C	21.0	C	23.8	C	21.1	C	23.8
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	21.4	B	16.7	C	21.4	B	16.7
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	C	32.9	B	15.9	C	32.8	B	15.9
32	Oak Street / 14th Street	Signal	B	17.4	C	34.6	B	17.5	C	34.5
33	Madison St. / 14th St.	Signal	A	9.6	B	10.1	A	9.6	B	10.2
34	Harrison St. / 14th St.	Signal	A	9.3	A	9.7	A	9.3	A	9.7
35	Madison St. / 12th St.	Signal	A	7.7	A	7.8	A	7.7	A	8.1
36	Oak Street / 12th Street	Signal	B	12.8	B	12.8	B	12.8	B	12.8
37	Oak Street / 11th Street	OWSC	B	10.5	B	10.7	B	10.5	B	10.7
38	Madison St. / 11th St.	Signal	B	12.2	A	9.7	B	12.1	A	9.6
39	Franklin St. / 11th St.	Signal	B	13.3	B	14.9	B	13.1	B	14.8
40	Oak Street / 7th Street	Signal	A	9.4	B	14.2	A	9.4	B	14.2
41	Madison St. / 7th St.	Signal	A	8.8	B	11.8	A	8.8	B	12.1
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak St. / 6th St. / I-880 NB Off-Ramp	Signal	B	14.9	B	11.2	B	15.1	B	11.2
44	Oak St. / 5th St. / I-880 SB On-Ramp	Signal	E	65.3	F	>120	E	66.3	F	>120

Bold indicates significant impact.

[a] SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

[b] The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

[c] The Project would eliminate this intersection.

SOURCE: AECOM, 2010.

Impact TRANS-12a: Phase I of the proposed Project, when added to existing traffic levels, would increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was used to evaluate the impact. The intersection operates with a v/c ratio of 0.98 under Existing Conditions and would operate with a v/c ratio of 1.16 under Existing plus South Tower Conditions for the PM peak hour. Because the increase in v/c ratio would be 18 percent, which is greater than the three percent threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure TRANS-12a: Implement the following measures at the Oakland Avenue / Perry Place / I-580 Eastbound Ramps intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing changes at this intersection with the adjacent intersections (e.g., Oakland Avenue / MacArthur Boulevard) that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division (TSD) for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

Because the delays at this intersection are primarily on the northbound right turn to the I-580 Eastbound On-Ramp and Perry Place, the existing crosswalk on the southeast side of the intersection (across I-580 Eastbound On-Ramp / Perry Place) could be repositioned to the northwest side of the intersection (across the I-580 Eastbound Off-Ramp), providing more green time to the northbound right-turn. However, this would require pedestrians to cross the I-580 Westbound Off-Ramp on the north side of Oakland Avenue between Perry Place and MacArthur Boulevard. Because this on-ramp is uncontrolled and visibility can be poor, this configuration would likely present more safety issues than the existing crosswalk across the eastbound on-ramp at this intersection, which is a signalized crossing.

Geometric modifications to increase capacity on the northbound right-turn would also be infeasible. The I-580 Eastbound On-Ramp is restricted to one lane, precluding the provision of an additional turn lane onto the on-ramp. A Class 2 bicycle lane has also been recently striped on Oakland Avenue, and adding an additional exclusive right-turn lane could require the removal of the bicycle lane or a reduction to its attractiveness, or could present safety issues for bicycles. Substantial capacity improvements such as additional travel lanes would also conflict with the goals of the Harrison Street / Oakland Avenue CTP.

In addition, signal optimization at this location would require approval of the change by Caltrans, making implementation of the proposed mitigation measure uncertain. Given these considerations, there are no feasible measures to completely mitigate the South Tower's impacts. Therefore, the South Tower impact at this intersection would be significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Existing plus Project (Phase I and Phase II) Conditions.

Impact TRANS-12b: Phase I of the proposed Project, when added to existing traffic levels, would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (Existing). (Significant)

Mitigation Measure TRANS-12b: Implement the following measures at the Harrison Street / 27th Street / 24th Street intersection:

- Prohibit westbound left turns from Bay Place (to Harrison Street and 24th Street) during the PM peak period.
- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Harrison Street / Grand Avenue and Harrison Street / Westlake Middle School Driveway) that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

The 59 vehicles making these movements during the PM peak hour (45 vehicles to southbound Harrison Street and 14 vehicles to westbound 24th Street) would likely divert to the westbound through movement at this intersection or use other intersections in the area. Given that the volumes are relatively low, the diversion of traffic as a result of the left-turn prohibition would not result in substantial secondary impacts. By prohibiting westbound left turns, the green times can be reallocated to the northbound and southbound through Harrison Street movements. After implementation of the mitigation measure, the intersection would operate at an acceptable LOS C in the PM peak hour.

However, the proposed mitigation measure would represent a less-than-ideal solution and could potentially still result in confusion for drivers who do not regularly use this intersection. This confusion could potentially result in drivers attempting to make abrupt lane changes out of the shared through-left lane or make prohibited traffic movements under the assumption that they have the “right of way.”

Significance after Implementation of Mitigation: Conservatively deemed Significant and Unavoidable. If the City rejects the specific implementation approach described for Mitigation

Measure TRANS-12b for the Project, and no other feasible options are identified, then the impact at this location would be Significant and Unavoidable. Alternatively, if the City accepts the approach identified, the Project impact at this location would be Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Existing plus Project (Phase I and Phase II) Conditions.

Impact TRANS-12c: Phase I of the proposed Project, when added to existing traffic levels, would increase the average intersection vehicle delay by more than two seconds during the PM peak hour at *Intersection #45 (Grand Avenue / El Embarcadero)* (Existing), which currently operates at an unacceptable LOS F during the PM peak hour under Existing Conditions. (Significant)

Mitigation Measure TRANS-12c: Implement the following measures at the Grand Avenue / El Embarcadero intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Grand Avenue / Mac Arthur Boulevard and Lakeshore Drive / El Embarcadero) in the same coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals

- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, the intersection (located outside the Downtown area) is expected to operate at an acceptable LOS D in the PM peak hour, thus mitigating the South Tower's impact at this intersection. However, since the Grand Avenue / El Embarcadero intersection was counted (in November 2008) prior to its modification, new level of service calculations will be needed based on new counts (to be taken after the completion of scheduled modifications to the Lakeshore Drive / Mac Arthur Boulevard intersection). This analysis should be provided to TSD for review and determination whether or not the above improvement measures should be implemented.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Existing plus Project (Phase I and Phase II) Conditions.

Impact TRANS-12d: Buildout of the proposed Project (Phase I and II), when added to existing traffic levels, would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #47 (Grand Avenue / MacArthur Boulevard (Eastbound) / I-580 Eastbound Off-Ramp)* (Existing). (Significant)

Mitigation Measure TRANS-12d: Implement the following measures at the Grand Avenue / MacArthur Boulevard (Eastbound) intersection:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Grand Avenue / El Embarcadero and Mac Arthur Boulevard / Lakeshore Drive) in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller

- GPS communication (clock)
- Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
- City Standard ADA wheelchair ramps
- Full actuation (video detection, pedestrian push buttons, bicycle detection)
- Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
- Countdown Pedestrian Signals
- Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
- Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, the intersection (located outside the Downtown area) is expected to operate at an acceptable LOS D in the PM peak hour, thus mitigating the South Tower's impact at this intersection. However, since the Grand Avenue / Mac Arthur Boulevard intersection was counted in November 2008, new level of service calculations will be needed based on new counts (to be taken after the completion of scheduled modifications to the Lakeshore Drive / Mac Arthur Boulevard intersection). This analysis should be provided to TSD for review and determination whether or not the above improvement measures should be implemented.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Existing plus Project (Phase I and Phase II) Conditions.

Roadway Impacts

Table 2 summarizes peak-hour LOS for the study roadway segments under Existing plus South Tower Conditions and indicates that South Tower-generated traffic is not expected to have a significant impact on any of the 12 study roadway segments.

Cumulative (2030) plus South Tower Conditions

This section provides the results of the analysis of Cumulative (2030) plus South Tower Conditions. Near Term (2015) plus Project (Phase I or South Tower) Conditions are addressed in Section IV.L of the Draft Environmental Impact Report (DEIR) for the Kaiser Center Office Project.

Intersection Impacts

Impact TRANS-13: Under 2030 cumulative conditions, Phase I of the proposed Project would worsen level of service conditions at area intersections. (Significant at intersections described below under Impacts TRANS-13a through TRANS-13e)

Cumulative (2030) plus South Tower Conditions traffic volumes are illustrated in **Figure 2a** through **Figure 2d**. **Table 3** summarizes the peak hour LOS at the 51 study intersections under Cumulative (2030) plus South Tower Conditions.

Average delay at some intersections would decrease under Cumulative (2030) plus South Tower Conditions (when compared to Cumulative Without Project Conditions) due to greater growth on movements which are under capacity (non-critical movements) and underutilizing the green time allotted by the signal, thereby resulting in a higher vehicle throughput and reduced overall intersection average delay.

As shown in Table 2, the following intersections would operate at unacceptable conditions under Cumulative (2030) plus South Tower Conditions:

Outside Downtown Area

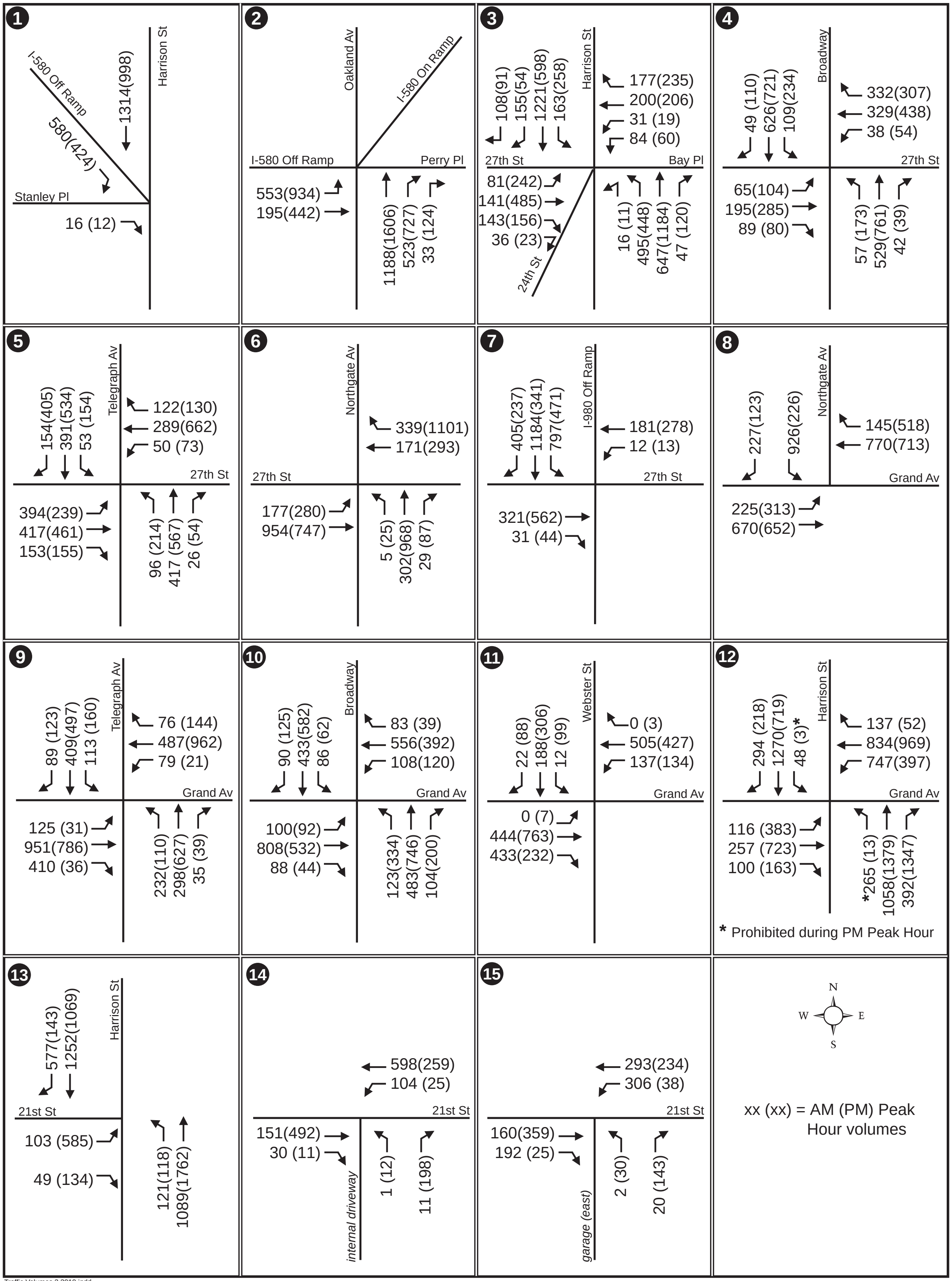
1. Harrison Street / Stanley Place / I-580 EB Off-Ramp (LOS F in AM peak hour)
2. Oakland Avenue / Perry Place / I-580 Eastbound Ramps (LOS F in AM and PM peak hours)
3. Harrison Street / 27th Street / 24th Street (LOS F in AM and PM peak hours)
5. Telegraph Avenue / 27th Street (LOS F in PM peak hour)
45. Grand Avenue / El Embarcadero (LOS F in PM peak hour)
47. Grand Avenue / MacArthur Boulevard (Eastbound) (LOS E in AM peak hour, and LOS F in PM peak hour)

TABLE 2
EXISTING WITHOUT AND WITH SOUTH TOWER ROADWAY SEGMENT LEVELS OF SERVICE

					Existing Conditions						Existing plus South Tower Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	**Roadway Segment**	**Dir.**	**Ln.**	**Capacity (veh/hr)**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**
Caltrans Facilities																
1	**SR 260 (Posey / Webster Tubes)**	NB	2	3,400	E	3,081	0.91	D	2,478	0.73	E	3,084	0.91	D	2,479	0.73
	from Alameda city limits to I-880	SB	2	3,400	B	1,575	0.46	C	2,347	0.69	B	1,576	0.46	C	2,355	0.69
2	**I-880**	EB	4	8,000	B	3,070	0.38	B	3,164	0.40	B	3,111	0.39	B	3,171	0.40
	from Market Street to I-980	WB	4	8,000	B	3,720	0.47	B	3,426	0.43	B	3,725	0.47	B	3,462	0.43
3	**I-880**	EB	4	8,000	C	4,968	0.62	D	5,737	0.72	C	4,974	0.62	D	5,777	0.72
	from Oak Street to 5th Avenue	WB	4	8,000	C	5,606	0.70	C	5,075	0.63	C	5,651	0.71	C	5,083	0.64
4	**I-980**	NB	3	6,000	A	1,611	0.27	C	3,609	0.60	A	1,626	0.27	C	3,706	0.62
	from 27th Street to 29th Street	SB	3	6,000	D	4,679	0.78	B	1,858	0.31	D	4,732	0.79	B	1,868	0.31
Non-Caltrans Facilities																
5	**Broadway**	NB	2	1,800	A	513	0.29	B	876	0.49	A	524	0.29	C	948	0.53
	from 19th Street to Grand Avenue	SB	2	1,800	A	438	0.24	B	597	0.33	A	472	0.26	B	604	0.34
6	**Telegraph Avenue**	NB	2	1,800	A	464	0.26	B	678	0.38	A	466	0.26	B	689	0.38
	from 20th Street to 27th Street	SB	2	1,800	B	661	0.37	B	565	0.31	B	661	0.37	B	567	0.32
7	**West Grand Avenue**	EB	2	1,800	C	1,054	0.59	B	719	0.40	C	1,113	0.62	B	722	0.40
	from S. Pablo Ave. to Telegraph Ave.	WB	2	1,800	B	672	0.37	B	862	0.48	B	677	0.38	B	897	0.50
8	**Grand Avenue**	EB	2	1,800	B	682	0.38	B	762	0.42	B	756	0.42	B	762	0.42
	from Broadway to Harrison Street	WB	2	1,800	B	644	0.36	B	783	0.44	B	644	0.36	B	783	0.44
9	**Grand Avenue**	EB	2	1,800	B	751	0.42	E	1,700	0.94	B	751	0.42	E	1,762	0.98
	from Harrison St. to El Embarcadero	WB	2	1,800	E	1,531	0.85	C	968	0.54	E	1,660	0.92	C	992	0.55
10	**Harrison Street / Oakland Avenue**	NB	2	1,800	C	1,189	0.66	E	1,536	0.85	C	1,216	0.68	E	1,651	0.92
	from I-580 to 27th Street	SB	2	1,800	C	1,041	0.58	B	686	0.38	C	1,117	0.62	B	700	0.39
11	**Harrison Street**	NB	3	2,700	A	784	0.29	B	1,236	0.46	B	819	0.30	C	1,400	0.52
	from 27th Street to Grand Avenue	SB	3	2,700	B	899	0.33	A	556	0.21	B	986	0.37	A	572	0.21
12	**Harrison Street**	NB	2	1,800	A	475	0.26	B	745	0.41	A	485	0.27	B	750	0.42
	from 20th Street to 14th Street	SB	2	1,800	A	444	0.25	A	286	0.16	A	444	0.25	A	295	0.16

SOURCE: AECOM, 2010.

AECOM



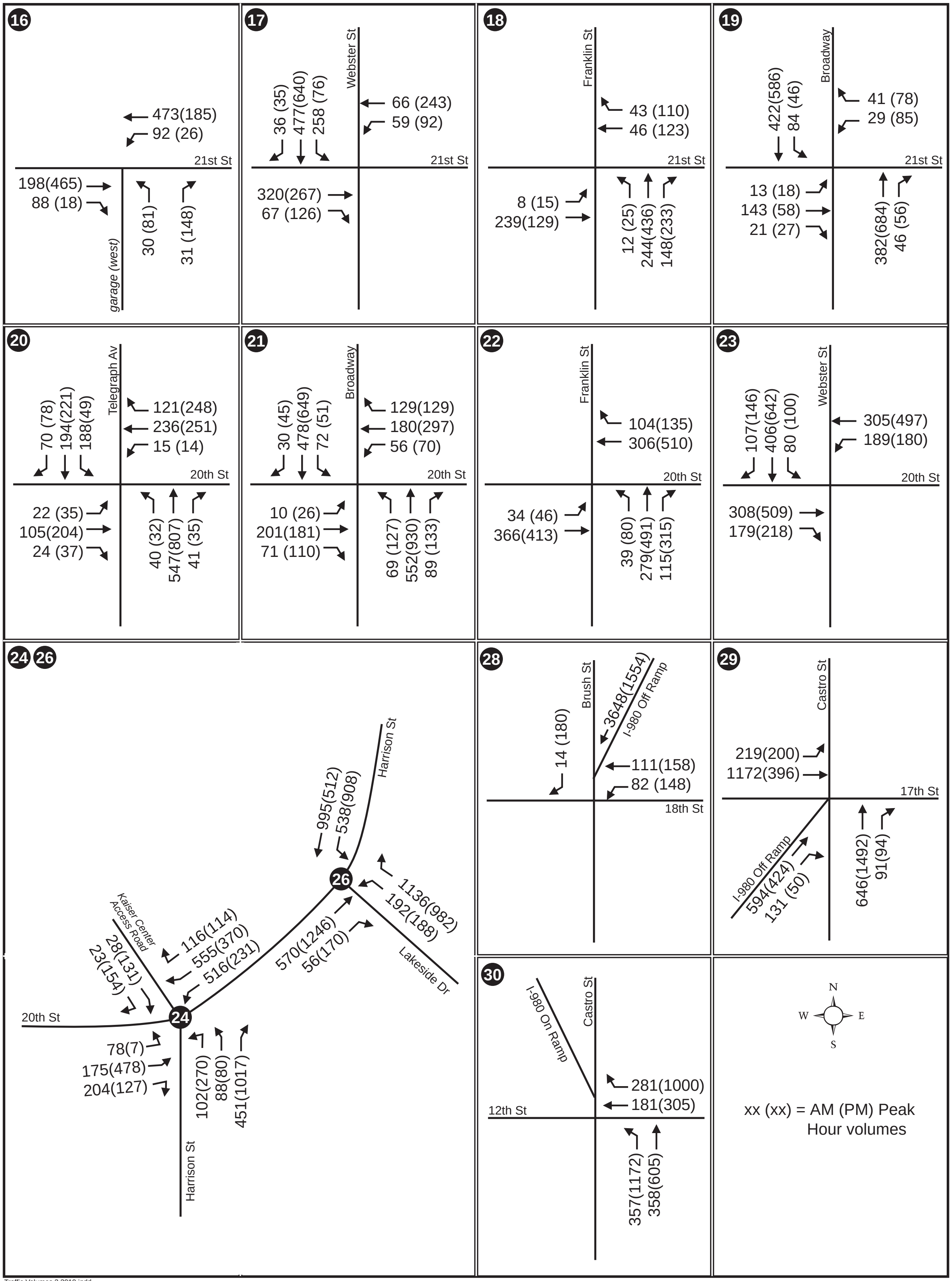
KAISER CENTER TRANSPORTATION STUDY

Figure 2a

CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour

AECOM



Traffic Volumes 2 2010.indd

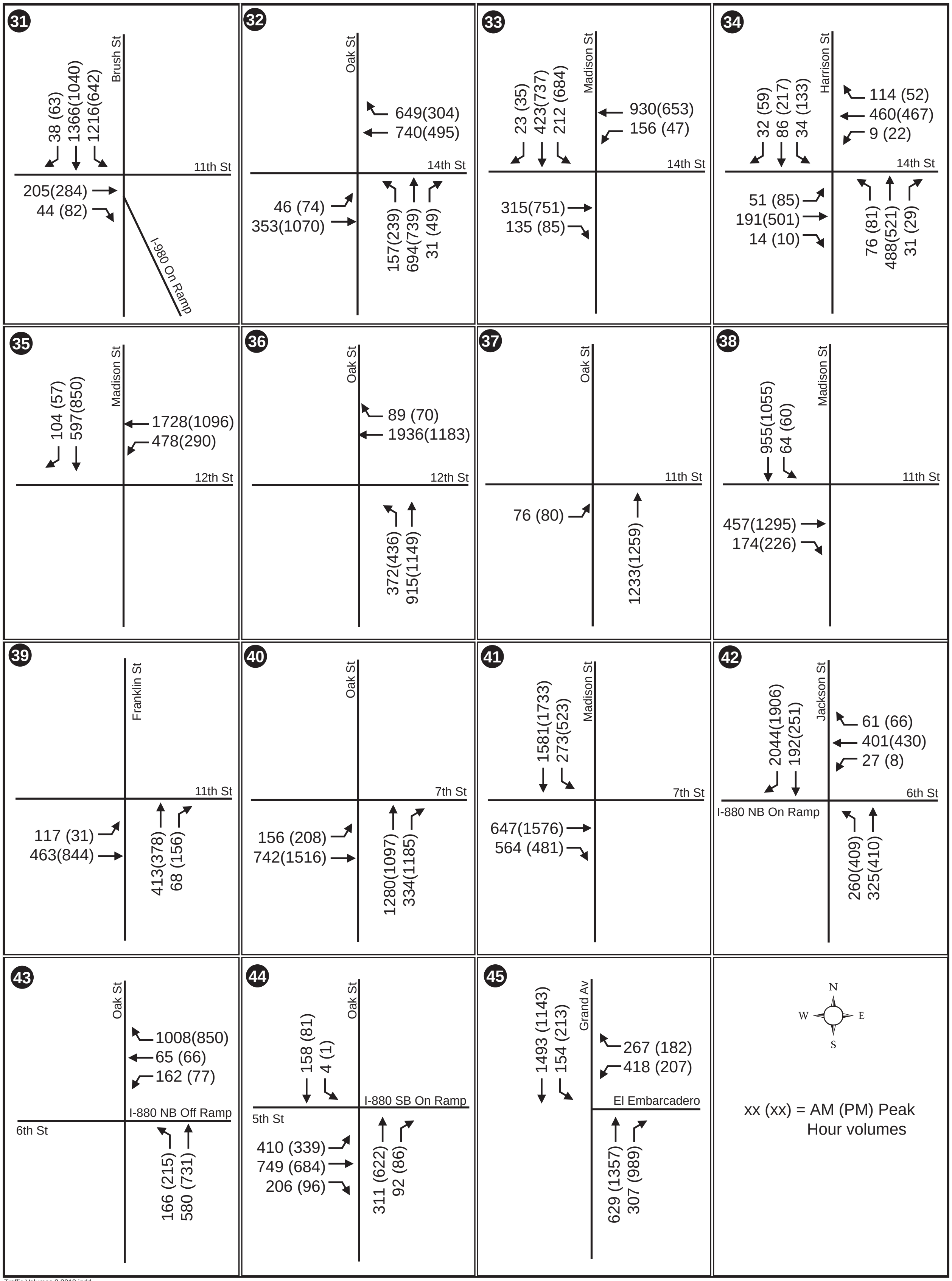
KAISER CENTER TRANSPORTATION STUDY

Figure 2b

CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour

AECOM



Traffic Volumes 2 2010.indd

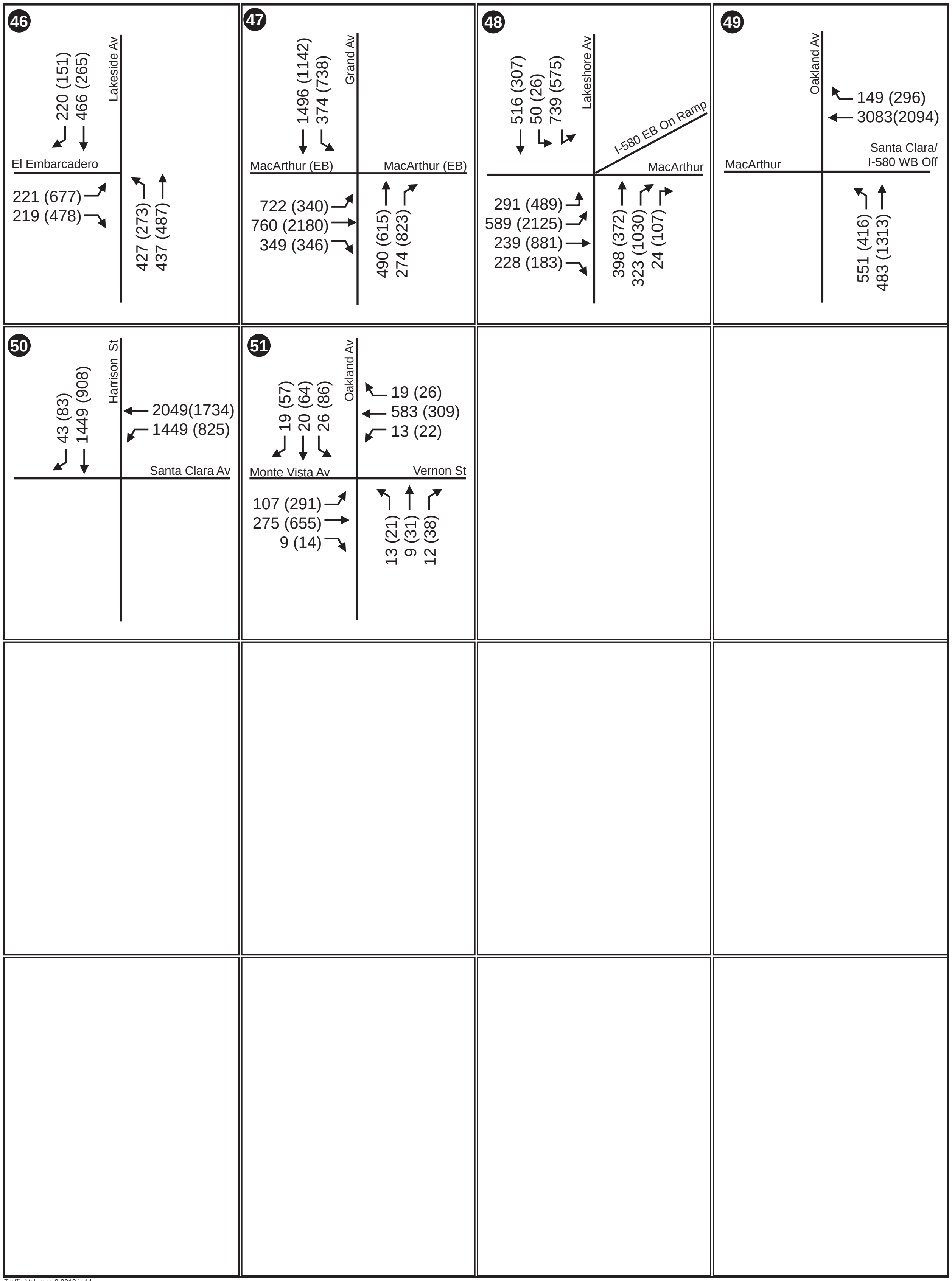
KAISER CENTER TRANSPORTATION STUDY

Figure 2c

CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour

AECOM



Traffic Volumes 2 2010.indd

KAISER CENTER TRANSPORTATION STUDY

Figure 2d

CUMULATIVE (2030) PLUS SOUTH TOWER TRAFFIC VOLUMES

AM (PM) Peak Hour

TABLE 3
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE

No.	Intersection	Traffic Control[a]	Cumulative (2030) without Project Conditions – AM Peak Hour LOS	Cumulative (2030) without Project Conditions – AM Peak Hour Delay[b]	Cumulative (2030) without Project Conditions – PM Peak Hour LOS	Cumulative (2030) without Project Conditions – PM Peak Hour Delay[b]	Cumulative (2030) + South Tower Conditions – AM Peak Hour LOS	Cumulative (2030) + South Tower Conditions – AM Peak Hour Delay[b]	Cumulative (2030) + South Tower Conditions – PM Peak Hour LOS	Cumulative (2030) + South Tower Conditions – PM Peak Hour Delay[b]
Outside Downtown										
1	Harrison St. / Stanley Pl. / I-580 EB Off-Ramp	TWSC	F	68.7	C	20.6	F	86.5	C	21.0
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	E	65.9	F	>120	**E**	**74.3**	**F**	**>120**
3	Harrison Street / 27th Street / 24th Street	Signal	F	97.0	E	78.9	**F**	**116.2**	**F**	**97.7**
4	Broadway / 27th Street	Signal	B	17.5	C	32.2	B	17.7	C	34.4
5	Telegraph Avenue / 27th Street	Signal	C	20.5	E	67.9	C	20.7	**E**	**79.9**
6	Northgate Ave. / 27th St. / I-980 EB On-Ramp	Signal	B	12.3	B	15.8	B	12.5	B	19.4
7	Northgate Ave. / 27th St. / I-980 WB Off-Ramp	Signal	B	15.7	B	12.1	B	16.5	B	12.1
45	Grand Avenue / El Embarcadero	Signal	C	23.4	F	>120	C	23.6	F	>120
46	Lakeshore Avenue / El Embarcadero	Signal	C	23.3	C	26.0	C	23.3	C	30.0
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	E	68.3	F	>120	E	68.3	F	>120
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	F	94.5	F	>120	F	94.4	F	>120
49	Oakland Avenue / MacArthur Blvd. (WB)	Signal	F	>120	C	21.0	F	>120	C	23.9
50	Harrison Street / MacArthur Blvd. (WB)	Signal	F	83.2	C	21.3	**F**	**88.8**	C	21.4
51	Oakland Avenue / Monte Vista Avenue	AWSC	C	22.9	F	61.2	D	25.3	F	72.3
Within Downtown										
8	Northgate Avenue / West Grand Avenue	Signal	C	26.8	C	20.5	C	28.0	C	21.1
9	Telegraph Avenue / West Grand Avenue	Signal	C	31.5	D	52.6	C	34.8	E	60.6
10	Broadway / Grand Avenue	Signal	C	22.5	C	21.4	C	23.4	C	26.5
11	Webster St. / Grand Ave.	Signal	C	29.9	C	29.4	C	30.4	C	30.0
12	Harrison St. / Grand Ave.	Signal	F	93.8	F	>120	**F**	**>120**	**F**	**>120**
13	Harrison St. / 21st St.	Signal	A	7.5	B	19.9	A	9.8	D	50.7
14	Kaiser Ctr. Access Rd. / 21st Street	SSSC	B	12.4	B	12.3	B	10.3	C	17.8
15	Kaiser Ctr. Garage (NE) / 21st Street	SSSC	B	13.6	B	12.9	B	12.5	C	15.2
16	Kaiser Ctr. Garage (NW) / 21st Street	SSSC	B	12.8	B	12.7	C	15.2	B	13.7
17	Webster St. / 21st St.	Signal	B	14.4	B	19.2	B	14.9	B	19.0

See next page for table footnotes.

TABLE 3 (Continued)
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE

			Cumulative (2030) without Project Conditions				Cumulative (2030) + South Tower Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control[a]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]	LOS	Delay[b]
18	Franklin St. / 21st St.	Signal	B	10.3	B	11.0	A	10.0	B	10.9
19	Broadway / 21st Street	Signal	B	10.8	B	12.4	B	11.2	B	12.5
20	Telegraph Ave. / 20th St.	Signal	B	13.1	B	13.0	B	13.3	B	13.1
21	Broadway / 20th Street	Signal	B	14.5	C	34.5	B	14.6	C	34.9
22	Franklin St. / 20th St.	Signal	B	11.6	B	14.8	B	13.6	B	14.5
23	Webster St. / 20th St.	Signal	C	24.0	C	24.6	C	21.5	C	24.4
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	C	25.7	D	42.3	E	65.8	**F**	**>120**
25	Kaiser Ctr. Access Rd. / 20th Street[c]	SSSC	B	10.5	B	10.1	--	--	--	--
26	Harrison St. / Lakeside Dr.	Signal	C	21.3	D	49.0	C	20.8	D	51.1
27	Lakeside Dr. / 20th St.[d]	Signal	--	--	--	--	--	--	--	--
28	Brush St. / 18th St. / I-980 WB Off-Ramp	Signal	A	7.6	A	8.4	A	7.6	A	8.5
29	Castro St. / 17th St. / I-980 EB Off-Ramp	Signal	E	58.0	D	43.9	E	59.1	D	44.1
30	Castro St. / 12th St. / I-980 EB On-Ramp	Signal	C	20.9	B	19.0	C	20.9	B	19.1
31	Brush St. / 11th St. / I-980 WB On-Ramp	Signal	E	58.5	B	17.4	E	58.4	B	17.4
32	Oak Street / 14th Street	Signal	D	44.7	F	89.8	D	45.4	F	89.8
33	Madison St. / 14th St.	Signal	B	19.6	B	19.3	B	19.5	B	19.3
34	Harrison St. / 14th St.	Signal	A	9.8	B	10.7	A	9.9	B	10.8
35	Madison St. / 12th St.	Signal	A	9.7	A	10.0	A	9.7	B	10.1
36	Oak Street / 12th Street	Signal	B	14.7	B	16.0	B	14.7	B	16.0
37	Oak Street / 11th Street	SSSC	B	11.4	B	11.7	B	11.5	B	11.8
38	Madison St. / 11th St.	Signal	B	11.6	B	11.7	B	11.5	B	11.5
39	Franklin St. / 11th St.	Signal	B	14.2	B	14.1	B	14.1	B	14.1
40	Oak Street / 7th Street	Signal	B	11.5	F	92.3	B	11.6	F	92.3
41	Madison St. / 7th St.	Signal	B	13.2	C	32.9	B	13.3	D	36.6
42	Jackson St. / 6th St. / I-880 NB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120
43	Oak Street / 6th Street / I-880 NB Off-Ramp	Signal	C	26.5	B	15.7	C	27.5	B	15.7
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	>120	F	>120	F	>120	F	>120

Bold indicates significant impact.

a SSSC = Side street stop controlled intersection; AWSC = All-way stop controlled intersection

b The LOS and delay for side street stop controlled intersections represent the worst traffic movement or approach. The LOS and delay for signalized intersections and all-way stop controlled intersections represent the average delay for all traffic movements.

c The Project would eliminate this intersection.

d After reconfiguration of Intersection 24 and Intersection 26, this intersection would be eliminated.

SOURCE: AECOM, 2010.

48. Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 Eastbound On-Ramp (LOS F in AM and PM peak hours)

49. Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 Westbound Off-Ramp (LOS F in AM peak hour)

50. Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue (LOS F in AM peak hour)

51. Oakland Avenue / Monte Vista Avenue / Vernon Street (LOS F in PM peak hour)

Within Downtown Area

12. Harrison Street / Grand Avenue (LOS F in AM and PM peak hours)

24. Harrison Street / 20th Street / Kaiser Center Access Road (LOS F in PM peak hour)

32. Oak Street / 14th Street (LOS F in PM peak hour)

40. Oak Street / 7th Street (LOS F in PM peak hour)

42. Jackson Street / 6th Street / I-880 Northbound On-Ramp (LOS F in AM and PM peak hours)

44. Oak Street / 5th Street / I-880 Southbound On-Ramp (LOS F in AM and PM peak hours)

South Tower–generated traffic would not result in a significant impact at the following intersections:

- #1: Harrison Street / Stanley Place / I-580 EB Off-Ramp (AM). Although the side-street service level at this unsignalized intersection would operate at LOS F during the AM peak hour under Near-Term (2030) plus South Tower Conditions, the intersection would not satisfy the California MUTCD peak-hour signal warrant.

- #45: Grand Avenue / El Embarcadero (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

- #47: Grand Avenue / MacArthur Boulevard (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

- #48: Lakeshore Avenue / El Embarcadero (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

- #49: Oakland Avenue / MacArthur Boulevard / I-580 WB Off-ramp (AM). Although the intersection would operate at LOS F during the AM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in v/c ratio above the three percent threshold.

- #32: Oak Street / 14th Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.

- #40: Oak Street / 7th Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause an increase in average intersection delay above the two-second threshold, nor an increase in critical movement delay above the four-second threshold.

- #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM). Although the intersection would operate at LOS F during the AM and PM peak hours under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause the v/c ratio to increase above the three percent threshold.

- #44: Oak Street / 5th Street / I-880 SB On-Ramp (AM / PM). Although the intersection would operate at LOS F during the AM and PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the addition of South Tower-generated traffic would not cause the v/c ratio to exceed the three percent threshold.

- #51: Oakland Avenue / Monte Vista Avenue / Vernon Street (PM). Although the intersection would operate at LOS F during the PM peak hour under both Cumulative (2030) without Project Conditions and Cumulative (2030) plus South Tower Conditions, the intersection is expected to be already meet the peak hour signal warrant under Cumulative (2030) without Project Conditions. Therefore, the Project would not result in a significant impact at this intersection.

Impacts due to South Tower-generated traffic at the remaining intersections above are discussed below.

Impact TRANS-13a: Under 2030 cumulative conditions, Phase I of the proposed Project would degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour at *Intersection #2 (Oakland Avenue / Perry Place / I-580 Eastbound Ramps)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of Project traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.43 under Cumulative (2030) without Project Conditions and 1.49 under Cumulative (2030) plus South Tower Conditions in the PM peak hour. Because the increase in v/c ratio would be 6 percent, which is above the three percent threshold of significance, South Tower-generated traffic would result in a significant impact at this intersection.

Mitigation Measure TRANS-13a: Implement Mitigation Measure TRANS-12a.

This measure alone should be sufficient to completely mitigate the South Tower impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13b: Under 2030 cumulative conditions, Phase I of the proposed Project would increase the average intersection vehicle delay by more than two seconds during the AM peak hour and degrade the vehicle level of service from an unacceptable LOS E to an unacceptable LOS F during the PM peak hour at *Intersection #3 (Harrison Street / 27th Street / 24th Street)* (2030), which would operate at LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

> **Mitigation Measure TRANS-13b:** Implement Mitigation Measure TRANS-12b, and also prohibit westbound left turns during the AM peak hour (in addition to the PM peak hour).

After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in both the AM and PM peak hours, mitigating the South Tower impacts at this intersection.

As discussed for Mitigation Measure TRANS-12b, however, the proposed mitigation measure would represent a less-than-ideal solution and could potentially result in driver confusion.

Significance after Implementation of Mitigation: Conservatively deemed Significant and Unavoidable. If the City rejects the specific implementation approach described for Mitigation Measure TRANS-12b for the Project, and no other feasible options are identified, then the impact at this location would be Significant and Unavoidable. Alternatively, if the City accepts the approach identified, the Project impact at this location would be Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a conservatively deemed significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13c: Under 2030 cumulative conditions, Phase I of the proposed Project would increase average intersection vehicle delay by more than four seconds during the PM peak hour at *Intersection #5 (Telegraph Avenue / 27th Street)* (2030), which would operate at an unacceptable LOS E during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

> **Mitigation Measure TRANS-13c:** Implement Mitigation Measure TRANS-5d at Telegraph Avenue / 27th Street:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing changes at this intersection with the adjacent intersections (e.g., Telegraph Avenue / 26th Street and 27th Street / Northgate Avenue-SR 24 EB On-ramp) that are in the same signal coordination group.

- Redesigned the signal plan to give the northbound Telegraph Avenue left-turn movement protected-permitted phasing.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of the mitigation measure, the intersection would operate at an unacceptable LOS E in the PM peak hour, but the average delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the South Tower's impacts at this intersection.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13d: Under 2030 cumulative conditions, Phase I of the proposed Project would increase the average intersection delay by more than two seconds during the AM peak hour at *Intersection #12 (Harrison Street / Grand Avenue)* (2030), which would operate at an unacceptable LOS F during the AM peak hour under Cumulative (2030) without Project Conditions. (Significant)

For the PM peak hour, because delay values over 120 seconds tend to increase exponentially and are thus generally considered unreliable, the increase in v/c ratio as a result of South Tower-generated traffic was instead evaluated. The intersection would operate with a v/c ratio of 1.32 under Cumulative (2030) without Project Conditions and 1.37 under Cumulative (2030) plus South Tower Conditions in the PM peak hour. Because the increase in v/c ratio would be 5 percent, which is above the three percent threshold of significance, South Tower-generated traffic would result in a significant impact at this intersection.

> **Mitigation Measure TRANS-13d:** Implement Mitigation Measure TRANS-3c, and also prohibit southbound Harrison Street left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches.

These measures alone would not be sufficient to completely mitigate the South Tower impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the South Tower impacts. Therefore, the South Tower impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13e: Under 2030 cumulative conditions, Phase I of the proposed Project would degrade the vehicle level of service from an acceptable LOS D to an unacceptable LOS F during the PM peak hour at *Intersection #24 (Harrison Street / 20th Street / Kaiser Center Access Road)* (2030). (Significant)

> **Mitigation Measure TRANS-13e:** Implement Mitigation Measure TRANS-1c at Harrison Street / 20th Street / Kaiser Center Access Road:

- Optimize the traffic signal (to include determination of allocation of green time for each intersection approach) for the PM peak period in tune with the relative traffic volumes on those approaches.
- Coordinate the signal timing at this intersection with the adjacent intersections (e.g., Webster Street / 20th Street and Harrison Street / Lakeside Drive) in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.After implementation of the mitigation measure, the intersection (located within the Downtown area) would operate at an acceptable LOS E in the PM peak hour.

Significance after Implementation of Mitigation: Less than Significant.

If both Phase I and Phase II of the Project were built, this intersection would also be a less than significant after mitigation impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-13f: Under 2030 cumulative conditions, buildout of the proposed Project (Phase I and Phase II) would increase the average intersection vehicle delay by more than two seconds during the AM peak hour at *Intersection #50 (Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue)* (2030), which would operate at an unacceptable LOS F during the AM poeak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-13f: Implement the following measures at the Harrison Street / MacArthur Boulevard (Westbound) / Santa Clara Avenue intersection:

- Optimize the traffic signal (to include determination of the allocation of green time for each intersection approach) for the AM peak hour in tune with the relative traffic volumes on those approaches.

- Coordinate the signal timing changes at this intersection with the adjacent intersections that are in the same signal coordination group.

To implement this measure, the Project Applicant shall submit the following to City of Oakland's Transportation Services Division for review and approval:

- Plans, Specifications, and Estimates (PS&E) to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction. Current City Standards call for the elements listed below:
  - 2070L Type Controller
  - GPS communication (clock)
  - Accessible pedestrian crosswalks according to Federal and State Access Board guidelines
  - City Standard ADA wheelchair ramps
  - Full actuation (video detection, pedestrian push buttons, bicycle detection)
  - Accessible Pedestrian Signals, audible and tactile according to Federal Access Board guidelines
  - Countdown Pedestrian Signals
  - Fiber signal interconnect and communication to City Traffic Management Center for corridors identified in the City's ITS Master Plan for a maximum of 600 feet
  - Signal timing plans for the signals in the coordination group.

The project sponsor shall fund, prepare, and install the approved plans and improvements.

After implementation of this measure, conditions at this intersection (located within the Downtown area) would remain unacceptable, and the Project impact would not be mitigated. To completely mitigate the Project's impacts at this intersection would require substantial capacity improvements such as additional lanes on both the Harrison Street and MacArthur Boulevard (Westbound) approaches. Therefore, there are no feasible measures to completely mitigate the Project's impacts, and the Project impacts at this intersection are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this intersection would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Roadway Impacts

Impact TRANS-14: Under 2030 cumulative traffic conditions, Phase I of the proposed Project would worsen level of service conditions on area roadway segments. (Significant at intersections described above under Impacts TRANS-13a to TRANS-13e)

Table 4 summarizes peak hour Level of Service for the study roadway segments under Cumulative (2030) plus South Tower Conditions, with the following roadway segments expected to operate at LOS F:

- <u>Caltrans Facilities</u>
  - #1: SR 260 (Posey/Webster Tubes) from Alameda city limits to I-880 (Northbound, AM and PM peak hours; and Southbound, PM peak hour)
  - #3: I-880 from Oak Street to 5th Avenue (Westbound, AM peak hour; and Eastbound PM peak hour)
  - #4: I-980 from 27th Street to 29th Street (Southbound, AM peak hour)
- <u>Non-Caltrans Facilities</u>
  - #9: Grand Avenue from Harrison Street to El Embarcadero (Westbound, AM peak hour; and Eastbound, PM peak hour)
  - #10: Harrison Street/Oakland Avenue between I-580 and 27th Street (Southbound, AM peak hour; and Northbound, PM peak hour)
  - #10: Harrison Street / Oakland Avenue from 27th Street to Grand Avenue (Southbound, AM peak hour; and Northbound, PM peak hour)

TABLE 4
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER ROADWAY SEGMENT LEVELS OF SERVICE

					Cumulative (2030) without Project Conditions						Cumulative (2030) plus South Tower Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	**Roadway Segment**	**Dir.**	**Ln.**	**Capacity (veh/hr)**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**	**LOS**	**Vol.**	**v/c**
Caltrans Facilities																
1	**SR 260 (Posey / Webster Tubes)** from Alameda city limits to I-880	NB	2	3,400	F	4,084	1.20	F	3,885	1.14	F	4,087	1.20	F	3,886	1.14
		SB	2	3,400	E	3,327	0.98	F	4,329	1.27	E	3,328	0.98	F	4,337	1.28
2	**I-880** from Market Street to I-980	EB	4	8,000	B	3,835	0.48	B	3,394	0.42	B	3,876	0.48	B	3,401	0.43
		WB	4	8,000	C	4,441	0.56	C	4,031	0.50	C	4,446	0.56	C	4,067	0.51
3	**I-880** from Oak Street to 5th Avenue	EB	4	8,000	E	7,390	0.92	E	7,920	0.99	E	7,396	0.92	E	7,960	1.00
		WB	4	8,000	E	7,925	0.99	E	7,217	0.90	E	7,970	1.00	E	7,225	0.90
4	**I-980** from 27th Street to 29th Street	NB	3	6,000	B	2,300	0.38	D	4,806	0.80	B	2,315	0.39	D	4,903	0.82
		SB	3	6,000	F	6,653	1.11	C	3,009	0.50	F	6,706	1.12	C	3,019	0.50
Non-Caltrans Facilities																
5	**Broadway** from 19th Street to Grand Ave.	NB	2	1,800	B	699	0.39	C	1,207	0.67	B	710	0.39	D	1,279	0.71
		SB	2	1,800	B	595	0.33	B	823	0.46	B	629	0.35	B	830	0.46
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	2	1,800	B	688	0.38	C	1,080	0.60	B	690	0.38	C	1,091	0.61
		SB	2	1,800	B	897	0.50	B	779	0.43	B	897	0.50	B	781	0.43
7	**West Grand Avenue** from Telegraph to San Pablo	EB	2	1,800	D	1,427	0.79	C	962	0.53	D	1,486	0.83	C	965	0.54
		WB	2	1,800	C	910	0.51	C	1,160	0.64	C	915	0.51	C	1,195	0.66
8	**Grand Avenue** from Broadway to Harrison	EB	2	1,800	C	924	0.51	D	1,269	0.71	C	998	0.55	C	1,269	0.71
		WB	2	1,800	D	1,393	0.77	C	1,199	0.67	D	1,393	0.77	C	1,199	0.67
9	**Grand Avenue** from Harrison St. to El Embarcadero	EB	2	1,800	C	936	0.52	F	2,284	1.27	C	936	0.52	F	2,346	1.30
		WB	2	1,800	E	1,782	0.99	D	1,326	0.74	**F**	**1,911**	**1.06**	D	1,350	0.75
10	**Harrison Street / Oakland Avenue** from I-580 to 27th St.	NB	2	1,800	E	1,718	0.95	F	2,342	1.30	E	1,745	0.97	**F**	**2,457**	**1.36**
		SB	2	1,800	E	1,571	0.87	C	987	0.55	E	1,647	0.92	C	1,001	0.56
11	**Harrison Street**	NB	3	2,700	B	1,276	0.47	C	1,650	0.61	B	1,311	0.49	C	1,814	0.67

	from 27th Street to Grand Ave.	SB	3	2,700	C	1,361	0.50	B	924	0.34	C	1,448	0.54	B	940	0.35
12	**Harrison Street** from 20th Street to 14th Street	NB	2	1,800	B	643	0.36	D	1,362	0.76	B	653	0.36	D	1,367	0.76

Bold indicates significant impact.

SOURCE: AECOM, 2010.

The South Tower would not result in a significant impact on the following segments because the addition of South Tower-generated traffic would not cause an increase in v/c ratio greater than the three percent threshold of significance:

- #1: SR 260 (Posey / Webster Tubes) from Alameda city limits to I-880
- #4: I-980 from 27th Street to 29th Street

The Project's potential impacts on each of the remaining segments are discussed below:

Impact TRANS-14a: Under 2030 cumulative traffic conditions, Phase I of the proposed Project would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during both peak hours on *Segment #3 (I-880 from Oak Street to 5th Avenue)* (2030). (Significant)

It should also be noted that, in each case, while the South Tower would cause the segment to operate to LOS F (because the traffic volumes would exceed the 8,000 vehicles hourly capacity), the increase in v/c ratio would be only one percent, and rounded to the hundredths place (per standard practice), the v/c ratio is 1.00, which is LOS E.

> **Mitigation Measure TRANS-14a:** There are no feasible measures to mitigate the South Tower impact, given the existing alignment and constraints due to lack of right-of-way for both the roadway on the west end of the channel and possibly for support columns above the Union Pacific right-of-way. The segment of I-880 from Oak Street to 5th Avenue consists of two four-lane aerial structures, with the segment immediately west of Lake Merritt Channel bordered on the north by the Laney College parking lot and on the south by industrial uses. The aerial structure continues east of the channel, crossing over the existing Union Pacific railroad right-of-way. Increasing capacity on the freeway would likely require increasing the number of travel lanes. Also, any proposed mitigation measure would also require Caltrans project approval. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-14b: Under 2030 cumulative traffic conditions, Phase I of the proposed Project would degrade the roadway segment level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #9 (Grand Avenue from Harrison Street to El Embarcadero)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

> **Mitigation Measure TRANS-14b:** Implement Mitigation Measure TRANS-2a along Grand Avenue:

- Optimize traffic signals (i.e., adjust the allocation of green time for each intersection approach) at intersections along Grand Avenue (i.e., Harrison Street, Bay Place, Park View Terrace / Bellevue Avenue, Perkins Street, Staten Avenue, Euclid Avenue, and El Embarcadero) for the AM and PM peak hours.

- Coordinate the signal timing at the intersections in the road segment.

To implement this measure, the Project Applicant shall submit the following to TSD for review and approval:

- PS&E to modify the intersections. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersections should be brought up to

After implementation of this measure, conditions would remain at an unacceptable LOS, and the South Tower impact would not be mitigated. This measure alone would not be sufficient to completely mitigate the South Tower impacts on this segment, but as discussed for Impact TRANS-2a, there are no feasible mitigation measures to completely mitigate the South Tower impacts. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Impact TRANS-14c: Under 2030 cumulative traffic conditions, buildout of the proposed Project (Phase I and Phase II) would degrade the level of service from an acceptable LOS E to an unacceptable LOS F during the AM peak hour and increase the v/c ratio by more than three percent during the PM peak hour on *Segment #10 (Harrison Street / Oakland Avenue from I-580 to 27th Street)* (2030), which would operate at an unacceptable LOS F during the PM peak hour under Cumulative (2030) without Project Conditions. (Significant)

Mitigation Measure TRANS-14c: To completely mitigate the South Tower's impacts would require substantial capacity improvements such as an additional travel lane on Harrison Street / Oakland Avenue in the northbound direction, which may conflict with objectives of Harrison Street / Oakland Avenue Community Transportation Plan currently in progress and require removal of bike lanes or substantial amounts of on-street parking. Therefore, there are no feasible measures to completely mitigate the impacts of the South Tower, and the impacts on this roadway segment are significant and unavoidable.

Significance after Implementation of Mitigation: Significant and Unavoidable.

If both Phase I and Phase II of the Project were built, this roadway segment would also be a significant and unavoidable impact under Cumulative (2030) plus Project (Phase I and Phase II) Conditions.

Bicycle Impacts

Table 5 specifies the City of Oakland Municipal Code requirements for the provision of short- and long-term bicycle parking facilities, as well as shower and locker facilities, for the South Tower. The 136 long-term bicycle spaces should be secure and serve office workers who may leave their bicycles at the same location all day or overnight, and should be provided in the form of bicycle lockers or bicycle cages.

TABLE 5
SOUTH TOWER BICYCLE FACILITY REQUIREMENTS

Facility / Land Use	Amount (KSF)[a]	Municipal Code Provision	Facility Requirement
Bicycle Parking			
Office	552	1 long-term space per 10 KSF 1 short-term space per 20 KSF	55 long-term spaces 28 short-term spaces
Retail	27	1 long-term space per 12 KSF 1 short-term space per 5 KSF	2 long-term spaces 5 short-term spaces
Total			57 long-term spaces 33 short-term spaces
Bicycle Showers and Lockers			
Office	552	2 showers per gender, plus one shower per gender for each 150 KSF above 150 KSF	4 showers per gender (8 total)
		4 lockers per shower	32 lockers
Retail	27	No locker or shower requirements (less than 150 KSF)	--
Total			4 showers per gender (8 total) 32 lockers

[a] KSF = 1,000 sq. ft.

SOURCE: AECOM, 2010.

The 33 short-term bicycle racks would accommodate visitors who leave their bikes for a reasonably short period of time and should be provided in areas that provide shelter and, ideally, a high level of passive security from surrounding pedestrians. Other visible security measures such as security cameras may also be considered.

South Tower site plans do not include provisions to accommodate bicycle parking. City of Oakland's SCAs include SCA TRANS-2, which requires that prior to the issuance of first certificate of occupancy, the applicant shall submit for review and approval of the Planning and Zoning Division, plans that show bicycle storage and parking facilities to accommodate 33 short-term bicycle parking spaces onsite or on public sidewalk, and 57 long-term bicycle parking spaces.

Although not required to mitigate a significant impact, Class 2 bicycle facilities (bicycle lane) should be considered on Franklin Street and Webster Street to improve bicycle conditions in the immediate vicinity of the South Tower. As discussed in the Existing Bicycle Conditions section, the section of Franklin Street and Webster Street between 8th Street and Broadway is proposed for Class 2 bicycle facilities (bicycle lanes) and Class 3 (bicycle route). In order to encourage use of alternative modes of travel such as bicycling and provide greater safety for bicyclists; it is recommended that these sections of the bikeway network be completed. **Table 6** presents the

TABLE 6
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE – WITH FRANKLIN STREET AND WEBSTER STREET BIKE LANES

			Cumulative (2030) without Project Conditions				Cumulative (2030) + South Tower Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	**Intersection**	**Traffic Control[a]**	**LOS**	**Delay[b]**	**LOS**	**Delay[b]**	**LOS**	**Delay[b]**	**LOS**	**Delay[b]**
Within Downtown										
17	Webster St. /21st St.	Signal	B	14.7	B	19.9	B	15.1	B	19.1
18	Franklin St. /21st St.	Signal	B	10.4	B	12.0	A	9.6	B	10.1
22	Franklin St. /20th St.	Signal	B	11.7	B	14.9	B	13.9	B	14.1
23	Webster St. /20th St.	Signal	C	24.6	C	25.9	C	22.0	C	25.2

[a] The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2010.

LOS results (without and with the South Tower) at four study intersections that would have its vehicle approach lanes modified to accommodate the proposed bike lane. More specifically, the proposed bike lanes would result in the following changes to the existing vehicle approach lanes:

SB Webster at 21st: Existing = 1 Shared Left-Thru, 1-Thru and 1-Shared Thru-Right
With Bike Lane=1-Shared Left-Thru and 1-Shared Thru-Right

NB Franklin at 21st: Existing = 1 Shared Left-Thru, 1-Thru and 1-Shared Thru-Right
With Bike Lane=1-Shared Left-Thru and 1-Shared Thru-Right

NB Franklin at 20th: Existing = 1 Shared Left-Thru, 2-Thru and 1-Right Turn Only
With Bike Lane=1-Shared Left-Thru, 1-Thru and 1-Right Turn Only

SB Webster at 20th: Existing = 1 Shared Left-Thru, 1-Thru and 1-Shared Thru-Right
With Bike Lane=1-Shared Left-Thru, 1-Thru and 1-Right Turn Only

Under Cumulative Conditions with the bike lanes on Franklin Street and Webster Street, the South Tower is not expected to have a significant impact on the four study intersections. In most cases, the South Tower is expected to add volume to non-critical movements, thus reducing the average delay at the intersections.

AC Transit Travel Time

Travel time along the following corridors was evaluated in order to determine the impacts of Project-generated traffic on the operations of key AC Transit trunk lines in Downtown Oakland:

1. 11th Street (eastbound) from Brush Street to Oak Street
2. 12th Street (westbound) from Oak Street to Brush Street
3. 20th Street (eastbound) from Telegraph Avenue to Harrison Street
4. 20th Street (westbound) from Harrison Street to Telegraph Avenue
5. Broadway (southbound) from 27th Street to 20th Street
6. Broadway (southbound) from 20th Street to 11th Street
7. Broadway (northbound) from 11th Street to 20th Street
8. Broadway (northbound) from 20th Street to 27th Street
9. Grand Avenue between MacArthur Boulevard and Harrison Street – (westbound AM and eastbound PM)
10. Harrison Street between MacArthur Boulevard and Grand Avenue (southbound AM and northbound PM)
11. Telegraph Avenue between 20th Street and 27th Street (southbound AM and northbound PM)

Corridors #1 through #8 were analyzed in both directions during both the AM and PM peak hours. Corridors #9, #10, and #11 were analyzed for only one direction during each peak hour, as traffic on these segments is highly directional. For the previous AC Transit Travel Time analysis, Phase I of the Project represented build-out of only the North Tower. The following analysis represents conditions with build-out of only the South Tower

Table 7 summarizes the results of the travel time analysis for the AM and PM peak hours. Observations of corridor travel times were taken for Existing Conditions and travel time differentials obtained from the Synchro networks used in the intersection LOS analysis. A minimum of three field runs were conducted in each direction for each corridor in September 2008.

It should be noted that the travel times presented here only represent the time it takes automobiles to travel the length of the corridor. Obtaining a travel time estimate for transit vehicles traveling through corridors can be difficult considering that the travel time for transit vehicles is much more variable than that for automobiles. This variability is due to a wide variety of factors, but primarily involves schedule adherence and on-time performance. A transit vehicle that is already behind schedule can quickly get further behind schedule due to accumulating passenger demand at transit stops, resulting in longer than usual dwell times to allow passengers to board and alight. In addition, because transit vehicles must follow the same route, there is less flexibility than with automobiles in events such as accidents or unexpected congestion, increasing delays further. Given these considerations, the values in Table 8 should be viewed as the incremental increase in transit travel time compared to Existing Conditions.

TABLE 7
TRANSIT CORRIDOR TRAVEL TIMES COMPARED TO EXISTING CONDITIONS

No.	Route	Existing (Sept. 2008) Travel Time	Incremental Increase (sec.) compared to Existing: Existing plus South Tower Conditions	Cumulative (2030) without Project Conditions	Cumulative (2030) plus South Tower Conditions
Weekday AM Peak Hour					
1	**11th Street EB** Brush Street to Oak Street	3:35	+ 0	+ 5	+ 4
2	**12th Street WB** Oak Street to Brush Street	3:19	+ 0	+ 5	+ 5
3	**20th Street EB** Telegraph Avenue to Harrison Street	2:17	+ 20	+ 25	+ 8
4	**20th Street WB** Harrison Street to Telegraph Avenue	1:40	+ 5	(- 23)	(- 7)
5	**Broadway SB** 27th Street to 20th Street	2:21	+ 2	+ 10	+ 13
6	**Broadway SB** 20th Street to 11th Street	2:28	+ 0	+ 16	+ 17
7	**Broadway NB** 11th Street to 20th Street	2:19	+ 0	+ 19	+ 21
8	**Broadway NB** 20th Street to 27th Street	1:03	+ 1	+ 7	+ 8
9	**Grand Avenue WB** MacArthur Blvd. to Harrison Street	3:30	+ 1	+ 15	+ 24
10	**Harrison Street SB** MacArthur Blvd. to Grand Avenue	3:28	+ 11	+ 390	+ 390
11	**Telegraph Street SB** 27th Street to 20th Street	2:23	+ 1	+ 4	+ 4
Weekday PM Peak Hour					
1	**11th Street EB** Brush Street to Oak Street	4:40	+ 0	+ 5	+ 5
2	**12th Street WB** Oak Street to Brush Street	3:28	+ 0	+ 14	+ 14
3	**20th Street EB** Telegraph Avenue to Harrison Street	2:18	+ 28	+ 6	+ 4
4	**20th Street WB** Harrison Street to Telegraph Ave.	3:29	+ 9	(- 32)	(- 13)
5	**Broadway SB** 27th Street to 20th Street	2:18	+ 0	+ 9	+ 10
6	**Broadway SB** 20th Street to 11th Street	2:58	+ 0	+ 163	+ 163
7	**Broadway NB** 11th Street to 20th Street	3:33	+ 3	+ 204	+ 206
8	**Broadway NB** 20th Street to 27th Street	1:45	+ 1	+ 101	+ 103
9	**Grand Avenue EB** Harrison Street to MacArthur Blvd.	4:21	+ 17	+ 138	+ 155
10	**Harrison Street NB** Grand Avenue to Perry Place	3:44	+ 51	+ 79	+ 146
11	**Telegraph Street NB** 20th Street to 27th Street	2:03	+ 0	+ 6	+ 7

SOURCE: AECOM, 2010.

As shown in Table 8, the South Tower would increase peak hour travel times along most corridors, mostly as a result of increases in intersection average delay. Some corridors would see average travel time decrease slightly between existing and future-year scenarios and between baseline and South Tower scenarios, primarily as a result of geometry changes or better-performing movements at intersections. Travel time on westbound 20th Street, for example, is lower under Cumulative (2030) without Project Conditions than under Existing Conditions, partially as a result of reduced delays due to Measure DD modifications at this intersection.

A comparison between Existing Conditions and Existing plus South Tower Conditions, indicate that the South Tower would increase travel time the most on the following transit corridors:

- #3: 20th Street EB (from Telegraph Avenue to Harrison Street)- 20 seconds in the AM and 28 seconds in the PM;
- #10: Harrison Street NB (from Grand Avenue to Perry Place) –51 seconds in the PM.

Under Cumulative (2030) plus South Tower Conditions, the South Tower (when compared to Cumulative without Project Conditions) would cause an increase in corridor travel time of nine seconds (=24-15) along westbound Grand Avenue (from MacArthur Boulevard to Harrison Street) in the AM peak hour and an increase of 67 seconds (=146-79) in the PM peak hour along northbound Harrison Street (from Grand Avenue to Perry Place). Other corridors such as Broadway would also experience substantial increases in travel time under Cumulative Conditions, but the South Tower contribution to these increases would be minimal.

Given that Grand Avenue and Harrison Street are major corridors with significant vehicle traffic traveling to and from I-580 ramps, transit vehicles on these routes already experience some delay during the peak periods and would continue to do so in Cumulative (2030) with South Tower Conditions.

Mitigation: None required.

Planning-Related Non-CEQA Issues

The following section discusses transportation-related planning issues that do not constitute physical environmental impacts under CEQA, but that are evaluated to inform decision makers and the public about these issues.

Transit

Based on the 30 percent transit mode share assumed for the trip generation analysis, the South Tower would generate about 256 transit trips in the weekday AM peak hour and 243 transit trips in the weekday PM peak hour. Given that the Project would consist primarily of office space, these trips would almost exclusively be inbound during the AM peak hour and outbound during the PM peak hour. The expected distribution of transit trips was developed based on the trip distributions derived from the ACCMA Travel Demand Model.

For origins and destinations with both BART and AC Transit service, the split of Project-generated new transit riders on BART and AC Transit was based on a transit mode split of 7 percent AC Transit and 23 percent BART (for a total transit share of 30 percent) presented in the *Downtown Transportation and Parking Plan* (2003) for the Old Oakland / Metro Center / County Center Downtown subareas. The results of this analysis are summarized in **Table 8**.

TABLE 8
SOUTH TOWER WEEKDAY PEAK-HOUR TRANSIT TRIPS

	Transit Routes				
	AM Peak Hour		PM Peak Hour		
Origin / Destination	**BART**	**AC**	**BART**	**AC**	**Transit Routes**
San Francisco	52	13	51	13	BART, NL
Hayward / Fremont	51	12	49	12	BART, 1, 1R, 40
West Oakland	17	11	16	11	BART, 13, 14, 19, NL
East Oakland	23	10	22	9	BART, 1, 1R, 11, 14, 18, 40, NL
North Oakland / Berkeley / Albany / El Cerrito / Richmond	27	11	26	11	BART, 1, 1R, 15, 18, 51, 72, 72R, 72M, 88
Walnut Creek / Pleasant Hill	25	0	25	0	BART
Total	**195**	**58**	**189**	**56**	

SOURCE: AECOM, 2010.

AC Transit Loading

As shown in Table 6, the most substantial increase in transit ridership as a result of the South Tower would occur on the NL route, which would carry about 12 new riders in both the AM and PM peak hours. With 15-minute headways, this increase in ridership is equivalent to about three new riders per bus. The NL is has substantial capacity to accommodate these additional riders.

The South Tower would also cause increases of 8 to 12 passengers in the AM and PM peak hours to and from other origins and destinations, but these areas are served by multiple AC Transit bus lines. The South Tower transit ridership would likely only result in a maximum increase of two passengers per bus on these lines.

Given this increase in AC Transit ridership, it is not expected that the South Tower would increase the average ridership on AC Transit lines by three percent at bus stops where the average load factor in place would exceed 125 percent over a peak 30-minute period.

BART Loading

As shown in Table 6, the most substantial increase in transit ridership as a result of the South Tower would occur on the San Francisco and Fremont corridors of the BART network, which would see increases of about 50 passengers each in both the AM and PM peak hours.

Based on BART fleet statistics, the maximum capacity of a BART car was assumed to be 150 passengers, with an average of 68 to 72 seats in each car. Therefore, cars would have only standing room available at about 45 to 48 percent capacity utilization.

Under Existing plus South Tower Conditions, ridership would increase by about 12 passengers per train for these lines during the peak hours, or about two passengers per car. This is equivalent to a one percent increase in capacity utilization for these lines, bringing maximum capacity utilization on Fremont – Richmond trains in the AM peak hour to 83 percent and on Richmond – Fremont trains in the PM peak hour to 81 percent. However, the South Tower would not cause BART passenger volumes to exceed the standing capacity of trains.

Trains on other lines would see similar increases, but because they currently operate at well under 100 percent capacity utilization, these trains have capacity to accommodate additional South Tower-generated riders without exceeding standing capacity.

BART Faregate Queuing

Based on the estimates of BART ridership in Table 6, South Tower would add about 20 passengers during the peak queuing scenario (13 passengers from the Fremont – Richmond train and 7 passengers from the SFO – Pittsburg / Bay Point train). Based on a BART faregate capacity of 25 passengers per minute and assuming that these additional South Tower-generated riders all arrive at the faregates at the same time, the South Tower would theoretically increase the maximum faregate queues by 7 passengers to 13 passengers in length. It is likely that the South Tower would increase maximum queue delay by ten seconds at the most, but still keeping the maximum queue delay well under the one minute performance standard of the City of Oakland.

Intersection and Roadway Segment Operations with BRT

The AC Transit East Bay Bus Rapid Transit (BRT) Project is in the planning and are neither fully funded nor approved. Although only funded and approved projects are typically considered for inclusion in impact analyses, the following describes the result of separate supplementary BRT related traffic analyses.

As described on page IV.L-36, the proposed BRT improvements would generally require the removal of one through lane in each direction along Telegraph Avenue, narrowing the roadway to one vehicular lane in each direction. BRT vehicles would run in a protected median, with left turn pockets for autos provided at key intersections. Along 11th and 12th streets in Downtown Oakland, the BRT service would operate in a side-running configuration, removing one lane of through traffic and eliminating some parking to allow for bulbouts at stations. The LOS at eight study intersections (**Table 9**) and the roadway segment (**Table 10**) closest to the proposed BRT were calculated for Cumulative Conditions. Under Cumulative Conditions with the BRT, the South Tower is expected to increase the V/C ratio by 0.10 (from 1.71 to 1.81) at Telegraph Avenue/27th Street, thus exceeding the three percent threshold of significance. Since it is not feasible to add lane capacity at this intersection and still accommodate the BRT, this impact will be Significant and Unavoidable. The proposed removal of one lane in each direction on Telegraph Avenue to accommodate the BRT reduces the capacity of each direction in half (from

1,800 vehicles/hour to 900) thus causing the northbound direction to operate at LOS F during the PM peak. In the northbound direction, the South Tower increases the V/C ratio by 0.01 (from 1.20 to 1.21), which is below the three percent threshold of significance.

Intersection Queuing Analysis

Queuing analysis was carried out for all of the "plus South Tower" scenarios using the Synchro software. Signalized intersections operating at unacceptable conditions as shown in Table IV.L-10, Table IV.L-12, Table IV.L-14, and Table IV.L-16 were selected for evaluation as the South Tower is expected to have its largest effect on 95th percentile queues at these intersections. A 95^{th} percentile queue of 100 feet means that 95 percent of the time, the queue is expected to be

TABLE 9
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER INTERSECTION LEVELS OF SERVICE – WITH BRT

			Cumulative (2030) without Project Conditions				Cumulative (2030) plus South Tower Conditions			
			AM Pk. Hr.		PM Pk. Hr.		AM Pk. Hr.		PM Pk. Hr.	
No.	**Intersection**	**Traffic Control**	**LOS**	**Delay[a]**	**LOS**	**Delay[a]**	**LOS**	**Delay[a]**	**LOS**	**Delay[a]**
Outside Downtown										
5	Telegraph Ave. / 27th St.	Signal	C	29.0	**F**	**>120.0**	C	30.5	**F**	**>120.0**
Within Downtown										
9	Telegraph / West Grand	Signal	D	37.9	E	59.2	D	40.9	E	64.5
20	Telegraph Ave. / 20th St.	Signal	B	18.3	D	38.0	B	19.5	D	36.7
21	Broadway / 20th Street	Signal	B	15.1	C	34.0	B	15.3	D	36.1
35	Madison St. / 12th Street	Signal	C	25.3	B	10.9	C	25.5	B	11.0
36	Oak Street /12th Street	Signal	B	16.1	B	16.3	B	16.1	B	16.3
38	Madison St. /11th Street	Signal	B	10.8	B	11.2	B	10.7	B	11.1
39	Franklin St. /11th Street	Signal	B	14.5	B	14.0	B	14.5	B	14.0

[a] The LOS and delay for signalized intersections represent the average delay for all movements.

SOURCE: AECOM, 2010.

100 feet or less. The 95th percentile queue is used for analysis, because it is standard practice to design a storage pocket to accommodate expected peak traffic demand 95 percent of the time. In all cases, the storage capacity (rounded to the nearest 25 feet) is taken as the distance to the nearest intersection, major driveway, or pedestrian crossing. **Table 11** and **Table 12** summarize the queuing analysis for Existing plus South Tower Conditions and Cumulative plus South Tower Conditions, respectively.

Identified below are instances where the South Tower trips would add 25 or more feet to the baseline (without South Tower) 95th percentile queue (if the baseline 95th percentile queue was already over the available storage length), or where South Tower trips would extend the queue over the available storage length. The findings are summarized below.

Existing plus South Tower Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (PM) – Harrison Street NBTR;
- Intersection #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM)-Jackson Street NBL and SBR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET; and,
- Intersection #47: Grand Avenue / MacArthur Boulevard (PM) – Grand Avenue NER.

TABLE 10
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER ROADWAY SEGMENT LEVELS OF SERVICE – WITH BRT

					Cumulative without Project Conditions						Cumulative plus South Tower Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Lane	Capacity (veh./hr.)	LOS	Volume	v/c	LOS	Volume	v/c	LOS	Volume	v/c	LOS	Volume	v/c
Non-Caltrans Facilities																
6	**Telegraph Avenue** from 20th Street to 27th Street	NB	1	900	D	688	0.76	F	1,080	1.20	D	690	0.77	F	1,091	1.21
		SB	1	900	E	897	1.00	E	779	0.87	E	897	1.00	E	781	0.87

SOURCE: AECOM, 2010.

TABLE 11
EXISTING WITHOUT AND WITH SOUTH TOWER CONDITIONS: 95TH PERCENTILE QUEUES

No.	Intersection	Lane Group		Existing Conditions Storage Cap. (feet)	Existing Conditions Queue Length (ft) AM Pk. Hour	Existing Conditions Queue Length (ft) PM Pk. Hour	Existing plus South Tower Conditions Storage Cap. (feet)	Existing plus South Tower Conditions Queue Length (ft) AM Pk. Hour	Existing plus South Tower Conditions Queue Length (ft) PM Pk. Hour
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	NE	T	400	--	125	400	**--**	125
			R	400	--	**600**	400	**--**	**650**
		SE	L	350	--	275	350	**--**	275
			T	350	--	300	350	**--**	300
3	Harrison St. / 27th St. / 24th St.	NB	L	400	--	125	400	**--**	150
			TR	400	--	**475**	400	**--**	**575**
		SB	L	150	--	250	150	**--**	250
			TR	375	--	200	375	**--**	200
		EB	L	725	--	225	725	**--**	225
			T	725	--	150	725	**--**	150
			R	725	--	100	725	**--**	100
		WB	L	175	--	75	175	**--**	75
			T	175	--	150	175	**--**	150
			R	175	--	50	175	**--**	50
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	NB	LTR	575	--	250	575	**--**	400
		SB	T	575	--	75	575	**--**	75
			R1	575	--	75	575	**--**	100
			R2	125	--	25	125	**--**	25
		SE	LT	--	--	--	150	**--**	**200**
			R	--	--	--	50	**--**	25
		EB	L2	--	--	--	100	**--**	25
			L	375	--	75	375	**--**	125
			TR	375	--	125	375	**--**	150
		WB	L	175	--	25	175	**--**	25
			T	175	--	25	175	**--**	50
42	Jackson St. / 6th St. / I-880 NB On-Ramp	NB	LT	175	**225**	**400**	175	**225**	**400**
		SB	T	250	50	50	250	50	50
			R	500	**875**	**950**	500	**875**	**950**
		WB	L	300	25	25	300	25	25
			T	300	125	225	300	125	225
			R	300	25	25	300	25	25
44	Oak St. / 5th St. / I-880 SB On-Ramp	NB	TR	100	--	275	100	125	275
		EB	LTR	300	--	200	300	200	200
45	Grand Avenue / El Embarcadero	NW	L	150	--	200	150	--	200
			R	300	--	25	300	**--**	25
		NE	T	600	--	**825**	600	**--**	**875**
		SW	L	150	--	225	150	--	225
			T	325	--	200	325	**--**	225
47	Grand Ave. / MacArthur Blvd. (EB)	NE	T	350	--	225	350	**--**	200
			R	350	--	**400**	350	**--**	**425**
		SE	LTR	350	--	300	350	**--**	300
		SW	L	150	--	300	150	--	300
			T	425	--	175	425	**--**	175

Bold indicates storage capacity exceeded.
All storage capacities and queue lengths rounded to the nearest 25 feet.

SOURCE: AECOM, 2010.

TABLE 12
CUMULATIVE (2030) WITHOUT & WITH SOUTH TOWER CONDITIONS: 95TH PERCENTILE QUEUES

No.	Intersection	Lane Group		Cumulative (2030) without Project Conditions: Storage Cap. (feet)	Cumulative (2030) without Project Conditions: Queue Length (ft) AM Pk. Hr.	Cumulative (2030) without Project Conditions: Queue Length (ft) PM Pk. Hr.	Cumulative (2030) plus South Tower Conditions: Storage Cap. (feet)	Cumulative (2030) plus South Tower Conditions: Queue Length (ft) AM Pk. Hr.	Cumulative (2030) plus South Tower Conditions: Queue Length (ft) PM Pk. Hr.
1	Harrison / Stanley / I-580	E	R	500	400	--	500	475	**--**
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	NE	T	400	175	300	400	175	300
			R	400	**475**	**700**	400	**500**	**775**
		SE	L	350	250	**625**	350	250	**625**
			T	350	250	**625**	350	250	**625**
3	Harrison St. / 27th St. / 24th St.	NB	L	400	250	200	400	250	225
			TR	400	250	**600**	400	250	**675**
		SB	L	150	**200**	**350**	150	**200**	**350**
			TR	375	**825**	325	375	**875**	325
		EB	L	725	100	325	725	100	350
			T	725	50	200	725	50	200
			R	725	150	150	725	150	150
		WB	L	175	125	100	175	125	100
			T	175	175	175	175	175	175
			R	175	50	50	175	50	50
5	Telegraph Ave. / 27th St.	NB	L	75	--	**300**	75	**--**	**325**
			TR	200	--	100	200	**--**	100
		SB	L	75	--	**175**	75	**--**	**175**
			TR	75	--	**250**	75	**--**	**250**
		EB	L	475	--	225	475	**--**	225
			T	475	--	350	475	**--**	350
			R	475	--	50	475	**--**	50
		WB	L	375	--	50	375	**--**	50
			T	375	--	**600**	375	**--**	**650**
			R	50	--	50	50	**--**	50
12	Harrison St. / Grand Ave.	NB	T	500	475	325	500	500	400
			R	525	75	**1,450**	525	75	**1,550**
		SB	TR	125	**575**	**200**	125	**625**	**225**
		EB	L	250	75	175	250	75	175
			T	450	100	300	450	100	300
			R	100	100	**125**	100	100	**125**
		WB	L	225	**375**	175	225	**475**	175
			T	425	300	425	425	300	425
			R	100	50	50	100	50	50
24	Harrison St. / 20th St. / Kaiser Ctr. Access Rd.	NB	LTR	575	--	500	575	**--**	**650**
		SB	T	575	--	100	575	**--**	175
			R1	575	--	100	575	**--**	150
			R2	125	--	25	125	**--**	50
		SE	LT	--	--	--	150	**--**	150

No.	Intersection	Lane Group		Cumulative (2030) without Project Conditions			Cumulative (2030) plus South Tower Conditions		
				Storage Cap. (feet)	Queue Length (ft)		Storage Cap. (feet)	Queue Length (ft)	
					AM Pk. Hr.	PM Pk. Hr.		AM Pk. Hr.	PM Pk. Hr.
			R	--	--	--	50	**--**	50
		EB	L2	--	--	--	100	**--**	25
			TR	375	--	100	375	**--**	100

TABLE 12 (Continued)
CUMULATIVE (2030) WITHOUT & WITH SOUTH TOWER CONDITIONS: 95TH PERCENTILE QUEUES

No.	Intersection	Lane Group		Cumulative (2030) without Project Conditions: Storage Cap. (feet)	Cumulative (2030) without Project Conditions: Queue Length (ft) AM Pk. Hr.	Cumulative (2030) without Project Conditions: Queue Length (ft) PM Pk. Hr.	Cumulative (2030) plus South Tower Conditions: Storage Cap. (feet)	Cumulative (2030) plus South Tower Conditions: Queue Length (ft) AM Pk. Hr.	Cumulative (2030) plus South Tower Conditions: Queue Length (ft) PM Pk. Hr.
32	Oak St. / 14th St.	NB	LT	200	--	175	200	**--**	175
			R	200	--	25	200	**--**	25
		EB	LT	300	--	**450**	300	**--**	**450**
		WB	LT	1,000	--	125	1000	**--**	125
			R	150	--	125	150	**--**	125
40	Oak St. / 7th St.	NB	TR	200	--	**400**	200	**--**	**400**
		EB	TR	300	--	75	300	**--**	100
42	Jackson St. / 6th St. / I-880 NB On-Ramp	NB	LT	175	**325**	**600**	175	**325**	**600**
		SB	T	250	50	75	250	50	75
			R	500	**1,250**	**1,425**	500	**1,250**	**1,425**
		WB	L	300	25	25	300	25	25
			T	300	200	**350**	300	200	**350**
			R	300	25	25	300	25	25
44	Oak St. / 5th St. / I-880 SB On-Ramp	NB	TR	100	**175**	**425**	100	**175**	**425**
		SB	LT	200	75	25	200	75	25
		EB	LTR	300	275	275	300	275	275
45	Grand Avenue / El Embarcadero	NW	L	150	--	**175**	150	**--**	**175**
			R	300	--	50	300	**--**	50
		NE	T	600	--	**1,175**	600	**--**	**1,225**
		SW	L	150	--	125	150	**--**	125
			T	325	--	200	325	**--**	175
47	Grand Ave. / MacArthur Blvd. (EB)	NE	T	350	275	150	350	275	150
			R	350	225	**525**	350	225	**550**
		SE	LTR	350	**675**	**1,050**	350	**675**	**1,050**
		SW	L	150	**325**	**825**	150	**325**	**825**
			T	425	**450**	275	425	**525**	300
48	Lakeshore Avenue / MacArthur Boulevard (EB) / I-580 EB On-Ramp	NE	TR	250	**375**	**750**	250	**375**	**775**
		SW	L	150	**1,075**	**850**	150	**1,075**	**850**
			T	150	125	50	150	125	50
		EB	L	475	150	75	475	150	75
			T	475	275	**550**	475	275	**550**
			R	475	75	425	475	75	425
49	Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Avenue / I-580 WB Off-Ramp	NE	T	175	**200**	**--**	175	**200**	**--**
		NW	TR	200	**850**	**--**	200	**875**	**--**
50	Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue	NW	L	250	**300**	**--**	250	**300**	**--**
			T	250	**300**	**--**	250	**300**	**--**
		SW	T	300	**700**	**--**	300	**700**	**--**

Bold indicates storage capacity exceeded. All storage capacities and queue lengths rounded to the nearest 25 ft. Source: AECOM, 2010.

Cumulative (2030) plus South Tower Conditions

- Intersection #2: Oakland Avenue / Perry Place / I-580 EB Ramps (AM / PM) – Oakland Avenue NER;
- Intersection #3: Harrison Street / 27th Street / 24th Street (AM / PM) – Harrison Street SBLTR (AM) and NBTR (PM);
- Intersection #5: Telegraph Avenue / 27th Street (PM) – Telegraph Avenue NBL and SBLTR, and 27th Street WBT;
- Intersection #12: Harrison Street / Grand Avenue (AM / PM) – Harrison Street NBTR (PM) and SBTR (AM / PM), and Grand Avenue WBL (AM);
- Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM) – Harrison Street NBLTR;
- Intersection #32: Oak Street / 14th Street (PM)-14th Street EBLT;
- Intersection #40: Oak Street / 7th Street (PM)-Oak Street NBTR;
- Intersection #42: Jackson Street / 6th Street / I-880 NB On-Ramp (AM / PM)-Jackson Street NBL and SBR (AM / PM), and 6th Street WBT (AM);
- Intersection #44: Oak Street / 5th Street / I-880 SB On-Ramp (AM / PM)-Oak Street NBTR;
- Intersection #45: Grand Avenue / El Embarcadero (PM) – Grand Avenue NET;
- Intersection #47: Grand Avenue / MacArthur Boulevard (AM / PM) – MacArthur Boulevard SELTR (AM / PM); and Grand Avenue SWLT (AM / PM) and NER (PM);
- Intersection #48: Lakeshore Avenue / MacArthur Boulevard / I-580 EB On-Ramp (AM / PM) – MacArthur Boulevard EBT (PM) and Lakeshore NETR and SWL (AM / PM);
- Intersection #49: Oakland Avenue / MacArthur Boulevard (WB) / Santa Clara Ave. / I-580 WB Off-Ramp (AM) – Oakland Avenue NET and I-580 WB Off-Ramp NWTR;
- Intersection #50: Harrison Street / MacArthur Boulevard (WB) / Santa Clara Avenue (AM) – Harrison Street SWT and MacArthur Boulevard NWLT.

It should be noted, however, that most of these locations have already been proposed for mitigation measures as a result of intersection LOS impacts. These measures, which include optimization of signal timing and phasing and upgrading of traffic signal hardware, would mitigate some of the Project's intersection LOS impacts at these locations, and would generally improve 95th percentile queues. In cases where the proposed mitigation measures would not completely mitigate the Project's intersection LOS impacts, further improvements to reduce 95th percentile queues would generally be infeasible, as these are typically geometrically-constrained intersections and may be locations where further improvements would conflict with policies for other modes or even with objectives of the Harrison Street / Oakland Avenue CTP.

South Tower Loading Docks and Parking Demand

Loading Docks

Three berths would be located in a single dock on the east side of the Project site, with access from the Access Road running through the Kaiser Center block. These berths would serve the South Tower and are shown in Figure IV.L-11 in the DEIR.

Impact TRANS-9 (as identified in the DEIR for Project Buildout): The Project would create potential conflict between loading dock operations and vehicular access to and from the Kaiser Center Garage and would present a potential safety hazard for pedestrians, bicyclists, and other drivers. (Significant)

The following mitigation measure (shall be applied to South Tower Phase 1 Build only.

> **Mitigation Measure TRANS-9 (as identified in the DEIR for Project Buildout):** Prohibit delivery and service vehicles from accessing the loading docks during the AM and PM peak periods in order to minimize the impact of loading operations on access for the Kaiser Center Garage. The section of the Access Road from Harrison Street / 20th Street to the garage entrance should be restricted to delivery and service vehicles during off-peak hours. During off-peak periods, the Access Road approach onto Harrison Street / 20th Street should be separated off by bollards or other removable barriers to prevent passenger vehicles from crossing the site and expand pedestrian space in this immediate area. Adequate additional site management staff should be made available to direct loading maneuvers to improve the safety of pedestrians, bicyclists, and drivers during deliveries into and out of this dock. Concurrent with the submittal of a Final Development Plan, the Project Applicant shall prepare and submit a loading dock plan and operational analysis which demonstrates there are no conflicts with vehicular, pedestrian, and bicycle access to or adjacent to the site for City review and approval. The Project Applicant shall implement the approved plan.

Potential Additional Recommended Conditions for Pedestrians

Site observations concluded that existing pedestrian facilities generally are insufficient. Given those concerns, and the fact that the Project will add a significant number of new pedestrian trips, the following “Recommended Conditions” should be considered to improve safety operations of pedestrian facilities in the immediate vicinity of the Project and are consistent with the City’s Pedestrian Master Plan. These Recommendations are the same as those identified in this DEIR for Project Buildout. Although not required by CEQA, these Recommended Conditions are recommended herein by City Staff to be included as Project specific conditions of approval. They are not necessary to address or mitigate any environmental impacts of the Project. .

Recommendation TRANS-1: Increase sidewalk capacity on the north side of 20th Street between Broadway and Harrison Street.

> In order to improve pedestrian flow, it is recommended that the sidewalk capacity along the north side of 20th Street between Broadway and Harrison Street be increased as follows:

- **Between Broadway and Franklin Street, remove parking and widen the sidewalk.** Currently, a limited amount of metered on-street parking is provided just east of the BART station entrance (three spaces on the north side of 20th Street and two spaces on the south side of 20th Street). The section on the north side directly east of the entrance is used as a de facto “kiss-and-ride” zone in the mornings and pickup zone in the afternoon and evenings. Several employee shuttles from the office buildings at 180 Grand, 155 Grand and 1 Kaiser Plaza also use this curb space to load and offload passengers. However, circulation space is limited because the sidewalk begins to narrow 30 feet east of the entrance. This section of curb also includes an exit driveway for the existing building on the northeast corner of the intersection of Franklin Street / 20th Street.

In the AM peak periods, pedestrian traffic exiting the BART station via the escalator (located on the north side of the station entrance) conflicts with pedestrian traffic entering the station attempting to access the stairwell (located on the south side of the station entrance). Employees attempting to board the special shuttles also cross against opposing pedestrian traffic in order to reach the shuttle boarding area.

By removing parking and widening the sidewalk, circulation space directly east of the entrance could be increased.

Once the three parking spaces on the north side of 20th Street are removed, the existing bus stop serving AC Transit Lines 11, 59, 59A, and 805 would then be moved out to the new curb line, resulting in a larger unobstructed width on the main part of the sidewalk. The extended curb could align with the existing "bulbout" for the BART station entrance and 20th Street restriped to remove the misalignment in the pavement markings. A bulbout could also be provided at the northwest corner of Franklin Street / 20th Street in the east-west direction. This would not require removal of any parking as that section of curb is already marked red, but would significantly increase queuing space for pedestrians waiting to cross.

Removal of three spaces would have a negligible impact on overall parking conditions in the area. It is important to note that the schematic is only a conceptual illustration, and implementation of any or all of the improvements would require further analysis and design.

It should also be noted that there are several AC Transit stops in close proximity along westbound 20th Street between Telegraph Avenue and Harrison Street:

- North side of 20th Street between Telegraph Avenue and Broadway (three stops occupying the full length of block);
- Northwest corner of Franklin Street / 20th Street; and,
- Northeast corner of Wesbter Street / 20th Street.

While most AC transit services do not use all three stops, some consolidation of stops could also be considered to streamline service, reduce transit vehicle travel times, and improve passenger connections.

- **Between Franklin Street and Webster Street, widen the sidewalk.**

This section of 20th Street is proposed for Class 2 bicycle facilities (bicycle lanes), which would require removal of the exclusive westbound right-turn lane. Additional space obtained as part of those improvements could be set aside for sidewalk widening along the north side of 20th Street, which has an extremely limited unobstructed width due to building frontage.

If the westbound right-turn lane were removed, the intersection of Franklin Street / 20th Street would still operate at LOS B (14.0 seconds of intersection average delay) during the weekday AM peak hour and LOS B (14.7 seconds of intersection average delay during the weekday PM peak hour under Cumulative (2030) plus Project (Phase I and Phase II) Conditions. Without removal of the westbound right-turn lane, the intersection would operate at LOS B under both peak hours, with intersection average delay at 14.1 seconds during the weekday AM peak hour and 14.5 seconds during the weekday PM peak hour. Therefore, removal of the westbound right-turn lane would produce a negligible change in intersection operations and would not result in secondary impacts if implemented.

The northeast corner of Franklin Street / 20th Street could be redesigned so as to reduce the curb radius, shortening crossing distances for pedestrians and encouraging drivers to take their turns slower. A bulbout could also be provided at this corner to further reduce crossing distances.

- **Between Webster Street and Harrison Street, redesign the Project frontage to be pedestrian-friendly.** The portion of 20th Street abutting the site is split into two narrow paths as a result of landscaping and a slight grade from the edge of the existing buildings to the curb. The path closest to the curb is extremely narrow and is partially restricted by the AC Transit bus stop east of the intersection of Webster Street / 20th Street. The path closer to the existing building is restricted by outdoor cafe seating.

  The sidewalk could be redesigned to reduce or eliminate the grade difference and better position the landscaping so as to buffer the sidewalk from the roadway as opposed to divide the sidewalk in two. Given the wide curb lane, the sidewalk closest to the intersection with Webster Street could be widened in a similar fashion to the section of 20th Street between Broadway and Franklin Street. The existing bus stop would be moved out to the new curb line. This may, however, restrict some through capacity along westbound 20th Street, as vehicles could queue up behind stopped transit vehicles, unable to pass around them.

  Bulbouts could be provided at the northwest and northeast corners of this intersection in the east-west direction, shortening crossing distances and increasing queuing space on the major pedestrian route to and from BART.

Recommendation TRANS-2: Reduce cycle times of signals at the intersections of Franklin Street / 20th Street and Webster Street / 20th Street.

Due to long cycle lengths, one-way traffic, and relatively low traffic volumes, there is a high occurrence of pedestrians on the north side of 20th Street crossing Franklin Street and Webster Street illegally. Reducing the cycle length of these signals would shorten wait times for pedestrians attempting to cross, improving safety for all road users, including drivers, bicyclists, and pedestrians. Currently, these intersections operate with 80-second cycle lengths, but these could be reduced to 60- or 70-second cycle lengths to reduce waiting times for pedestrians attempting to cross.

Parking Demand Evaluation

This section evaluates if the South Tower estimated parking demand would be met by the existing parking supply within a reasonable walking distance (five minutes or 900 feet) of the Project site.

Table 13 summarizes vehicle parking code requirements and estimated parking demand for the South Tower. Because the proposed retail space is assumed to be a one-to-one replacement of existing retail space at the Project site, the proposed retail space is omitted from the code requirement and demand calculations.

The South Tower would construct 467 new parking spaces, but would not involve demolition of any existing parking spaces in the Kaiser Center Garage, resulting in a net new increase of 467 parking spaces. After completion of the South Tower, the Kaiser Center Garage would have a capacity of 1,807 spaces and be operated as a single garage shared between the existing Kaiser Center tower and the South tower. For the purposes of comparing parking supply and demand, however, the South tower is assumed to have an on-site parking supply of 467 spaces.

TABLE 13
PARKING CODE REQUIREMENTS AND PARKING DEMAND FOR THE SOUTH TOWER

			Parking Demand		
Land Use[a]	**Size (KSF)[b]**	**Code Requirement**	**ITE**	**Downtown Transportation and Parking Plan**	**Spaces Proposed (Net)**
Office (South Tower Only)	552	0	1,325	773	467

[a] For office use (Land Use 701 – Office Building, Urban):
Average Peak Period Parking Demand: 2.40 vehicles per 1,000 sq. ft. GFA

[b] KSF = 1,000 sq. ft.

SOURCE: City of Oakland *Municipal Code* 17.116.080; Institute of Transportation Engineers (ITE), *Parking Generation* (3rd Edition), 2003; AECOM, 2010.

According to the City of Oakland Municipal Code, the Project is not required to provide any off-street parking because of its location in a C-55 / S-17 zoning district. Therefore, no additional parking is being proposed with the South Tower only option.

According to national Institute of Transportation Engineers (ITE) statistics, the South Tower would generate a parking demand of approximately 1,325 spaces. The available existing capacity within the Kaiser Center Garage and in the surrounding area would be about 913 spaces:

- 419 spaces in average existing capacity available at the Kaiser Center Garage, based on occupancy data as of July 2010 (Table IV.L-7); and,
- 494 spaces in average existing capacity available at off-street parking facilities in the vicinity of the Project, based on occupancy surveys as of October 2008 (Table IV.L-7, all facilities other than the Kaiser Center Garage).

Based on this available capacity and ITE parking demand estimates, the South Tower may result in a parking shortfall of about 412spaces.

It should be noted, however, that the estimated parking demand rate of 2.4 vehicles per 1,000 square feet represents an average for suburban locations where private automobiles are the primary mode of travel, and is therefore not entirely applicable for areas with comprehensive transit service such as Downtown Oakland. The *Downtown Transportation and Parking Plan*, compiled by Dowling Associates for the City of Oakland Redevelopment Agency and the Community and Economic Development Agency (CEDA) in October 2003, recommended off-street parking ratios of 1.4 vehicles per 1,000 square feet for locations in Downtown outside of the City Center area, within two blocks of BART. Based on these calculations, the South Tower would generate a parking demand of about 773 spaces, which could be met by available off-street parking capacity in the surrounding area.

Alternative Measure DD Analysis for South Tower

The following is a summary of the Alternative Measure DD analysis for both Cumulative (2030) conditions without and with the South Tower. **Figure 3** summarizes the traffic volumes used for the LOS analysis presented in **Table 14**.

TABLE 14
CUMULATIVE (2030) WITHOUT AND WITH SOUTH TOWER
INTERSECTION LEVELS OF SERVICE – ALTERNATIVE MEASURE DD

			Cumulative (2030) without Project Conditions (Alternative Measure DD)				Cumulative (2030) plus South Tower Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	Intersection	Traffic Control	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]	LOS	Delay[a]
Within Downtown										
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	Signal	D	39.8	**F**	**107.4**	E	69.0	**F**	**>120**
25	Kaiser Ctr. Access Rd. / 20th Street [b]	SSSC	B	10.5	B	10.1	--	--	--	--

Bold indicates significant impact.

[a] The LOS and delay for one-way stop controlled intersections represent the worst movement or approach. The LOS and delay for signalized intersections represent the average delay for all movements.

[b] The Project would combine this intersection with Intersection #24.

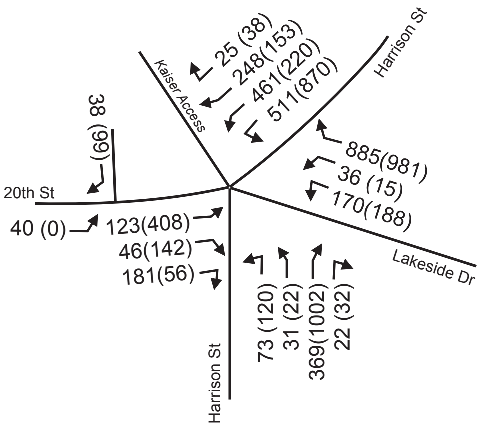
SOURCE: AECOM, 2010.

As shown in the table, the following intersection would operate at unacceptable conditions under Cumulative (2030) plus South Tower Conditions (Alternative Measure DD):

- Within Downtown (LOS F)
  - LOS F - Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM)

AECOM

Cumulative (2030) without South Tower Conditions



Cumulative (2030) plus South Tower Conditions

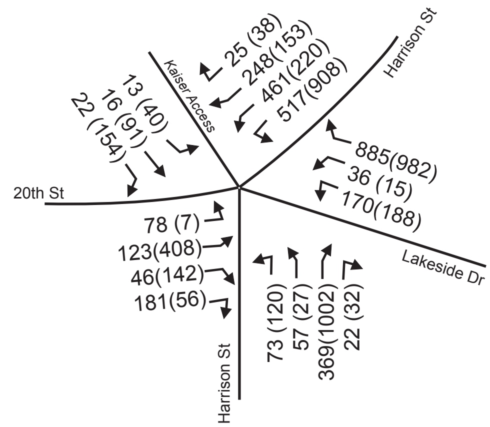


Figure 3

ALTERNATIVE MEASURE DD TRAFFIC VOLUMES

AM (PM) Peak Hour

Potential impacts at the above intersections due to the Project are discussed below.

Impact ALT DD TRANS-4 Intersection #24: Harrison Street / 20th Street / Kaiser Center Access Road (PM). The intersection of Harrison Street / 20th Street / Kaiser Center Access Road would operate at LOS F in the PM peak hour under both Cumulative (2030) without Project Conditions (Alternative Measure DD) and Cumulative (2030) plus South Tower Conditions (Alternative Measure DD). The intersection is located within the Downtown area.

Because the Project would cause an increase in average intersection delay greater than the two-second threshold of significance, the Project would result in a significant impact at this intersection.

Mitigation Measure ALT DD TRANS-4:

1. The Project applicant shall add an additional lane and reconfigure the northbound Harrison Street approach as a shared left-through lane (to westbound 20th Street and Kaiser Center Access Road) and two exclusive right-turn lanes (one lane to northbound Harrison Street, the other to northbound Harrison Street and eastbound 20th Street / Lakeside Drive). This would require curb setback of about 10 feet and a corresponding reduction in park space and removal of up to five on-street parking spaces along the west side of Snow Park.

   In addition, the left turns from the Kaiser Center Access Road to eastbound 20th Street / Lakeside Drive would need to be prohibited in order to allow the northbound movement along Harrison Street to run concurrently with the Access Road phase.

2. Implement Mitigation Measure TRANS-13e.

3. Consider implementation of Recommendation TRANS 6:

   Installation of a signalized mid-block pedestrian crossing across Harrison Street between 20th Street and 21st Street under the Alternative Measure DD Configuration would require signal coordination with adjacent traffic signals at Harrison Street / 21st Street, Harrison Street / 20th Street / Kaiser Center Access Road, and other signals in the same signal coordination group. Due to the coordination, the pedestrian phase could be timed to coincide with periods of low arriving traffic flow from upstream intersections such that no additional intersection delay would be created. Instead, the signalized mid-block crossing would potentially improve operations along this corridor by “metering” traffic entering the ultimate bottleneck intersections at Harrison Street / Grand Avenue and Harrison Street / 20th Street / Kaiser Center Access Road. As a result, the crossing itself would not result in secondary impacts to other modes.

To implement these measures, the Project Applicant shall submit to City of Oakland’s Transportation Services Division for review and approval a PS&E to modify the intersection. All elements shall be designed to City standards in effect at the time of construction, and all new or upgraded signals should include these enhancements. All other facilities supporting vehicle travel and alternative modes through the intersection should be brought up to both City standards and ADA standards (according to Federal and State Access Board guidelines) at the time of construction.

The Project Applicant shall fund, prepare, and install the approved plans and improvements.

Significance after Implementation of Mitigation: If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project impacts at this location would be Significant and Unavoidable.

After implementation of the proposed mitigation measure, the intersection would still operate at LOS D in the PM peak hour under Cumulative (2030) plus Project (Phase I) Conditions (Alternative Measure DD), which is a Less than Significant impact. However, measures that reduce the land area of Snow Park or eliminate parking spaces in this block may not be acceptable to the City, as they also result in secondary impacts on pedestrians. Therefore, signal optimization may be the only other feasible mitigation measure; however, this does not completely mitigate the Project's impacts.

If additional mitigation measures for the Project are determined feasible by the City, then the impact at this location would be Less than Significant. Otherwise, as described above, the Project (Phase I) impacts at this location would be Significant and Unavoidable.

Microsimulation Analysis

A microsimulation analysis was conducted to better determine the operational performance of the Alternative Measure DD Configuration. Selected measures of effectiveness (MOEs) were then compared against the original Measure DD Configuration.

As shown in **Table 15**, which summarizes the movement delay for the original Measure DD Configuration and Alternative Measure DD Configuration, the northbound Harrison Street, eastbound 20th Street, and southbound Kaiser Center Access Road approaches to the intersection of Harrison Street / 20th Street / Kaiser Center Access Road would perform poorly (LOS F) under either configuration.

TABLE 15
CUMULATIVE (2030) PLUS SOUTH TOWER MICROSIMULATED MOVEMENT DELAY

			Cumulative (2030) plus South Tower Conditions (Original Measure DD)				Cumulative (2030) plus South Tower Conditions (Alternative Measure DD)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
No.	**Intersection**	**Mvmt.**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	EBL	D	35.2	C	28.0	**F**	**>120.0**	E	80.0
		EBT	C	22.8	**F**	**>120**	D	35.4	E	117.0
	EB: EB 20th St.	EBR	B	10.3	**F**	**>120**	B	14.1	C	20.8
	WB: SWB Harrison St.	EBR2	E	58.2	D	35.1	B	19.5	B	16.2
	NB: NB Harrison St.	WBL2	B	19.9	A	8.6	D	41.1	E	92.9
	NW: WB 20th St.	WBL	A	5.0	A	2.9	D	42.7	C	22.5
	SB: Kaiser Center Access Road	WBT	C	26.5	**F**	**>120**	E	85.3	D	43.0
		WBR	C	27.9	**F**	**>120**	E	66.1	C	27.2
		NBL	A	8.6	**F**	**>120**	**F**	**>120.0**	**F**	**>120**
		NBT	C	33.4	D	52.0	E	106.2	**F**	**>120**
		NBR	A	9.0	C	23.8	**F**	**>120.0**	**F**	**>120**
		NBR2	C	22.1	**F**	**>120**	**F**	**>120.0**	**F**	**>120**
		NWL	D	35.2	C	28.0	E	77.7	**F**	**>120**
		NWT	C	22.8	**F**	**>120**	E	79.2	**F**	**>120**
		NWR	B	10.3	**F**	**>120**	A	9.7	B	15.6
		SBL	E	58.2	D	35.1	E	63.9	**F**	**>120**
		SBT	B	19.9	A	8.6	E	71.5	**F**	**>120**
		SBR	A	5.0	A	2.9	B	14.3	**F**	**>120**
		All	C	26.5	**F**	**>120**	E	55.1	**F**	**>120**
26	Harrison Street / Lakeside Drive[a]	EBT	B	15.4	D	37.9	--	--	--	--
		EBR	B	10.7	D	35.7	--	--	--	--
	EB: NB Harrison St.	WBL	**F**	**>120**	**F**	**>120**	--	--	--	--
	WB: SB Harrison St.	WBT	**F**	**>120**	E	83.3	--	--	--	--
	NB: NB Lakeside Dr.	NBL	C	29.8	C	23.7	--	--	--	--
		NBR	B	12.4	A	9.8	--	--	--	--
		All	**F**	**>120**	E	59.1	--	--	--	--

Bold indicates movements operating at LOS F.

[a] Intersection only present in Original Measure DD. SOURCE: AECOM 2010.

Queuing Conditions

As shown in **Table 16** , which summarize the 95th percentile queues by lane for the original Measure DD Configuration and Alternative Measure DD Configuration, queues on the northbound Harrison Street approach at Harrison Street / 20th Street / Kaiser Center Access Road exceed available storage capacity in the PM peak hour for all Cumulative scenarios, regardless of configuration. Under the original Measure DD Configuration, queues on the eastbound Harrison Street approach at Harrison Street / Lakeside Drive exceed or approach the available storage capacity. The lack of storage between the two key intersections in the original Measure DD Configuration causes spillback queuing along northbound Harrison Street and eastbound

TABLE 16
CUMULATIVE (2030) PLUS SOUTH TOWER MICROSIMULATED 95TH PERCENTILE QUEUES

		Cumulative (2030) plus South Tower Conditions (Original Measure DD)				Cumulative (2030) plus South Tower Conditions (Alternative Measure DD)			
No.	**Intersection**	**Move-ment**	**Storage**	**AM Peak Hour**	**PM Peak Hour**	**Move-ment**	**Storage**	**AM Peak Hour**	**PM Peak Hour**
24	Harrison St. / 20th St. / Kaiser Ctr. Access Road	EBL	100	75	25	EBL	100	**150**	50
		EBT	375	50	150	EBT	375	275	375
		EBT	375	50	375	EBT	375	125	375
	EB: EB 20th St.	EBTR	375	100	**575**	EBR	375	150	200
	WB: SWB Harrison St.	WBL	200	100	100	WBL	600	275	250
	NB: NB Harrison St.	WBT	200	125	100	WBL	600	275	250
	NW: WB 20th St.	WBT	200	125	100	WBL	600	350	175
	SB: Kaiser Center Access Road	WBR	125	75	75	WBTR	200	**275**	**225**
		NBLTR	575	175	**>1,000**	NBLTR	575	575	**>1,000**
		NBR	575	100	**>1,000**	NBR	575	575	**>1,000**
		--	--	--	--	NWLR	800	275	525
		--	--	--	--	NWR	475	175	400
		--	--	--	--	NWR	475	200	325
		SBT	150	50	**225**	SBLT	150	75	**250**
		SBR	50	50	**100**	SBR	50	50	**100**
26	Harrison Street / Lakeside Drive[a]	EBT	150	100	**150**	--	--	--	--
		EBT	150	125	**175**	--	--	--	--
	EB: NB Harrison St.	EBTR	150	125	150	--	--	--	--
	WB: SWB Harrison St.	WBL	250	200	**450**	--	--	--	--
	NB: NB Lakeside Dr.	WBL	250	**500**	**450**	--	--	--	--
		WBT	250	**450**	**350**	--	--	--	--
		WBT	250	**250**	75	--	--	--	--
		WBT	250	150	75	--	--	--	--
		NBL	450	75	75	--	--	--	--
		NBLR	450	250	175	--	--	--	--
		NBR	800	200	150	--	--	--	--

Bold indicates movements operating at LOS F.

[a] Intersection only present in Original Measure DD.

All storage capacities and queue lengths rounded to the nearest 25 feet

SOURCE: AECOM, 2010.

20th Street, hampering throughput on the northbound Harrison Street and eastbound 20th Street approaches at Harrison Street / 20th Street / Kaiser Center Access Road. These queues then stretch back to upstream intersections, affecting Harrison Street / 19th Street and Webster Street / 20th Street. Likewise, queues on the westbound Harrison Street approach to Harrison Street / Lakeside Drive also exceed the available storage capacity, causing spillback into the upstream intersection at Harrison Street / 21st Street.

Conclusions

The following is a summary of the 12 CEQA related mitigation measures that are expected due to the build-out of the South Tower under Existing Conditions (requiring measures at four intersections) and Cumulative (2030) Conditions (requiring measures at five intersections and three roadways). After implementation of these proposed measures, the South Tower impacts under Existing Conditions would be significant and unavoidable at two of the intersections and less than significant at the other two intersections. Under Cumulative Conditions, the implementation of the measures would result in the South Tower impacts being significant and unavoidable at one intersection; less than significant at the four other intersections and all three roadway segments.

Existing plus South Tower Conditions

1) Implement Intersection Mitigation Measure TRANS-12a at the **Oakland Avenue / Perry Place / I-580 Eastbound Ramps** intersection. However, even after implementation of the proposed measure, the South Tower impacts at this intersection would be significant and unavoidable.

2) Implement Intersection Mitigation Measure TRANS-12b at the **Harrison Street / 27th Street-Bay Place / 24th Street** intersection. However, even after implementation of the proposed measure, the South Tower impacts at this intersection would be significant and unavoidable.

3) Implement Intersection Mitigation Measure TRANS-12c at the **Grand Avenue / El Embarcadero** intersection and the South Tower impacts on this intersection are expected to be less than significant.

4) Implement Intersection Mitigation Measure TRANS-12d at the **Grand Avenue / MacArthur Boulevard** intersection and the South Tower impacts on this intersection are expected to be less than significant.

Cumulative (2030) plus South Tower Conditions

1) Intersection Mitigation Measure TRANS-13a: Implement Mitigation Measure TRANS-12a. This measure alone should be sufficient to completely mitigate the South Tower impacts at **Oakland Avenue / Perry Place / I-580 Eastbound Ramps**. Therefore, the South Tower impacts are less than significant.

2) Intersection Mitigation Measure TRANS-13b: Implement Mitigation Measure TRANS-12b at **Harrison Street / 27th Street-Bay Place / 24th Street**, and also prohibit westbound left turns from Bay Place during the AM peak hour (in addition to the PM peak hour). After implementation of the mitigation measure, the intersection would operate at an acceptable LOS D in both the AM and PM peak hours, mitigating the South Tower impacts at this intersection. Therefore, the South Tower impacts on this intersection are less than significant.

3) Intersection Mitigation Measure TRANS-13c: Implement Mitigation Measure TRANS-5d at **Telegraph Avenue / 27th Street**. After implementation of the mitigation measure, the intersection would operate at an unacceptable LOS E in the PM peak hour, but the average

delay for the overall intersection and for critical movements would be reduced to less than Cumulative (2030) without Project conditions, mitigating the South Tower's impacts at this intersection. Therefore, the South Tower impacts on this intersection are less than significant.

4) Intersection Mitigation Measure TRANS-13d: Implement Mitigation Measure TRANS-3c at **Harrison Street / Grand Avenue**, and also prohibit southbound Harrison Street left turns in the AM peak period (this movement is already prohibited in the PM peak period). To help enforce the prohibition, extinguishable message signs should be installed on the northbound and southbound approaches. These measures alone would not be sufficient to completely mitigate the South Tower impacts at this intersection, but as discussed for Impact TRANS-3c, there are no feasible mitigation measures to completely mitigate the South Tower impacts. Therefore, the South Tower impacts at this intersection are significant and unavoidable.

5) Intersection Mitigation Measure TRANS-13e: Implement Mitigation Measure TRANS-1c at **Harrison Street / 20th Street / Kaiser Center Access Road**:

- Optimize the traffic signal for the PM peak period.
- Coordinate the signal timing at this intersection with the adjacent intersections.

To implement this measure, the Project Applicant shall submit to TSD for review and approval PS&E to upgrade the intersection to both City standards and ADA standards at the time of construction. The Applicant shall also fund, prepare, and install the approved plans and improvements, which would make the South Tower impacts on this intersection less than significant.

6) Roadway Mitigation Measure TRANS-14a: There are no feasible measures to mitigate the South Tower impact on **I-880 from Oak Street to 5th Avenue**, given the existing alignment and constraints due to lack of right-of-way. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.

7) Roadway Mitigation Measure TRANS-14b: Implement Mitigation Measure TRANS-2a on **Eastbound Grand Avenue from Harrison Street to El Embarcadero**. After implementation of this measure, conditions would remain at an unacceptable LOS, and the South Tower impact would not be mitigated. Therefore, the South Tower impacts on this roadway segment are significant and unavoidable.

8) Roadway Mitigation Measure TRANS-14c: To completely mitigate the South Tower's impacts would require substantial capacity improvements such as an additional travel lane on **Northbound Harrison Street / Oakland Avenue from 27th Street to I-580**. Since there are no feasible measures to add such capacity, and the South Tower impacts on this roadway segment are significant and unavoidable.

APPENDIX I
Preliminary Greenhouse Gas Emissions Reduction Plan

GHG EMISSIONS INVENTORY AND REDUCTION ANALYSIS AND DATA

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Preliminary Greenhouse Gas Emissions Reduction Plan

date August 20, 2010

to Eric Angstadt, Deputy Director, Oakland Community and Economic Development Agency

from Joan Douglas, AICP, Project Manager
Crescentia Brown, AICP, Project Director

subject Kaiser Center Office Project – Preliminary GHG Emissions Reduction Plan

This preliminary Greenhouse Gas (GHG) Emissions Reduction Plan (or "GHG Plan") presents GHG emissions inventory estimates and identifies potential GHG emissions reduction measures available for the Kaiser Center Office Project ("Project" or "Proposed Project"). Emission inventories for two Project Alternatives are also presented. This GHG Plan is organized as follows:

Part A: GHG Emissions Inventory and Impacts

a) Identifies and discusses the emission sources that are included in the inventory, as well as other sources that are not included.

b) Identifies and discusses Project design features, applicable City Standard Conditions of Approval, regulatory requirements, and General Plan policies and programs that would reduce GHG emissions from the Project.

c) Estimates the Project's "unadjusted" ("business as usual") GHG emissions inventory in carbon dioxide equivalents (CO_2e) for construction and operations, generally excluding the emissions reductions resulting from the considerations in "b," above.

d) Estimates the Project's and the Alternatives' "adjusted" baseline GHG emissions, which incorporate the emissions reductions resulting from the considerations in "b,", against the CEQA thresholds of significance for GHGs.

Part B: Additional GHG Reduction Measures that May be Considered

e) Describes a comprehensive set of additional GHG reduction measures that may be implemented by the Project to further reduce GHG emission beyond "adjusted" emissions described in "c" above.

This GHG Plan is considered “preliminary” because it is anticipated that the Project Applicant will continue to develop this GHG Plan to further refine the list of additional GHG reduction measures (including preparation and implementation of an approved Transportation Demand Management [TDM] Plan), whereupon it shall fully satisfy Mitigation Measure AIR-3 and SCA GHG-1 identified in the EIR. The Final GHG Plan will be a document to be updated, refined and implemented throughout the Project.

The information and analysis presented herein has been prepared by Chris Sanchez, ESA Senior Technical Associate, Air Quality/GHG; and Jeff Caton, P.E., LEED AP, Director, ESA Renewable Resources.

Part A: GHG Emissions Inventory and Impacts

1.0 Background and CEQA Context

The analysis presented herein is prepared consistent with both statewide and local guidance on the estimation and evaluation of GHG emissions relative to CEQA. These specifically include amendments adopted on March 18, 2010 to the *CEQA Guidelines* regarding GHG emissions. No significance threshold is included in the amendments; the *CEQA Guidelines* afford the customary deference provided to lead agencies in their analysis and methodologies. The Governor’s Office of Planning and Research (OPR) emphasizes the need for a consistent threshold to analyze projects, specifies that the analyses should be performed based on the best available information, and that if a lead agency determines that a project may generate GHGs, the agency is responsible for quantifying estimated GHG emissions by type and source. The analysis in this GHG Plan is consistent with this guidance.

Local guidance includes the Air Quality CEQA Thresholds of Significance from the Bay Area Air Quality Management District (BAAQMD), adopted June, 2, 2010. These thresholds represent the only quantitative thresholds formally proposed by a regulatory agency with jurisdiction over the Project. In its June 2010 *CEQA Air Quality Guidelines*, BAAQMD is specific as to what sources of emissions should be considered relative to proposed CEQA GHG thresholds[1] (Table 4-2: Guidance for estimating a Project’s Operations GHG Emissions, page 4-6) and also provides the BAAQMD Bay Area Greenhouse Gas Emissions Model (BGM) to estimate GHG emissions from land development of projects. As such, the Project’s baseline GHG emissions inventory presented in this GHG Plan provides emissions data for the sources identified by BAAQMD in its updated Guidelines and applies the adopted significance thresholds. .

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1 Bay Area Air Quality Management District, *California Environmental Quality Act Air Quality Guidelines,* Table 4-3: GHG Quantification Guidance Standard, page 4-6. http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

2.0 GHG Emission Sources

2.1 GHG Emission Sources Included in the Inventory

Emissions included in the updated BAAQMD Guidelines and therefore included in the baseline GHG emissions inventory for the Project, if applicable, are:

- Area Source Emissions. These are direct emissions from sources that include natural gas combustion for heating, cooking, fireplaces, or boilers, as well as emissions from landscape maintenance equipment.

- Transportation Emissions. These are direct emissions from mobile sources including automobiles, trucks, motorcycles, and busses.

- Operational Electricity Consumption. These are indirect emissions emitted off-site via non-renewable, non-nuclear electricity generators as a result of increased electrical demand.

- Solid Waste Disposal Emissions. These are indirect emissions associated with waste generation. The non-residential uses at the development would generate waste. A large percentage of this waste would be diverted from landfills by waste reduction, recycling, and composting. Oakland currently diverts a large portion of its waste and has goals to even further reduce the amount of waste sent to a landfill. The remainder of the waste not diverted would be disposed of at a landfill. Landfills emit anthropogenic methane from the anaerobic breakdown of material.

- Operational Fugitive (Direct) Emissions. These direct emissions are most commonly associated with a inadvertent emissions to the atmosphere due to leakage or inherent imperfections in a gas transport or collection system. Direct fugitive GHG emissions that may reasonably be expected to be generated by a commercial building like the Project would consist of GHG refrigerants emitted from leaks or other imperfections in refrigeration or air cooling equipment.

- Operational Water Emissions (embedded energy). These indirect emissions are associated with the electricity used to convey water, due to increased water demand from the Project.

- Operational Wastewater (non-biogenic). The updated Guidelines define indirect emissions from wastewater treatment as including the GHG emissions associated with the electricity use in wastewater treatment and not the biogenic CO_2 process emissions[2].

2.2 GHG Emission Sources Not Included in the Inventory

Emissions not included in the BAAQMD Guidelines, and therefore not included in the baseline GHG emissions inventory for the Project, are discussed below. These emissions may be considered in addition to those incorporated into the Project's baseline GHG emissions inventory discussed below in Sections 6.0 through 9.0.

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2 Bay Area Air Quality Management District, *California Environmental Quality Act Air Quality Guidelines,* page 4-7. http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Draft%20BAAQMD%20CEQA%20Guidelines_Dec%207%202009.ashx

- Permitted Stationary Source Equipment. Per BAAQMD, GHG emissions from permitted stationary source equipment are not to be assessed as part of the operational emissions of a land development project, but are instead to be directly compared to BAAQMD's 10,000 metric ton per year threshold for such equipment for the purposes of impact assessment relative to CEQA. GHG emissions from permitted stationary source equipment are not to be included in the project inventory that is used for comparison to either the BAAQMD's proposed threshold of 1,100 metric tons (MT) of CO_2e per day or the efficiency-based threshold of 4.6 MT per year per service population (Tholen, 2010b). The GHG analysis for the Project does not include any permitted stationary source equipment.

- Vegetation Sequestration Change. This is the net change in CO_2 emissions resulting from vegetation change and its associated carbon sequestration. Given the urban location of the Proposed Project, a significant change in sequestration of CO_2 from vegetative sources is not expected.

- Fugitive Refrigeration Emissions. Refrigerant gases such as CFCs, HFCs, and HCFCs have a high global warming potential. Leaks of refrigeration gases were not quantified for the Project. At the entitlement stage of development, data necessary to estimate emissions (the pounds of charge of refrigerant for all air handling units) is not readily available.

- Life Cycle Emissions. Although there is no regulatory definition for "lifecycle emissions," the term is generally used to refer to all emissions associated with the creation and existence of a project, including emissions from the manufacture and transportation of component materials, and even emissions from the manufacture of the machines required to produce those materials. However, since it is impossible to accurately estimate the entire chain of emissions associated with any given project, lifecycle analyses are limited in effectiveness and meaning (relative to assessing or reducing Project-specific emissions for the CEQA analysis). The California Natural Resources Agency (CNRA) has stated that lifecycle analyses are not required under CEQA,[3] and in December 2009 CNRA issued new energy conservation guidelines for EIR's that make no reference to lifecycle emissions.[4] The CNRA's explained that: (1) There exists no standard regulatory definition for lifecycle emissions, and (2) Even if a standard definition for 'lifecycle' existed, the term might be interpreted to refer to emissions "beyond those that could be considered 'indirect effects'" as defined by CEQA Guidelines, and therefore beyond what project managers are required to estimate and mitigate.[5]

- Agricultural Emissions. These are emissions from livestock, from fuel combustion associated with agricultural equipment operation, electricity use and fertilizer application. These sources were assumed not to be generated by the Proposed Project.

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3 California Natural Resources Agency, 2009. *Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97,* p. 71-72. http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf (accessed February 4, 2010).

4 State CEQA Guidelines, Appendix F. These new guidelines were part of amendments issued pursuant to SB97.

5 California Natural Resources Agency, 2009. *Final Statement of Reasons for Regulatory Action: Amendments to the State CEQA Guidelines Addressing Analysis and Mitigation of Greenhouse Gas Emissions Pursuant to SB97,* p. 71. http://ceres.ca.gov/ceqa/docs/Final_Statement_of_Reasons.pdf (accessed February 4, 2010).

- Off Road Equipment Emissions. These are emissions from off-road equipment typically associated with equipment typically associated with industrial or large commercial land uses such as fork lifts, yard dogs and generators. These sources were assumed not to be generated by the proposed office tower project.

3.0 Project Design Features, City Standard Conditions of Approval, Regulatory Requirements, and General Plan Policies and Local Programs that Reduce GHG Emissions

There are many ways for a project to reduce its GHG emissions through its design, construction and operations. Local conditions of approval, policies, programs and regulatory requirements that apply to a project also combine to reduce project GHG emissions. Each of these components is considered part of the Proposed Project and is included in the estimate of the Project's baseline GHG emissions inventory as follows:

3.1 Project Design Features

- CALGreen – Energy Performance Standard. One of the objectives of the Project (presented in Chapter 3, Project Description) is to meet contemporary energy and design objectives by ensuring that the new towers meet mandatory CALGreenperformance standard under CALGreen and provide the opportunity for the Project, as part of this GHG Plan, to exceed such standards where feasible. CALGreen is a newly enacted building code requirement pursuant to Title 24 of the CCR, which is effective January 2011 and will apply to construction of the Proposed Project. CALGreen will require that every new building constructed in California reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills and install low pollutant-emitting materials. It also requires separate water meters for nonresidential buildings' indoor and outdoor water use, with a requirement for moisture-sensing irrigation systems for larger landscape projects and mandatory inspections of energy systems (e.g., heat furnace, air conditioner and mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity and according to their design efficiencies. The effects of these energy and water saving features are incorporated into the baseline emission inventory for the Proposed Project.

3.2 City Standard Conditions of Approval

City Standard Conditions of Approval (also referred to as "SCAs") are incorporated and required as part of a Proposed Project and are adopted as conditions of approval and required of the project to help ensure less than significant impacts.

The following SCAs are required as part of a Proposed Project and adopted as conditions of approval to help reduce GHG emissions of the Project:

- SCA TRANS-1 – Parking and Transportation Demand Management Plan. SCA TRANS-1 requires the Project applicant to submit for review and approval by the City of Oakland Planning and Zoning Division a Transportation Demand Management (TDM) Plan containing strategies to reduce on-site parking demand and single occupancy vehicle (SOV) travel. Although a TDM Plan for the Project has not yet been prepared, generally, TDM could reduce SOV trips for a large office project near located near transit by about 10 to 20 percent. Calculations of GHG reductions attributable to the TDM Plan preliminarily (and conservatively) assume a 10 percent reduction in Project trip generation. This GHG Plan provides emissions estimates for the project both with and without the preliminary 10 percent projected TDM trip reduction. Once the TDM Plan is completed and approved (prior to certification of the EIR), the appropriate refinement to the Project trip generation and resulting GHG emissions will be calculated and reported in the EIR prior to certification.

- SCA UTIL-1 – Waste Reduction and Recycling. SCA UTIL-1 requires the Project applicant to submit a Construction & Demolition Waste Reduction and Recycling Plan (WRRP) and an Operational Diversion Plan (ODP) for review and approval by the Oakland Public Works Agency. Chapter 15.34 of the Oakland Municipal Code outlines requirements for reducing waste and optimizing construction and demolition (C&D) recycling. Affected projects include all new construction and all demolition. This SCA essentially addresses reduction in construction–related emissions, which the City combines with the Project's operational emissions to assess against the significance thresholds for operational emissions, even though construction emissions are not a component of BAAQMD's Guidelines. Therefore, this SCA will contribute to reducing total emissions of the Project.

- Landscape Requirements and Tree Replacement. SCAs address landscape requirements for frontages of commercial buildings and replacement of trees removed as part of a project. Projects are required to install one tree for every 25 feet of street frontage in cases sidewalks have adequate width. Additionally SCAs generally require the replacement of native trees removed as part of a project. Together, these SCAs that maintain and increase landscaping and trees effect cooler climate, reduce excessive solar gain, and absorb CO_2e emissions over the minimum 3.5 years to construct Phase 2 of the Project, but have no impact on the emissions inventory of the Proposed Project.

- SCA GHG-1- GHG Reduction Plan. SCA GHG-1 applies to certain projects that produce total GHG emissions that exceed the BAAQMD CEQA Thresholds, including commercial office buildings employing 1,000 persons or containing more than 250,000 square feet of total floor area, such as the Proposed Project. SCA GHG-1 requires the Project applicant to prepare a GHG Reduction Plan to increase energy efficiency and reduce GHG emissions to the greatest extent feasible below the BAAQMD CEQA Thresholds. The GHG Reduction Plan will include a comprehensive set of quantified GHG emissions reduction measures in addition to energy efficiencies included as part of the project (including the City's Standard Conditions of Approval, proposed mitigation measures, project design features, and other City requirements. SCA GHG-1 is presented in the detailed Project GHG emissions impact analysis further below and will reduce the GHG emissions of the Project.

3.3 General Plan Policies and City Programs

- Oakland General Plan LUTE. The LUTE is aimed at promoting use of public transit, bicycles and pedestrian travel. Any reduction of transportation-related GHG emissions are captured in the trip reduction associated with the TDM Plan.

- Oakland General Plan Open Space, Conservation and Recreation (OSCAR) Element. The OSCAR contains policies that (a) encourage the provision of open space, which increases vegetation area (trees, grass, landscaping, etc.) to effect cooler climate, reduce excessive solar gain, and absorb CO_2; (b) encourage stormwater management, which relates to the maintenance of floodplains and infrastructure to accommodate potential increased storms and flooding; and (c) encourage energy efficiency and use of alternative energy sources. Policies that address vegetation area have no impact on the emissions inventory as vegetative sequestration is not a component of BAAQMD's Guidelines Other policies regarding energy efficiency encourage and support energy efficiency but are not requirements under any implementation mechanism via the General Plan. They have resulted, however, in the implementation of the City of Oakland sustainability program discussed below.

- City of Oakland Sustainability Programs. The City has proactively adopted a number of sustainability programs in an effort to reduce the City's impact on climate change. Oakland's sustainability efforts are managed by the Oakland Sustainability Community Development Initiative and there are two main categories that relate to reducing GHG emissions from a development project: renewable energy and green building.

  Renewable Energy. With regard to renewable energy, the City's Sustainability Program has set a priority of promoting renewable energy with a particular emphasis on solar generation. The Program's aggressive renewable energy goals include the following: 50 percent of city facilities entire electricity use from renewable sources by 2017; and 100 percent of the city's entire electricity use from renewable sources by 2030. The City has some control over renewable energy percentages for buildings it operates by contracting its energy needs directly with the local utility. However, private building operators generally receive a standard energy mix from PG&E, and would not be required to contract for a higher percentage of renewables under this program as it only targets City facilities. PG&E does have a 20 percent renewable energy mix goal for 2020 (compared to a 12 percent mix in 2007).

  Green Building. With regard to green building strategies, the City of Oakland has implemented green building principles in City buildings through the following programs: Civic Green Building Ordinance (Ordinance No. 12658 C.M.S., 2005), requiring, for certain large civic projects, techniques that minimize the environmental and health impacts of the built environment through energy, water and material efficiencies and improved indoor air quality, while also reducing the waste associated with construction, maintenance and remodeling over the life of the building; Green Building Guidelines (Resolution No. 79871, 2006) which provides guidelines to Alameda County residents and developers regarding construction and remodeling; and Green Building Education Incentives for private developers. Green building requirements for private developers are anticipated for adoption in the fall of 2010, however, the baseline emissions inventory for the

Proposed Project assumes implementation of mandatory CALGreen standards as a Project design feature, as discussed above.

3.4 Regulatory Requirements

- *AB 1493 and Amended "Pavley" Regulations*. AB 1493 required the California Air Resources Board (CARB) to develop and adopt, by January 1, 2005, regulations that achieve "the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the State. The CARB has adopted amendments to the Pavley regulations that reduce GHG emissions in new passenger vehicles from 2009 through 2016. The amendments, approved by CARB on September 24, 2009, are part of California's commitment toward a nation-wide program to reduce new passenger vehicle GHGs from 2012 through 2016. The model used to estimate the Proposed Project's GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of Pavley standards.

- *Low Carbon Fuel Standards (LCFS).* On April 23, 2009 CARB approved the regulation to implement the LCFS. The LCFS will reduce GHG emissions from the transportation sector in California by about 16 million metric tons (MMT) in 2020. The model used to estimate the Proposed Project's GHG emissions for this analysis accounts for reductions of GHG resulting from implementation of LCFS.

Other Project characteristics that reduce GHG emissions and support the Project's alignment with AB 32 GHG reduction goals include proposed pedestrian improvements. The Project final design is anticipated to include extensive streetscape improvements, including new and increased sidewalk, curb, and gutter; right-of-way landscaping; streetlights; street furniture; wayfinding signage; and/or art. These features, as outlined in the City's Pedestrian Master Plan adopted in November 2002, are identified as design amenities that develop a pedestrian-oriented environment that facilitate walking and transit use. These features would help reduce transportation-related GHG emissions by encouraging additional pedestrian trips. Also, the Project's combination of office and commercial/retail uses has the potential to reduce greenhouse gas emissions related to transportation for both the employees and the patrons of each of these uses. Multiple amenities and services an employee or patron might use would be located in this single development, which would reduce vehicle-miles-traveled.

4.0 Baseline GHG Emissions Inventory

4.1 Construction-Related GHGs

Assumptions

Estimated Total and Annualized Construction-generated GHG Emissions

The construction-generated GHG emissions of the Project are shown in **Table 1**, which summarizes the emissions estimates from the principal GHGs (CO_2, CH_4 and N_2O) in metric tons of CO_2e, by construction year and Project phase. An estimated total 2,081 MT CO_2e emissions from Project construction equipment and vehicles would be emitted over the minimum 3.5 years to construct Phase 1 of the Project, and an estimated total 2,461 MT CO_2e emissions over the minimum 3.5 years to construct Phase 2 of the Project, for a total of approximately 4,542 MT CO_2e emissions over the minimum total construction period of seven years through Buildout. Approximately 46 percent of the total construction GHG emissions is associated with Phase 1 construction, with approximately 54 percent associated with Phase 2 construction.

TABLE 1
CONSTRUCTION-GENERATED GHG EMISSIONS OF THE PROPOSED PROJECT

	Annual CO_2e Emissions (metric tons per year)			
Construction Year	**CO_2**	**CH_4**	**N_2O**	**Total CO_2e**
Phase 1				
2012	244	0.29	1.94	246
2013	733	0.88	5.82	740
2014	750	0.90	5.96	757
2015 (Phase 1)	335	0.40	2.66	338
Total Phase 1				**2,081**
Phase Construction Emissions per Year (annualized over 40 years)				52
Phase 2				
2015 (Phase 2)	112	0.13	0.89	113
2016	953	1.14	7.57	962
2017	948	1.14	7.53	957
2018	426	0.51	3.39	430
Total Phase 2				**2,461**
Total Construction Emissions – Project Buildout				**4,542**
Total Construction Emissions per Year (annualized over 40 years)				**114**
Total Construction Emissions per Year (annualized over approximately 7 years to construct the Project)				649

SOURCE: ESA, 2010

Construction emissions are annualized because the proposed operational GHG emissions thresholds are analyzed in terms of metric tons “per year.” Assuming a 40-year development life of the Project until it is demolished or remodeled for energy efficiency (which is the common standard currently used in practice), total construction emissions represent approximately 114 MT CO_2e annually, over 40 years. Annualized over the 3.5-year construction period for Phase 1, the one-time construction–related contribution to GHG emissions is approximately 52 MT CO_2e per year, and over the seven-year construction period of the Project Buildout the one-time construction-related contribution is approximately 649 MT CO_2e per year.

The BAAQMD Guidelines do not include a specific threshold or methodology for assessing construction-related GHG emissions for CEQA analysis. The City's methodology adds the 40-year annualized construction-related GHG emissions to the Project's total operational-related emissions, to assess construction-related GHG emissions against the BAAQMD thresholds and Project's ability to meet AB 32 GHG reduction goals, as discussed below.

The Project includes characteristics that specifically contribute it being consistent with AB 32 GHG reduction goals during construction. The analysis of construction emissions only considers improvements in construction equipment exhaust emissions through manufacturer requirements and turnover. In addition to considering the CO_2e emission from construction activities, the Project would incorporate dust control measures recommended by BAAQMD (Oakland SCA AIR-1, Construction-Related Air Pollution Controls (Dust and Equipment Emissions [Dust Control]), and measures related to construction exhaust emissions (Oakland SCA AIR-2, Construction Emissions). Further, the SCAs that apply to the Project align with BAAQMD regulations that relate to portable equipment (e.g., concrete batch plants, and gasoline- or diesel-powered engines used for power generation, pumps, compressors, pile drivers, and cranes), architectural coatings, and paving materials. Equipment used during project construction would be subject to the requirements of BAAQMD Regulation 2 (Permits), Rule 1 (General Requirements) with respect to portable equipment unless exempt under Rule 2-1-105 (Exemption, Registered Statewide Portable Equipment); BAAQMD Regulation 8 (Organic Compounds), Rule 3 (Architectural Coatings); and BAAQMD Regulation 8 (Organic Compounds), Rule 15 (Emulsified and Liquid Asphalts).

In summary, the annualized GHG emissions from construction of the Project would not conflict with the goals of AB 32.

4.2 Construction and Long-Term Operational GHGs

As introduced above, long-term operational GHG emissions associated with the Project include indirect emissions from mobile sources (motor vehicle trips), emissions from natural gas combustion used in non-residential buildings, emissions from electricity use in non-residential buildings (grid electricity), emissions from water conveyance and waste water treatment and conveyance, and emissions from area sources. Emissions from each of these sources, in addition to the construction-related emissions discussed above, are reported in **Tables 2** and **3**, below.

Unadjusted Operational GHG Emissions

"Unadjusted Operational GHG Emissions" of the Project do not factor in the Project's design features, applicable City SCAs (including TDM), and regulatory requirements that are considered part of the Project and that reduced the Project's GHG emissions; it is essentially a "business as usual" approach. Unadjusted emissions do, however, assume the same Project assumptions and inputs used to estimate the Project's baseline emissions, below. The unadjusted emissions are considered to demonstrate the emissions reductions that are attributable to measures incorporated as part of the Project. As shown in **Table 2**, the total unadjusted annual GHG emissions generated by the Project is approximately 8,197 MT CO_2e per year at Phase 1 and 15,772 MT CO_2e per year at Project Buildout.

TABLE 2

UNADJUSTED OPERATIONAL GHG EMISSIONS INVENTORY FROM THE PROPOSED PROJECT

	Total Annual CO_2e Emissions (metric tons per year)	
	Phase 1 Total CO_2e	**Project Buildout [a] Total CO_2e**
Emission Source		
Motor vehicle trips (no TDM)	4,570	9,143
Natural gas	734	1,749
Grid Electricity	2,538	3,966
Water Conveyance	11	20
Wastewater Treatment & Conveyance	12	22
Solid Waste	280	758
Area Source (landscape maintenance)	0.24	0.24
Total Unadjusted Operational Project GHG Emissions without Construction Emissions	**8,145**	**15,658**
Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9)	**52**	**114**
Total Unadjusted Operational Project GHG Emissions with Construction Emissions	**8,197**	**15,772**
Total Unadjusted Operational Project GHG Emissions by Service Population	**5.7[b]**	**4.8[b]**

[a] Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components
[b] Total emissions divided by service population of 1,423 net new employees for the Project at Phase 1, and 3,233 net new employees for the Project at Buildout.

SOURCE: ESA, 2010

Assumptions and Estimated Baseline Adjusted Operational GHG Emissions, by Source

- Mobile Source (Motor Vehicle) Emissions. The Proposed Project consists of high-density commercial development located within walking distance of public transportation, designed to minimize the use and impacts of private automobiles. The Project mobile source emissions would result from the typical daily operation of motor vehicles by employees, customers and vendors. Vehicle trip generation from the Proposed Project is based on information from the transportation analysis in Table IV.L-9 of the DEIR. The Proposed Project would result in a net increase of 7,966 standard vehicle trips per day over existing conditions without the preliminary 10 percent TDM reduction, and 7,169 standard vehicle trips per day over existing conditions with the assumed preliminary 10 percent TDM trip reduction. Emissions for vehicle trips were calculated using the URBEMIS2007 computer model and the BGM of the BAAQMD. Trip generation rates of the BGM were adjusted to reflect the Project-specific vehicle trip generation presented in the DEIR. The calculation used the model default vehicle trip lengths specific to urban areas of Alameda County in the San Francisco Bay Area Air Basin.

BGM calculates the CO_2, CH_4 and N_2O emissions from motor vehicle trips based on trip generation and trip lengths and other data in the URBEMIS model. BGM uses CH_4 and N_2O emission factors from CCAR and multiplies them by their respective global warming potential (GWP) to convert them to CO_2e. BGM also takes into account emissions reductions that would result from the implementation of Pavley greenhouse gas standards and the LCFS. The resulting total Project mobile source emissions are estimated to be approximately **8,359 MT CO_2e per year** *without the preliminary 10 percent TDM reduction* and **7,515 MT CO_2e per year** *with the preliminary 10 percent TDM reduction***.**

- Project Natural Gas Combustion Emissions. GHG emission estimates from natural gas were calculated using the BGM of BAAQMD. The Project-related natural gas GHG emissions are estimated to be 1,749 MT CO_2e per year. GHG emissions from existing buildings to be demolished represent 371 MT CO_2e per year. The net increase in GHG emissions from natural gas resulting from the Proposed Project are estimated to be **1,632 MT CO_2e per year**.

- Indirect Project Electrical GHG Emissions. Non-residential buildings require electricity for space and water heating, air conditioning, lighting, and plug-in outlets. The amount of energy used (and the amount of associated GHG emissions emitted) per dwelling unit would vary with the type of residential building.

  GHGs are indirectly emitted as a result of electrical service required for a Proposed Project. GHGs are emitted during the generation of electricity from fossil fuels. When electricity is used in a building, a portion of the electricity is typically generated off site at a power plant, while the remaining percentages are generated by renewable resources such as hydroelectric dams. The relative percentages of renewable and non-renewable resources vary from year-to-year based on the magnitude of available water flows at hydroelectric dams and other source variables. Currently, electricity provided by the standard PG&E grid invariably represents indirect emissions of GHGs from the combustion of fossil fuels. PG&E maintains annual records on the percentage of electricity from renewable and non-renewable resources and, using this data, calculates an average annual emission factor (CO_2e emission rate per kilowatt of electricity generated) for its sources.

  BGM was not used to calculate GHG emissions because it uses statewide composite emission factors that cannot be adjusted in the model. Because PG&E would be the electrical provider for the Proposed Project and because PG&E calculates its own emission factors based on its percentage of renewable energy within its portfolio.

  For the Project inventory, all indirect electricity emission factors are drawn from the most recent PG&E's calculation of a 5-year rolling average and have been adjusted to incorporate its fluctuating Renewable Portfolio Standard. The PG&E emission factor is provided in terms of CO_2e and does not separate out the individual contribution of CH_4 and N_2O. While fossil fuel combustion generates CH_4 and N_2O, the emissions of these GHGs typically comprise less than one percent of total CO_2e emissions.

  Project electrical GHG emissions were calculated based on energy demand estimates for commercial buildings contained in the California Energy Commission's latest *California Energy*

Demand Staff Report adopted in December 2009. The Proposed Project will construct the buildings to 2010 CALGreen standards that will become mandatory by 2011. To achieve CALGreen Tier I energy efficiency, buildings must achieve 15 percent beyond Title 24, part 6. For the inventory these standards were applied to the Proposed Project and a 15 percent reduction in energy demand was incorporated into the calculation of GHG emissions from grid electricity. The resulting energy demand was then converted to GHG emissions by using the appropriate emission factors discussed above. To determine the net increase resulting from the Project, the GHG emissions from existing structures to be demolished were subtracted from Project emissions. The resulting net Project-related electrical GHG emissions are estimated to **3,099 MT CO_2e per year**.

- Water and Wastewater Treatment and Conveyance. The Project GHG inventory includes emissions associated with drinking water and wastewater supply and treatment. In general, the majority of these emissions are indirect emissions associated with the energy used to convey, treat, and distribute water and wastewater. Additional emissions from wastewater treatment include CH_4 and N_2O, which are emitted directly from wastewater treatment processes.

  The amount of electricity required to treat and supply water is a function of water use. According to Section 4.M, Utilities and Service Systems, of the DEIR, the Project would generate a net water demand of 119,000 gallons per day (gpd) after accounting for existing uses in the buildings to be demolished. Implementation of the proposed CALGreen standard would reduce water demand by an additional 20 percent (projected).

  Three main processes are required to supply potable water to residential and commercial users: (1) supply and conveyance of the water from the source; (2) treatment of the water to potable standards; and (3) distribution of the water to individual users. Indirect emissions resulting from electricity use were determined by multiplying electricity use by California statewide CO_2, CH_4 and N_2O emission factors from CCAR's General Reporting Protocol. Statewide emission factors are used rather than local PG&E factors to reflect the fact that drinking water from the local water utility (EBMUD) is pumped from a variety of sources including primarily the Mokelumne River watershed in the eastern Sierras and therefore has the potential to be pumped through the jurisdictions of electricity providers other than PG&E.

  Energy use for the various aspects of water treatment (e.g., source water pumping and conveyance, water treatment, distribution to users) was determined using the stated water demand and energy intensity values from the CEC that are also recommended for use by BAAQMD in its latest proposed Air Quality Guidelines.

  Emissions associated with wastewater treatment include indirect emissions associated with powering the treatment process and direct emissions from degradation of organic material in the wastewater, which are biogenic in nature and not considered as part of the Project's GHG inventory. Wastewater discharge from the Proposed Project is estimated in Section 4.M, Utilities and Service Systems, of the EIR, to be 105,500 mgd. Implementation of the proposed CALGreen standard would reduce water demand by an additional 20 percent. In total, all municipal of water and wastewater treatment and conveyance for the Project is expected to produce **39 MT CO_2e**

annually: approximately **15 MT CO_2e per year** attributable to water conveyance and approximately **24 MT CO_2e per year** attributable to wastewater treatment and conveyance.

- Solid Waste. The updated BAAQMD Air Quality Guidelines now specifically identifies emissions from solid waste as an element to be included in a GHG inventory for comparison to their proposed GHG significance thresholds. For solid waste, BGM uses the emission factors compiled by CALrecycle to estimate GHG emissions. For office uses the factor used is one of the highest and is from an unverifiable source in a Ventura County EIR This analysis used the user override function to apply an office land use waste generation use rate of 1.999 pounds per 1,000 square feet per year. This rate is consistent with what was in the EIR and is also from Cal recycle.

  BGM uses a two step process. In the first step, BGM estimates the amount of solid waste that the project will generate based on solid waste generation rates compiled by Calrecycle (formerly the California Integrated Waste Management Board). In the second step, BGM estimates the GHG emissions associated with that solid waste.

  The solid waste GHG emissions include two components: truck hauling emissions and emissions resulting from the decomposition of solid waste. Truck hauling emissions use the vehicle miles traveled (VMT) estimates described in Step 1 and multiply them by EMFAC2007 emission rates for heavy heavy-duty trucks. An EMFAC2007 modeling run was used to estimate CO2 and CH4 emissions in grams per mile for trucks traveling at an average speed of 35 mph. Truck emissions also account for the Low Carbon Fuels Rule For this Project, BGM was adjusted to assume that solid waste was assumed to be disposed of a Altamont Landfill for a round trip distance of 75 miles.

  BGM uses the U.S. EPA WARM Model emission rates for mixed solid waste decomposition. Those rates equal 3.1 metric tons of CO2e per short ton of solid waste that is land filled, assuming no recovery, 0.64 tons CO2e per short ton, assuming land filled waste with flaring, and 0.3 tons CO2e per short ton, assuming land filled waste with energy recovery. For the Project, the scenario with landfill recovery was assumed, as Altamont landfill implements landfill gas (LFG) recovery and energy conversion, including running some of its vehicles on collected LFG. BGM calculates the net increase in GHG emissions from the increase in solid waste generation of the Proposed Project to be **462 MT CO_2e per year**.

- Area Sources. Area source emissions stem from hearths (including gas fireplaces, wood-burning fireplaces, and wood-burning stoves) and small mobile fuel combustion sources such as lawnmowers and other landscape maintenance equipment. For commercial development with no hearth facilities, such as the Proposed Project, area source emissions of GHG would be entirely due to landscape maintenance equipment.

  For the Proposed Project, the URBEMIS model indicates practically no quantifiable change in GHG emissions from landscape equipment compared to the existing uses to be demolished. The net increase of area source emissions in the Project GHG inventory is approximately **0.24 MT CO_2e per year**.

Estimated Adjusted Total Baseline Operational GHG Emissions

"Baseline Operational GHG Emissions" of the Project factor in all the emissions reduction components described in Section 3.0, which are part of the Project: the Project design features, applicable City SCAs (including TDM, but excluding SCA GHG-1), and regulatory requirements. Although a TDM Plan for the Project (required by SCA TRANS-1) has not yet been prepared, generally, TDM could reduce SOV trips for a large office project near located near transit by about 10 to 20percent. Baseline emissions are reported with and without a preliminary (and conservative) 10 percent TDM trip reduction assumption.

TABLE 3
BASELINE OPERATIONAL GHG EMISSIONS INVENTORY
FROM THE PROPOSED PROJECT

	Annual CO_2e Emissions (metric tons per year)	
	Phase 1 Total CO_2e	**Project Buildout [a] Total CO_2e**
Emission Source		
Motor vehicle trips without TDM / with TDM [a]	4,190 / 3,771	8,359 / 7,515
Natural gas	682	1,632
Grid Electricity	1,995	3,099
Water Conveyance	8	15
Wastewater Treatment & Conveyance	13	24
Solid Waste	170	462
Area Source (landscape maintenance)	0.24	0.24
Total Baseline Operational Project GHG Emissions without TDM / with TDM, without Construction Emissions	**7,058 / 6,639**	**13,591 / 12,747**
Construction Emissions per Year (annualized over 40 years) (see Table IV.B-9)	**52**	**114**
Total Baseline Operational Project GHG Emissions without TDM / with TDM, with Construction Emissions	**7,110 / 6,691**	**13,705 / 12,861**
BAAQMD Threshold of Significance	1,100	1,100
Exceeds Threshold?	*Yes*	*Yes*
Total Operational Project GHG Emissions by Service Population without TDM / with TDM	**5.0 / 4.7 [c]**	**4.2 / 3.9 [d]**
BAAQMD Threshold of Significance	4.6	4.6
Exceeds Threshold?	*Yes*	*No*
Impact Determination	**Significant**	**Less than Significant [e]**

a Project Buildout includes Phase 1 (South Tower) and Phase 2 (North Tower) and all other Project components
b Assumes preliminary 10 percent TDM reduction of vehicle trips.
c Total emissions divided by service population of 1,423 net new employees for Phase I of the Project.
d Total emissions divided by service population of 3,233 net new employees for the Project at Buildout.
e For projects that meet the City's definition of a "very large project," the City requires the Project applicant to prepare a GHG Reduction Plan as a Standard Condition of Approval, even though no CEQA impact is identified.

SOURCE: ESA, 2010

The total annual baseline GHG emissions generated by the Project not assuming the preliminary 10 percent TDM reduction is approximately 13,705 MT CO2e per year, including

construction emissions. See Table 3, which shows emissions for Phase 1 and Buildout (Phase 1 and Phase 2). The table reveals that the majority of annual Project emissions results from vehicle use (62 percent), followed by electrical demand (23 percent). As a result, the Project would generate GHG emissions of approximately **4.2 MT CO_2e per year per capita of service population**, which is the total annual GHG emissions divided by the Project's estimated total service population of 3,233 net new employees.[6]

The total annual baseline GHG emissions generated by the Project *assuming the preliminary 10 percent TDM reduction* is approximately **12,861 MT CO_2e per year**, exclusive of one-time construction emissions for which BAAQMD has specifically not proposed a threshold of significance. See Table 3. The majority of the annual Project emissions would continue to result from vehicle use (59 percent), followed by electrical demand (24 percent). Total Project GHG emissions would be approximately **3.9 MT CO_2e per year per capita of service population**.

Comparison of Unadjusted and Baseline Emissions

The difference in the baseline and unadjusted GHG emissions of the Project generally demonstrate the extent of emissions reduction that is attributable to measures incorporated with the Project.

At Phase 1, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (7,110 MT CO_2e shown in Table IV.B-11), is approximately 1,087 MT CO_2e per year less than the Project's estimated unadjusted Phase 1 emissions (8,197 MT CO_2e shown in IV.B-10). This is a reduction of approximately 13 percent. The most substantial reductions are associated with motor vehicle emissions (approximately 380 MT CO_2e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 543 MT CO_2e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards, as discussed in the assumptions, above).

At Buildout, the total annual GHG emissions generated by the Project, *assuming no TDM reduction* (13,705 MT CO_2e shown in Table IV.B-11), is approximately 2,067 MT CO_2e per year less than the Project's estimated unadjusted emissions (15,772 MT CO_2e shown in IV.B-10). This is a reduction of approximately 13 percent (as with Phase 1). Again, the most substantial reductions are associated with motor vehicle emissions (approximately 784 MT CO_2e per year less than the unadjusted emissions, based primarily on implementation of Pavley GHG standards and the LCFS since no TDM is assumed) and indirect electricity emissions (approximately 867 MT CO_2e per year less than the unadjusted emissions, which do not consider the Project's adherence to CALGreen standards).

[6] Total Service Population is calculated as the sum of additional net new residents (zero) and 3,233 net new employees associated with the Project.

Impacts of Baseline Operational GHG Emissions

Based on the project-level significance thresholds, the Project would have a significant impact on the environment if it would produce total emissions of more than 1,100 metric tons of CO_2e annually *and* more than 4.6 metric tons of CO_2e per service population annually, or conflict with an applicable plan, policy, or regulation adopted for the purposes of reducing greenhouse gas emissions.

Impact at Phase 1

For Phase 1, as shown in Table IV. B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 7,110 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold. Also, the Project's 5.0 MT CO_2e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 6,691 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold, and the 4.7 MT CO_2e per year per capita of service population exceeds the 4.6 MT CO per year threshold. Therefore, the Project would have a significant cumulative GHG impact in Phase 1 because its emissions would exceed both the 1,100 MT CO_2e per year threshold *and* the 4.6 MT CO_2e per year service population threshold.

Impact at Total Buildout

At Buildout, as shown in Table IV.B-11, the Project's total annual GHG emissions *not assuming the preliminary 10 percent TDM reduction* is approximately 13,705 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold. However, the Project's 4.2 MT CO_2e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Similarly, *assuming the preliminary 10 percent TDM reduction*, the Project's total annual GHG emissions is approximately 12,861 MT CO_2e, which exceeds the 1,100 MT CO_2e per year threshold, but the 3.9 MT CO_2e per year per capita of service population does not exceed the 4.6 MT CO per year threshold. Therefore, at Buildout, the Project would not have a significant cumulative GHG impact because it would not exceed the 4.6 MT CO_2e per year service population threshold, even though it would exceed the 1,100 MT CO_2e per year threshold.

5.0 Alternatives GHG Emissions Inventory and Impacts

This section presents the relative operational GHG emissions and resulting impacts for Alternative 1 (South Tower Build Only) and Alternative 2 (Onsite Maximum Reduced Impacts). Table 4 summarizes the relative emissions and impacts of the two alternatives and the Proposed Project. The emissions inventory for Alternatives 1 and 2 are presented below in Tables 4 and 5, respectively.

TABLE 4
COMPARISON OF OPERATIONAL GHG EMISSIONS AND IMPACTS FOR THE PROPOSED PROJECT AND ALTERNATIVES

	Annual CO2e Emissions (metric tons per year)		
	Proposed Project	**Alternative 1 (South Tower Build Only)**	**Alternative 2 (Onsite Maximum Reduced**
Total Operational GHG Emissions (without TDM / with TDM) [a]	13,591 / 12,747	7,110 / 6,691	2,554 / 2,304
Exceeds BAAQMD 1,100 MT CO_2e threshold?	*Yes*	*Yes*	*Yes*
Total Operational GHG Emissions by Service Population (without TDM / with TDM)	4.2 / 3.9 [b]	5.0 / 4.7 [c]	3.9 / 3.5 [d]
Exceeds 4.6 MT CO_2e per Service Population threshold?	*No*	***Yes***	*No*
IMPACT DETERMINATION	Less than Significant	**Significant**	Less than Significant
Total Construction GHG Emissions	4,542	2,081	2,081
Annualized Construction Emissions	114 over 40 years	52 over 40 years	52 over 40 years

[a] Assumes preliminary 10 percent TDM reduction of vehicle trips and annualized construction emissions.
[b] Total emissions divided by service population of 3,233 net new employees for the Project at Buildout.
[c] Total emissions divided by service population 1,423 net new employees for Phase I of the Project.
[d] Total emissions divided by service population 647 net new employees for the reduced Project.

5.1 Alternative 1 (South Tower Build Only)

GHG Emissions for Alternative 1 were calculated similarly to those for the Proposed Project, with a few differences:

- Emissions from increased electricity demand for water and wastewater treatment and conveyance were calculated based on the prorated reduction of square feet of development (approximately 56 percent) compared to the Proposed Project. Existing uses to be demolished under this alternative would be 22,000 square feet, reduced from 280,000 square feet to be demolished under the Project.

- Since this Alternative would be completed earlier (2015) than the Proposed Project (2019), the effect of the Pavley GHG Standards (AB 1493) on mobile emissions would not be as great since fewer Pavley-compliant models would part of the vehicle fleet .

The detailed emissions inventory for Alternative 1 (which is the same as Phase 1 of the Proposed Project) is show in Table 3. As shown in Tables 3 and 4, the total annual GHG emissions generated from Alternative 1, including the design features related to energy use and transit, is approximately **7,110 MT CO_2e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 13,705 MT CO_2e for the Proposed Project). The majority of estimated GHG emissions for Alternative 1 results from vehicle use (59 percent), followed by electrical demand (28 percent), similar to sources for the Proposed Project. The total operational emissions for Alternative 1 exceeds the 1,100 MT CO_2e per year threshold. Alternative 1 emissions *assuming the preliminary 10 percent TDM reduction* would total approximately 6,694 MT CO_2e per year, which would still exceed the 1,100 MT CO_2e per year threshold.

As also shown in Tables 3 and 4, the resulting emissions estimate for the proposed Alternative 1 on an annual per capita service population basis is **5.0 MT CO_2e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 4.2 MT CO_2e for the Proposed Project). This was calculated by dividing total emissions (7,110 MT CO_2e) by the service population associated with this Alternative 1, which would only build the South Tower (1,423 net new employees).[7] This service population-based estimate for Alternative 1 exceeds the 4.6 MT CO_2e per year service population threshold, which is not exceed under the Proposed Project. Alternative 1 emissions *assuming the preliminary 10 percent TDM reduction* on an annual per capita service population basis would be **4.7 MT CO_2e per year,** which would still exceed the 4.6 MT CO_2e per year service population.

A project that exceeds **both** thresholds is considered a significant impact. Thus, Alternative 1 would result in a significant cumulative GHG impact under the BAAQMD thresholds.

5.2 Alternative 2 (On-Site Maximum Reduced Impacts)

- GHG Emissions for Alternative 2 were calculated similarly to those for the Proposed Project, with the following differences: Emissions from increased electricity demand for water and wastewater treatment and conveyance were calculated based on the prorated reduction of square feet of development (approximately 80 percent) compared to the Proposed Project.

- Existing uses would be demolished.

As shown in Tables 4 and 5, the total annual GHG emissions generated from Alternative 2 including the design features related to energy use and transit is approximately **2,554 MT CO_2e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 13,705 MT CO_2e for the Proposed Project). The majority of GHG emissions for Alternative 2 results from vehicle use (83 percent), followed by natural gas demand (11 percent), which is a notably higher portion from vehicle use and a lower portion from natural gas, compared to the Proposed Project and to Alternative 1. The total operational emissions for Alternative 2 exceed the proposed bright-line 1,100 MT CO_2e per year threshold. Alternative 2 emissions *assuming the preliminary 10 percent TDM reduction* would total approximately **2,304 MT CO_2e per year**, which would still exceed the 1,100 MT CO_2e per year threshold.

As also shown in Table 5, the resulting emissions estimate for the proposed Alternative 2 on an annual service population basis is **3.9 MT CO_2e per year** *not assuming the preliminary 10 percent TDM reduction* (compared to 4.2 MT CO_2e for the Proposed Project). This was calculated by dividing total emissions (2,554 MT CO_2e) by the service population associated with this Alternative (647 net new employees). This service population-based estimate for Alternative 2 is below the 3.9 MT CO_2e per year service population threshold. Alternative 2 emissions *assuming the preliminary 10 percent TDM*

[7] Alternative 1 results in a greater service population than the Proposed Project given the relatively lower ratio of employees to total emissions.

reduction on an annual per capita service population basis would be **3.5 MT CO_2e per year,** which is further below the 4.6 MT CO_2e per year service population.

Like the Proposed Project (and Alternative 1), Alternative 2 exceeds the 1,100 MT CO_2e per year threshold, and like the Proposed Project (at Buildout) it is below the service population threshold . Therefore, Alternative 2 would result in a less-than-significant cumulative GHG impact under the BAAQMD thresholds.

TABLE 5

OPERATIONAL GHG EMISSIONS INVENTORY FROM

ALTERNATIVE 2 (ON-SITE MAXIMUM REDUCED IMPACTS)

	Annual CO_2e Emissions (metric tons per year)
	Total CO_2e
Emission Source	
Motor vehicle trips without TDM / with TDM [a]	2,078 / 1,870
Natural gas	274
Grid Electricity	71
Water Conveyance	4
Wastewater Treatment & Conveyance	6
Solid Waste	69
Area Source (landscape maintenance)	0.24
Total Baseline Operational Project GHG Emissions without TDM / with TDM (no Construction Emissions_	2,502 / 2,252
Construction Emissions per Year Annualized over 40 years	52
Total Baseline Operational Project GHG Emissions without TDM / with TDM	**2,554 / 2,304**
BAAQMD Threshold of Significance	1,100
Exceeds Threshold?	*Yes*
Total Operational Project GHG Emissions by Service Population without TDM / with TDM	**3.9 / 3.5** [b]
BAAQMD Threshold of Significance	4.6
Exceeds Threshold?	*No*
Does Project Meet "Very Large Project" Definition?	*No*
IMPACT DETERMINATION	**Less than Significant**

[a] Assumes preliminary 10 percent TDM reduction of vehicle trips and annualized construction emissions.

[b] Total emissions divided by service population 647 net new employees for the reduced Project.

SOURCE: ESA, 2010

PART B: Available GHG Reduction Measures

In preparing this preliminary GHG Reduction Plan, ESA consulted multiple sources including the State of California’s Climate Change Scoping Plan (December 2008), the State Attorney General’s web site, the California Air Pollution Control Officer Association’s (CAPCOA) white paper on CEQA and Climate Change (January 2008), Reference Guides on Leadership in Energy and Environmental Design (LEED) published by the US Green Building Council, and BAAQMD’s CEQA Air Quality Guidelines. ESA identified and assessed the feasibility of emission reduction measures from these various sources to identify “additional” measures for potential implementation during development and operation of the Project This analysis presents a best-professional effort to identify available reduction strategies and does not assume to be exhaustive in its scope.

6.0 GHG Reduction Measures Identified in the Climate Change Scoping Plan of the California Air Resources Board

Table IV.B-8 of the DEIR presented the 39 Recommended Actions (qualitative measures) identified to date by CARB’s Scoping Plan. Of the 39 measures identified, those considered to have potential application to the Proposed Project are primarily related to transportation, electricity and natural gas use and green building design. Each of these measures is evaluated below, by source-type, for its applicability to the Proposed Project, its emission reduction potential, and for its inclusion in the Proposed Project as currently designed.

6.1 Transportation

CARB’s Scoping Plan identifies nine transportation-related recommended actions. **Action T-1** concerns improvements to light-duty vehicle technology for the purposes of reducing GHG emissions (Pavley Standards). This action focuses on legislating improved controls for vehicle manufacturers and would not generally be considered applicable to the Proposed Project. However, it is reasonably anticipated that vehicles utilized by the Proposed Project would be subject to the new Pavley regulation. BGM took into account emissions reductions that would result from the implementation of the Pavley Standards, therefore this action does not represent additional mitigation available to the City and Project applicant.

Action T-2 concerns implementation of a LCFS. To reduce the carbon intensity of transportation fuels, CARB is developing a LCFS, which would reduce the carbon intensity of California's transportation fuels by at least ten percent by 2020 as called for by Governor Schwarzenegger in Executive Order S-01-07. LCFS will incorporate compliance mechanisms that provide flexibility to fuel providers in how they meet the requirements to reduce GHG emissions. Implementation of such a standard is not within the purview of a development project and this action does not represent additional mitigation available to the City and Project applicant. BGM took into account emissions reductions that would result from the implementation of the LCFS.

Action T-3 addressees regional transportation targets for reducing GHG emissions. SB 375 requires CARB to develop, in consultation with MPOs, passenger vehicle GHG emissions reduction targets for

2020 and 2035 by September 30, 2010. It sets forth a collaborative process to establish these targets, including the appointment by CARB of a Regional Targets Advisory Committee to recommend factors to be considered and methodologies for setting GHG emissions reduction targets. SB 375 also provides incentives – relief from certain CEQA requirements for development projects that are consistent with regional plans that achieve the targets. While no targets have been set pursuant to SB 375 and the Sustainable Community Strategy for the region will likely not be adopted prior to 2012, the Proposed Project will be required to implement TDM measures which reduce VMT as a Standard Condition of Approval. Although there are presently no details as to what specific measures would and what would not be included in the TDM Plan, a preliminary estimated 10 percent vehicle trip reduction was accounted for in the Project inventory reported in Table 3. As such, TDM measures represent a potential available means of further reducing GHG emissions from the Project.

Action T-4 is concerned with vehicle efficiency measures. The California Integrated Waste Management Board (CIWMB) with various partners continues to conduct a public awareness campaign to promote sustainable tire practices. CARB is pursuing a regulation to ensure that tires are properly inflated when vehicles are serviced. Because the Proposed Project would not involve the operation of fleet vehicles, this action does not represent additional mitigation available to the City and Project applicant.

Actions T-5 and T-6 addresses electrification of ships at ports and port operations and is not applicable to the Proposed Project. Therefore, this action does not represent additional mitigation available to the City and Project applicant.

Action T-7 requires addresses existing trucks/trailers to be retrofitted with the best available technology and/or CARB-approved technology. This action does not represent additional mitigation available to the City and Project applicant.

Action T-8 focuses on hybridization of medium- and heavy-duty vehicles. The implementation approach to Action T-8 is to adopt a regulation and/or incentive program that reduces GHG emissions by encouraging hybrid technology as applied to vocational applications that have significant urban, stop-and-go driving, idling, and power take-off operations in their duty cycle. Such applications include parcel delivery trucks and vans. This action does not represent additional mitigation available to the City and Project applicant.

Action T-9 concerns implementation of a high speed rail (HSR) system. This action does not represent additional mitigation available to the City and Project applicant.

6.2 Electricity and Natural Gas

Action E-1, together **with Action GB-1** (Green Building), aims to reduce electricity demand by increased efficiency of Utility Energy Programs and adoption of more stringent building and appliance standards. Elements of this action include encouraging construction of zero net energy (ZNE) buildings and implementation of passive solar design. In addition to employing on-site electricity generation, a ZNE building must either replace natural gas with renewable energy for space and water heating, or compensate for natural gas use by generating surplus electricity for sale on the state's electricity grid. The Project proposes to construct the proposed towers consistent with the updated CALGreen building code standards which will become effective in January 2011. Compliance with CALGreen standards was accounted for in the inventory presented in Table 3. The intent of compliance with CALGreen standards is generally consistent with the objectives of Action E-1 and GB-1. However, the Proposed Project does not currently include any form of on-site electricity generation. Consequently, on-site power generation represents a potential additional mitigation measure .

Action E-2 encourages an increase in the use of combined heat and power (CHP) use, or co-generation, facilities. California has supported CHP for many years, but market and other barriers continue to keep CHP from reaching its full market potential. Increasing the deployment of efficient CHP will require a multi-pronged approach that includes addressing significant barriers and instituting incentives or mandates where appropriate. Co-generation would not be applicable to the Project site as it would require a constant need for steam that is absent. This action does not represent additional mitigation available to the City and Project applicant.

Action E-3 concerns Renewable Portfolio Standards for utilities and does not apply to development projects. Therefore, the Proposed Project would not conflict with the recommended measure.

Action E-4 strives to promote solar generated electricity. As discussed with respect to Action E-1, the proposed Project does not currently include any form of on-site electricity generation. Consequently, on-site power generation represents a potential additional mitigation measure.

7.0 GHG Reduction Measures Identified in the California Air Pollution Control Officers Association (CAPCOA) CEQA and Climate Change Guidance Document

Proposed project design elements and mitigation measures may be compared to the list of 64 project-specific mitigation measures developed by the CAPCOA in their document *CEQA and Climate Change*.[8] **Table 7** presents an itemized list of each of the project-specific mitigation measures identified in the CAPCOA document and correlates them to any existing or Proposed Project elements. Mitigation measures which are not proposed by the project or identified as a Standard Condition of Approval or Mitigation Measure in the DEIR are then identified as potential GHG reduction measures if they are deemed applicable to the type of project proposed. The State Attorney General has also published a list of various "measures that may reduce the global warming related impacts of a project."[9] These measures are generally included in CAPCOA's more extensive listing of GHG mitigations and are not repeated.

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8 California Air Pollution Control Officers Association, *CAPCOA White Paper - CEQA and Climate Change. CAPCOA*, 2008, http://www.capcoa.org/ceqa/CAPCOA%20White%20Paper%20-%20CEQA%20and%20Climate%20Change.pdf, accessed on October 23, 2008.

9 California Department of Justice, Attorney General Edmund G. Brown Jr., *The California Environmental Quality Act Addressing Global Warming Impacts at the Local Agency Level*, December 9, 2008, http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf, accessed on July 1, 2009.

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
MM T-1	Bike parking	1-5 percent for MM T-1, MM T-2, and MM T-3	Yes Municipal Code Chapter 17.117 requires new development to provide both short-term (i.e., bicycle racks) and long-term bicycle parking (i.e., lockers or indoor storage) for bicycles per SCA TRANS 2 the applicant shall submit for review and approval of the Planning and Zoning Division, plans that show bicycle storage and parking facilities to accommodate 75 short-term bicycle parking spaces onsite or on public sidewalk, and 136 long-term bicycle parking spaces
MM T-2	End of trip facilities (i.e., showers and lockers)		Yes – Showers (20) and lockers (80) to be installed for office uses per Table 4.L-18 of the DEIR.
MM T-3	Bike parking (residential)		Not Applicable –No Residential component.
MM T-4	Proximity to bike path/bike lanes		Yes – per DEIR Transportation Section, Class I, II and III bike routes exist in the area.
MM T-5	Pedestrian network	1 percent – 10 percent	Yes – per DEIR Transportation Section, Pedestrian facilities include sidewalks, crosswalks, and pedestrian signals. Sidewalks are provided on all of the existing roadways in the study area.
MM T-6	Pedestrian barriers minimized		
MM T-7	Bus Shelter for Existing/Planned Transit Service	1 percent – 2 percent	Yes – per DEIR Transportation Section, the Project would install AC Transit shelters at two relocated stops on 20th Street.
MM T-8	Traffic Calming	1 percent - 10 percent	Not applicable to commercial office building located in an urban area.
MM T-9	Paid Parking	1 percent – 30 percent	**This could be a consideration of the TDM Plan and as such represents a potential additional mitigation measure**.
MM T-10	Minimum Parking	1 percent – 30 percent	Yes -The Proposed Project would have a parking demand deficit of 238 spaces per the Transportation Section of the DEIR.
MM T-11	Parking Reduction beyond Code/Shared Parking	1 percent – 3- percent	Not Applicable -The Municipal Code specifies the Project is not required to provide any off-street parking because of its location in a C-55 / S-17 zoning district. However, the Proposed Project would have a parking demand deficit of 238 spaces per the Transportation Section of the DEIR.
MM T-12	Pedestrian pathway through parking	1 percent - 4 percent	Not Applicable. The project includes subterranean parking levels which would not be an impediment to pedestrian travel.
MM T-13	Off Street Parking	1 percent – 4 percent	Yes - Design of the Proposed Project provides for off street parking.
MM T-14	Parking Area Tree Cover (50 percent cover in ten years)	3.1 kg/m^3 of canopy	Not Applicable. The project includes subterranean parking levels which would not be exposed to sunlight.
MM T-15	Valet Bicycle Parking	Low	Not Applicable – project is not an event center.
MM T-16	Garage Bicycle Storage	Low	Not Applicable – Project is not residential.
MM T-17	Preferential Parking for EVs/CNG Vehicles	Low	Yes – This required by CALGreen section 5.106.5.2.

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
MM T-18	Reduced/No Parking Fee for EVs/CNG Vehicles	Low	**No –This measure represents a potential additional mitigation measure.**
MM T-19	TMA Membership	1 percent – 28 percent	Yes - Project will prepare aTDM implementation as SCA TRANS-1, however, details of the TDM Plan are not established and no GHG reduction estimate from implementation of the TDM Plan was considered in the inventory. **Consequently, this measure represents a means by which further GHG emission reductions may be realized.**
MM T-20	Use or provide ULEV	Low	Not Applicable – No applicant vehicle fleet that can feasibly operate on hybrid or electric power.
MM T-21	Flex Fuel Vehicles	Low	Not Applicable – No applicant vehicle fleet.
MM D-1	Office/ Mixed Use Density	0.05 percent – 2 percent	Yes – Project provides office and retail use proximate to transit with bicycle and pedestrian access.
MM D-2	Orientation to Existing/Planned Mass Transit	0.4 percent – 1 percent	Yes – DEIR Transportation Section states that the site is located approximately 0.25 mile of the 19th Street BART station. AC Transit provides bus service to the project site.
MM D-3	Services Operational – for Employees	0.5 percent – 5 percent	Yes - Operational features include retail space restaurants and a fitness center.
MM D-4	Residential Density	1 percent – 40 percent	Not Applicable – Project is not residential.
MM D-5	Street Grid	1 percent	Not Applicable to non-residential projects.
MM D-6	Neighborhood Electric Vehicle Access	0.5 percent – 1.5 percent	Not Applicable to non-residential project.
MM D-7	Affordable Housing Component	0.4 percent – 6 percent	Not Applicable – Project is not residential.
MM D-8	Recharging Area	Low	Not Applicable – Project is not residential.
MM D-9	Urban Mixed Use Development	3 percent - 9 percent	Yes - Development predominantly characterized office and retail uses that are combined in two buildings on a single site in an integrated development project with functional interrelationships.
MM D-10	Suburban Mixed Use Development	3 percent	Not Applicable – Project is urban not suburban (see MM D-9)
MM D-11	Other Mixed Use Development	1 percent	Not Applicable to non-residential project.
MM D-12	Infill Development	3 percent - 30 percent	Not Applicable – Project is not located on a vacant infill site, brownfield or greyfield.
MM D-13	Electric Lawnmower Provided to Residents	1 percent	Not Applicable – Project is not Residential.
MM D-14	Enhanced Recycling	Low	Construction : Yes – DEIR Project Description states that the Project Applicant proposes to establish a construction debris recycling program throughout demolition and construction of the project which would assume 50 percent materials recycled or reused. Concrete materials, in particular, not needed for the Proposed Project would be hauled from the site for recycled material reuse.

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
			Operation: -No. In terms of operational elements, while the City has adopted a zero-waste resolution there are no operational project recycling goals**. Operational recycling goals represent a potential additional mitigation measure**
MM D-15	LEED Certification	Moderate	Partially – The Proposed Project will be designed to CALGreen standards. These standards require a reduction over existing Title 24 energy standards as well as water demand reductions. CALGreen standards do not contain specificity with regard to measures or building techniques to be implemented. **Therefore, LEED certification and its corresponding measures represent a potential for further GHG reductions.**
MM D-16	Retro-Commissioning: Building systems perform interactively to optimize energy performance	8 percent – 10 percent	**No –This measure represents a potential additional mitigation measure. However it may be a technique to achieve CALGreen standards proposed by the Project.**
MM D-17	Drought tolerant Landscaping and shade trees	Low	Partially – shade trees are proposed for 20th, 21st and Webster Streets. There is no speifcity regarding landscaping. **Consequently drought-tolerant landscaping represents potential additional mitigation measure**.
MM D-18	Local Farmers Market	Low	Not Applicable to retail/office project.
MM D-19	Community Gardens	Low	Not Applicable to retail/office project.
MM E-1	High-Efficiency Pumps	Low	**No –This measure represents a potential additional mitigation measure.**
MM E-2	Wood Burning Fireplaces/Stoves	Low	Not Applicable to retail/office project.
MM E-3	Natural Gas Stove	Low	Not Applicable to retail/office project.
MM E-4	Energy Star Roof	0.5 percent – 1 percent	**No –This measure represents a potential additional mitigation measure.**
MM E-5	On-Site Renewable Energy System	1 percent – 3 percent	**No –This measure represents a potential additional mitigation measure.**
MM E-6	Exceed Title 24	1 percent	Yes – CALGreen standards require exceeding existing Title 24 requirements by 15%.
MM E-7	Solar Orientation	Low	Not feasible for high rise towers – This measure cannot be implemented for high rise towers because by design they require exposure from all directions to maximize natural light and view shed**.**
MM E-8	Non-roof Surfaces - Provide light-colored pavement for at least 30 percent of the site's non-roof impervious surfaces, including parking lots, walkways, plazas, OR place a minimum of 50 percent of parking spaces underground or covered by structured parking	Low	Yes – Non-roof surfaces would be landscaped gardens. Parking areas would be subterranean.

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
MM E-9	Low-energy Cooling (Separate ventilation and Cooling systems)	1 percent – 10 percent	**No –This measure represents a potential additional mitigation measure.**
MM E-10	Install Vegetated Green Roof	1 percent	**No –However, this measure would compete for roof space with Measures E-4 and E-5 and would be unrealistic for a high-rise building and is not suggested as an additional mitigation measure.**
MM E-11	Charging Facilities	Low	**No –This measure represents a potential additional mitigation measure.**
MM E-12	Light-colored Paving	Low	Not applicable to a high rise commercial building with subterranean parking.
MM E-13	Cool Roof	Low	**No –However, MM E-4 requires Energy Star roofs which are low emissivity materials[10]. This measure does not represent an additional mitigation measure with implementation of MM E-4.**
MM E-14	Solar Water Heaters	20 percent – 70 percent	Not applicable for institutional complex with central boiler.
MM E-15	Electric Yard Equipment Compatibility	Low	**No –This measure represents a potential additional mitigation measure.**
MM E-16	Energy Efficient Appliance Standards	Low	Not Applicable to retail/office project.
MM E-17	Green Building Materials	Low	**No –This measure represents a potential additional mitigation measure.**
MM E-18	Shading Mechanisms for windows, patio and walkway overhangs	Low	**No –This measure represents a potential additional mitigation measure.**
MM E-19	Ceiling/whole-house fans	Low	Not Applicable to retail/office project.
MM E-20	Programmable Thermostats	Low	**No –This measure represents a potential additional mitigation measure.**
MM E-21	Passive Heating and Cooling Systems	Low	Not applicable for high rise towers. High rise towers would be exposed to summer sunlight in all directions and would require more tan just a passive cooling system. Similar considerations or winter heating based on concrete and steel substructure necessary for high-rise towers.
MM E-22	Day Lighting Systems	Low	Not applicable – High rise towers are designed to receive sunlight from all directions. CAPCOA indicates that this measure has “little benefit in multi-floor buildings”. .
MM E-23	Low- Water Use Appliances	Low	Yes – This measure would be a requirement of CALGreen Standards.
MM E-24	Goods Transport by Rail	Moderate	Not Applicable to retail/office project.
MM S-1	Emissions Reduction Education	Low	**No –This measure represents a potential additional mitigation measure.**
MM S-2	School Curriculum	Low	Not Applicable to retail/office project.

10 http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_emissivity

TABLE 7
CAPCOA-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
MM M-1	Off-Site Mitigation Fee Program	Moderate	The BAAQMD does not have a fee mitigation program for GHG. CARB's cap and trade program is not scheduled for launch until 2012. CAPCOA identifies this measure as not logistically feasible at present.
MM M-2	Offset Purchase	Low	Not Applicable (As noted above, CARB is developing a cap and trade program but it is not scheduled for launch until 2012). CAPCOA identifies this measure as not logistically feasible at present.

SOURCE: CAPCOA, 2009.

8.0 GHG Reduction Measures Identified in the Bay Area Air Quality Management District (BAAQMD) Proposed CEQA Air Quality Guidelines

The BAAQMD's CEQA Air Quality Guidelines contains tables of mitigation measures to reduce operational-related emissions of GHG's from mobile, area and stationary sources in Section 4.3 of the document. These measures include reduction estimates applicable to each measure. **Table 8** presents an itemized list of each of the project-specific mitigation measures identified in by BAAQMD and correlates them to any existing or Proposed Project elements. Mitigation measures which are not proposed by the project or identified as a Standard Condition of Approval or Mitigation Measure in the DEIR are then identified as potential GHG reduction measures if they are deemed applicable to the type of project proposed.

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
1	Mix of Uses	-3 percent – 9 percent	Yes, residential within ½ mile
2	Local Serving Retail within ½ mile of Project	2 percent	Yes
3	Transit Service	0 percent – 15 percent	Yes – DEIR Transportation Section states that the site is located approximately 0.25 mile of the 19th Street BART station. AC Transit provides bus service to the project site.
4	Bike & Pedestrian	0 percent - 9 percent	Yes – per DEIR Transportation Section, Class I, II and III bike routes exist in the area.
5	Affordable Housing	0 percent – 4 percent	Not Applicable to retail/office project.`

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
6	Daily Parking Charge	0 percent – 25 percent	**This could be a consideration of the TDM Plan and as such represents a potential additional mitigation measure**.
7	Parking Cash-out. California law requires certain employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space	0 percent – 12.5 percent	**No –This measure represents a potential additional mitigation measure.**
8	Free Transit Passes	25 percent of transit service reduction	**No –This measure represents a potential additional mitigation measure.**
9	Employee Telecommuting Program	1 percent – 100 percent	Not feasible for a commercial building where tenants are not yet identified.
10-12	Compressed Work Schedule	1 percent – 40 percent	Not feasible for a commercial building with multiple tenants that are not yet identified.
13	Secure Bike Parking	3 or more elements = 1percent; 5 or more = 2 percent reduction	Yes bicycles per SCA TRANS 2 the applicant shall submit for review and approval of the Planning and Zoning Division, plans that show bicycle storage and parking facilities to accommodate 75 short-term bicycle parking spaces onsite or on public sidewalk, and 136 long-term bicycle parking spaces
14	Showers/Changing facilities provided		Yes – Showers (20) and lockers (80) to be installed for office uses per Table 4.L-18 of the DEIR.
15	Guaranteed Ride Home Program provided		Yes – Alameda County has this program available to all employers and employees in the County
16	Car sharing services provided		**No –This measure represents a potential additional mitigation measure.**
17	Information provided on transportation alternatives		**No –This measure represents a potential additional mitigation measure.**
18	Dedicated employee transportation coordinator		**No –This measure represents a potential additional mitigation measure.**
19	Carpool matching program		**No –This measure represents a potential additional mitigation measure.**
20	Preferential carpool/vanpool parking		**No –This measure represents a potential additional mitigation measure.**
21	Parking supply	0-50 percent	Yes -The Proposed Project would have a parking deficit of 416 spaces per the Transportation Section of the DEIR.
22	On Road trucks	URBEMIS determination	Not Applicable to retail/office project
23	Increase energy efficiency beyond Title 24	Equal to percentage increase beyond Title 24	Yes – CALGreen standards require exceeding existing Title 24 requirements by 15%.
24	Electrically powered landscape equipment and electrical outlets	Equivalent to URBEMIS estimated emissions	**No –This measure represents a potential additional mitigation measure.**

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
26	Plant shade trees within 40 feet of the south side or within 60 feet of the west sides of properties	30 percent	Yes – shade trees are proposed for 20th, 21st and Webster Streets.
27	Require cool roof materials	34 percent	**No –However, MM E-4 requires Energy Star roofs which are low emissivity materials[11]. This measure does not represent an additional mitigation measure with implementation of MM E-4.**
28	Install green roofs	1 percent	**No –However, this measure would compete for roof space with Measures E-4 and E-5 and would be unrealistic for a high-rise building and is not suggested as an additional mitigation measure.**
29	Require smart meters and programmable thermostats	10 percent	**Installation of Smart Meters would not reduce GHG emissions. Installation of programmable thermostats is addressed in CAPCOA Measure E-20.**
30	Meet GBC standards in all new construction	3 percent – 17 percent	Yes. Buildings will be built to CALGreen standards.
32	Install solar water heaters	70 percent	Not Applicable to retail/office project.`
33	Install tankless water heaters	35 percent	Not Applicable to retail/office project.`
34	Install solar panels on residential and commercial buildings	100 percent	**No –However, CAPCOA MM E-5 discusses solar energy systems. This measure does not represent an additional mitigation measure with implementation of MM E-5.**
35	100% increase in diversity of land use mix	5 percent	Not Applicable to retail/office project.`
36	Jobs/housing balance	Trip reduction as determined by traffic consultant	Trip generation estimates considered households and employment for the Study area. Not a true mitigation measure, given the project location is not changeable.
37	100% increase in design (i.e., presence of design guidelines for transit oriented development, complete street standards	3 percent	Yes – per DEIR Transportation Section, the Project would relocate two AC Transit stops on 20th Street and add shelter. The site is located approximately 0.5 mile of the 19th Street BART station. AC Transit provides bus service to the project site
38	100% increase in density	5 percent	Yes – Per DEIR Project Description, project will increase total useable floor area on the project site by 92 percent.
39	HVAC duct sealing	30 percent	Yes -this measure is required by section 5.504.3 of the CALGreen mandatory standards for commercial buildings.
40	Provide necessary infrastructure and treatment to allow use of 50% greywater;/recycled water in residential and commercial uses for outdoor irrigation	6 percent	**No – However, per DEIR Utilities section pp. IV.M-10, , EBMUD has stated that recycled water service is not recommended for the type of project proposed .**

[11] http://www.energystar.gov/index.cfm?c=roof_prods.pr_roof_emissivity

TABLE 8
BAAQMD-IDENTIFIED GHG MITIGATION MEASURES

Mitigation Measure	Description	Reduction Estimate	Existing or proposed by the project?
41	Complete streets	1percent – 5 percent	Not Applicable to retail/office project
42	Maximize interior daylight	None Given	Not applicable – High rise towers are designed to receive sunlight from all directions. CAPCOA indicates that this measure has “little benefit in multi-floor buildings”. .
43	Increase roof/ceiling insulation	None Given	**No –This measure represents a potential additional mitigation measure. However it may be a technique to achieve CALGreen standards proposed by the Project.**
45	Install rainwater collection systems in commercial buildings	None Given	**No –This measure represents a potential additional mitigation measure.**
46	Install low-water use appliances and fixtures	None Given	Yes –CALGreen standards would require low flow, water efficient fixtures
47	Restrict the use of water for cleaning outdoor surfaces/prohibit systems that apply water to non-vegetated surfaces	None Given	**No –This measure represents a potential additional mitigation measure.**
48	Implement water-sensitive urban design practices in new construction	None Given	**No –This measure represents a potential additional mitigation measure. However it may be a technique to achieve CALGreen standards proposed by the Project.**
50	Create food waste and green waste curb-side collection service	None Given	Not Applicable to retail/office project
51	Require provision of storage areas for recyclables and green waste in new construction	None Given	**No –This measure represents a potential additional mitigation measure.**

9.0 Summary of Additional GHG Reduction Measures Considered for the Proposed Project

The following Table 9 summarizes the available additional GHG reduction measures identified in Sections 6.0 through 8.0 above. These listed were indentified as those not already assumed as part of the Project and that could be considered for implementation development and operation of the Project to further increase energy efficiency and reduce GHG emissions from the Project to the greatest extent practical and feasible. As previously indicated, available and feasible reduction measures would not be limited to those listed in Table 9; given the evolving nature of GHG emissions reduction strategies and technologies, there is some uncertainty involved with the identification and effectiveness of available GHG reduction measures. Further, additional measures may because feasible (or less so) as the Project is developed in greater detail. Overall, a “comprehensive set of quantified additional GHG reduction measures available to further reduce GHG emissions beyond the adjusted GHG emissions" that may include but not be limited to a combination of the available measures in Table 9 would constitute a GHG Emissions Reduction Plan for the Project.

A preliminary estimate of emissions reductions is presented for some measures. For others a quantifiable emission reduction cannot be reasonably estimated given the available details of the Project or are insubstantial because the emissions would be minimal. However, these measures are still identified for possible implementation by the Project (as the GHG Emissions Reduction Plan) to ensure emissions reduction to the greatest extent feasible below the BAAQMD CEQA Thresholds of Significance (1,100 metric tons of CO2e per year and 4.6 metric tons of CO2e per year per service population), pursuant to Mitigation Measure AIR-3 and Standard Condition of Approval GHG-1 identified in the EIR for the Project..

Following Table 9 is an individual assessment of the feasibility, applicability and GHG emissions reduction potential of each of these additional reduction measures identified.

TABLE 9

ADDITIONAL GHG REDUCTION MEASURES IDENTIFIED FOR POTENTIAL IMPLEMENTATION BY THE PROPOSED PROJECT

Mitigation Measure	Description	CO_2e Emissions Reduction Estimate Range
CAPCOA MM T-9	Paid Parking[a]	1 percent – 30 percent
CAPCOA MM T-18	Reduced/No Parking Fee for EVs/CNG Vehicles	Low
CAPCOA MM T-19	TMA Membership[a]	1 percent – 28 percent
CAPCOA MM D-14	Enhanced Recycling	Low
CAPCOA MM D-15	LEED Certification[b]	Moderate
CAPCOA MM D-16	Retro-Commissioning	8 percent – 10 percent
CAPCOA MM D-17	Drought-tolerant Landscaping	Low
CAPCOA MM E-1	High-Efficiency Pumps	Low
CAPCOA MM E-4	Energy Star Roof	0.5 percent – 1 percent
CAPCOA MM E-5	On-Site Renewable Energy System	1 percent – 3 percent
CAPCOA MM E-9	Low energy Cooling	1 percent – 10 percent
CAPCOA MM E-11	Charging Facilities	Low
CAPCOA MM E-15	Electric Yard Equipment Compatibility	Low
CAPCOA MM E-17	Green Building Materials	Low
CAPCOA MM E-18	Shading Mechanisms for windows, patio and walkway overhangs	Low
CAPCOA MM E-20	Programmable Thermostats	Low
CAPCOA MM S-1	Emissions Reduction Education	Low
CAPCOA MM M-2	Offset Purchase	Up to 100 percent
BAAQMD MM 6	Daily Parking Charge [a,c]	0 percent - 25 percent
BAAQMD MM 7	Parking Cash-out. California law requires certain employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space [a]	0 percent – 12.5 percent
BAAQMD MM 8	Free Transit Passes [a]	25 percent of transit service reduction
BAAQMD MM 16	Car sharing services provided [a]	1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together
BAAQMD MM 17	Information Provided on Transportation Alternatives [a]	1 percent additional mobile source reduction with implementation of these 5 additional TDM Measures together
BAAQMD MM 18	Dedicated Employee Transportation Coordinator [a]	
BAAQMD MM 19	Carpool Matching Program [a]	
BAAQMD MM 20	Preferential Carpool/Vanpool Parking [a]	
BAAQMD MM 24	Electrically powered landscape equipment and electrical outlets	Equivalent to URBEMIS estimated emissions

Mitigation Measure	Description	CO_2e Emissions Reduction Estimate Range
BAAQMD MM 43	Increase Roof/Ceiling Insulation	BAAQMD provides no emissions reduction range
BAAQMD MM 45	Install rainwater collection systems in commercial buildings	BAAQMD provides no emissions reduction range
BAAQMD MM 47	Restrict the use of water for cleaning outdoor surfaces/prohibit systems that apply water to non-vegetated surfaces	BAAQMD provides no emissions reduction range
BAAQMD MM 48	Implement water-sensitive Urban Design Practices in New Construction	BAAQMD provides no emissions reduction range
BAAQMD MM 51	Require the Provision of storage areas for recyclables and green waste in new construction	BAAQMD provides no emissions reduction range

[a] To be estimated with SCA TRANS-1, which requires preparation of a TDM incorporating a variety of measures aimed at reducing SOV trips generated by the Project.

[b] While LEED certification is not being proposed for the Project, Voluntary Tier CALGreen standards may be identified.

[c] Addressed In CAPCOA Measure T-9.

SOURCE: ESA, 2010

9.1 **CAPCOA Mitigation Measure T-9: Paid Parking.** This measure would provide an employee and/or customer paid parking system. Project must have a permanent and enforceable method of maintaining user fees for all parking facilities. The facility may not provide customer or employee validations. Daily charge for parking must be equal to or greater than the cost of a transit pass plus 20 percent. This measure would reduce trip generation and could be a component of the required TDM Plan. The estimated reduction of trip generation (and associated GHG emissions) is best determined by the traffic consultant preparing the TDM Plan. BAAQMD estimates an employee trip reduction benefit of 0 to 25 percent with this measure.

9.2 **CAPCOA Mitigation Measure T-18: Reduced Parking Fee for EV/CNG Vehicles.** This measure would reward and encourage the use of low GHG emission vehicles. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in transportation-related emissions can reliably be estimated.

9.3 **CAPCOA Mitigation Measure T-19: TDM Membership.** This measure would require permanent TMA membership and funding requirement. Funding to be provided by Community Facilities District or County Service Area or other non-revocable funding mechanism. TDMs have been shown to reduce employee vehicle trips up to 28 percent with the largest reductions achieved through parking pricing and transit passes. The impact depends on the travel alternatives. These trip reductions will be detailed in the TDM Plan to be prepared for the Project (pursuant to SCA TRANS-1), and the resulting vehicle trip and related GHG emissions reductions will be calculated.

9.4 CAPCOA Mitigation Measure D-14: Enhanced Recycling. This measure would provide infrastructure/education that promotes the avoidance of products with excessive packaging, recycle, buying of refills, separating of food and yard waste for composting, and using rechargeable batteries. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.

9.5 CAPCOA Mitigation Measure D-15: LEED Certification. The Proposed Project will be designed to the CALGreen building standards which when adopted on January of 2011. While LEED certification is not being proposed for the Project towers, they nonetheless are proposed to be built to CALGreen standards. For the purpose of meaningful GHG emissions reduction calculations, CALGreen standards for commercial buildings would result in 15 percent less energy demand and 20 percent reduced water demand than a standard building built to 2008 Title 24 standards. Therefore, for the purpose of estimating an emissions inventory, CALGreen is equivalent to a LEED “silver” rating in terms of meaningful emissions reductions. CALGreen is assumed in the adjusted baseline emissions for the Project reported in the Project’s baseline emissions discussed previously. More aggressive LEED certification (“gold” or “platinum”) would further increase efficiency and further reduce GHG emissions.

9.6 CAPCOA Mitigation Measure E-5: On-site Renewable Energy System. This measure would provide onsite renewable energy system(s). Nonpolluting and renewable energy potential includes solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, projects may take advantage of net metering with the local utility. Of these strategies, the most common for commercial building applications in an urban environment would be solar. The effectiveness of a solar energy system for the Proposed Project would be restricted by the available roof space and the need for other ancillary equipment on the rooftop.

With regard to feasibility of this measure, it should be noted that in a March 30, 2010 press release, Kaiser Permanente announced its intention to install 15 megawatts of solar power systems[12] on its hospitals, medical offices and other buildings at 15 locations in California. Kaiser estimates that installation of solar power systems will provide for 10 percent of electricity demand for its buildings at each location. Lowering this reduction goal to 5 percent to account for rooftop space limits the estimate of the potential GHG reductions resulting if such a measure was implemented for the Proposed Project, a potential reduction of 176 MT/year of CO_2e would be possible.

9.7 CAPCOA Mitigation Measure E-9: Low Energy Cooling. This measure would require the Project to optimize the buildings thermal distribution by separating ventilation and

[12] http://xnet.kp.org/newscenter/pressreleases/nat/2010/033010solarpower.html

thermal conditioning systems. CAPCOA estimates a 1 to 10 percent reduction in energy demand through implementation of this measure. Applying the lower end of this estimated reduction goal as an estimate of the potential GHG reductions if such a measure was to be implemented for the proposed Project, a potential reduction of 35.3 MT/year of CO_2e would be possible

9.8 CAPCOA Mitigation Measure E-11: Charging Facilities. This measure would require the Project to install electric vehicle charging facilities. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.

9.9 .CAPCOA Mitigation Measure E-15: Electric Yard Equipment Compatibility. This measure would require provision of electrical outlets at building exterior areas. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.

9.10 CAPCOA Mitigation Measure E-17: Green Building Materials. This measure would require the Project to use materials which are resource efficient, recycled, with long life-cycles and manufactured in an environmentally friendly way. This measure addresses lifecycle GHG emissions which are not a consideration relative to CEQA. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions would be applicable to the Project inventory.

9.11 CAPCOA Mitigation Measure E-18: Shading Mechanisms for Windows, Patios and Walkway Overhangs. This measure would require installation of energy-reducing shading mechanisms for windows, porch, patio and walkway overhangs. CAPCOA cites an estimate the savings of this measure to be $450 per year. Based on a commercial electrical rate of 0.18 dollars per kw-hr represents approximately 2,500 kw-hr per year or about 0.6 MT/year of CO_2e.

9.12 CAPCOA Mitigation Measure E-20 Programmable Thermostats. This measure would require the Project to install energy-reducing programmable thermostats that automatically adjust temperature settings. CAPCOA cites an estimate the savings of this measure to be $100 per year. Based on a commercial electrical rate of 0.18 dollars per kw-hr represents approximately 556 kw-hr per year or about 0.13 MT/year of CO_2e.

9.13 CAPCOA Mitigation Measure S-1: Emission reductions Education. This measure would require the Project to provide businesses with guidance/protocols/information on how to reduce GHG emissions. CAPCOA indicates that this measure has a low reduction score and does not quantify any emissions reduction related to this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions can reliably be estimated.

9.14 CAPCOA Mitigation Measure M-2: Offset Purchase. This analysis considers Offset Purchase (CAPCOA Mitigation Measures M-2) to be a potentially feasible measure, despite CAPCOA's indication that it is "logistically feasible at present", given that Phase 1 of the Project would not be operational until approximately 2016, and Phase 2 or Project Buildout could be up to an additional several years after that (approximately 2-3 years assumed in this analysis), and given the potential for implementation of this measure to have a "Moderate/High" reduction estimate.

There is recognized uncertain in the current state of carbon markets (including the availability and pricing of offsets) in the U.S. With a federal climate bill languishing in the Senate, and emerging political challenges to AB 32 it is difficult at best to characterize supply and demand in yet-to-be-created carbon market, and even more difficult to predict the price of emissions allocations or offsets. A national cap and trade system, where buyers and sellers determine a market price for allocations and offsets, is still a possibility at the national level, and has a strong likelihood of developing in California (through AB 32) and other Western states (through the Western Climate Initiative). Currently in California, buyers purchase offsets either to reduce their carbon footprint voluntarily, or as a "pre-compliance" strategy with the hope that they can use them in a future cap-and-trade system. Prices have remained relatively low over the past year or two due to the sluggish economy and the policy uncertainty. They are certain to rise significantly if and when federal, regional, and/or state cap-and-trade becomes a reality.

The AB 32 Scoping Plan identifies cap-and-trade as a key strategy for helping California reduce its GHG emissions, but ARB still has not yet indicated how the system will work. Consistent with AB 32, ARB must adopt the cap-and-trade regulation by January 1, 2011, and the program itself must begin in 2012. At the time of this writing it is not known how such a system would distribute allocations to those who fall under the cap, and how offsets could be used to reduce emissions against the cap. It is also unclear whether ARB will operate their own cap-and-trade program or contract the program to a third party, and if the program will link to external registries of approved carbon offset credits.

Despite the various uncertainties, several registries of carbon reduction projects (representing carbon credits) have emerged in the United States in recent years. These registries facilitate and give legitimacy to carbon credit tracking and trading. One of the leading registries, the Climate Action Reserve (CAR), is expected to serve as a source of regulatory offsets under the future California program. CAR is a spin-off program of the California Climate Action Registry (CCAR) which was created by California state legislation in 2001 and has been closely involved with ARB throughout the AB 32 implementation process, including the development of its reporting rule, verification scheme, and many sector accounting protocols. CAR is also recognized in the Kerry-Boxer and Waxman-Markey climate bills as eligible for providing offset credits to the federal cap-and-trade system. CAR is respected as a national project registry that sets standards, accredits verifiers, and registers and tracks projects using sophisticated software to serialize and transfer emission reduction credits. In 2009, CAR transactions accounted for the majority of the US offset market value, and CAR Climate Reserve Tons (CRTs) usually command a premium over the general voluntary offset market.

Newly enacted CEQA Guidelines Section 15126.4 (c), adopted March 18, 2010 expressly provides for this as mitigation to reduce GHG emissions.

9.15 BAAQMD Mitigation Measure 6: Daily Parking Charge. This measure would require parking fees for all employees to discourage daily vehicle trips and promote use of transit These will be detailed in the TDM Plan for the Project., and the resulting vehicle trip and related GHG emissions reductions will be calculated. Employee trips represent 35 percent of trip generation based on URBEMIS2007 data for office buildings.

9.16 BAAQMD Mitigation Measure 7: Parking Cash-out. This measure would require employers who provide subsidized parking for their employees to offer a cash subsidy to employees who do not drive, in lieu of a parking space. This measure would reduce employee trips only, not visitor trips. BAAQMD estimates an employee trip reduction benefit of 0 to 12.5 percent with this measure. Employee trips represent 35 percent of trip generation based on URBEMIS2007 data for office building. Assuming an average of 6 percent reduction in employee trips, implementation of this measure would reduce Phase 1 emissions by 192 MT/year of CO_2e .

Employee trips represent 7 percent of MOB trip generation based on URBEMIS2007 data for medical office buildings. Assuming an average of 6 percent reduction in employee trips, implementation of this measure would reduce remaining future phase emissions by 21.1 MT/year of CO_2e .

9.17 BAAQMD Mitigation Measure 8: Free Transit Passes. This measure would require employers to provide free transit passes to employees. BAAQMD estimates that this measure would result in a further 25 percent of the existing transit service reduction Thirty percent of employees take BART or buses to the Project site, according to the DEIR Transportation section. A 25 percent increase in this rate would result in 37.5 percent of employees taking transit. Given the Proposed Project results in 3,233 total employees with the Project. The additional 7.5 percent increase in employee transit ridership resulting from this measure would remove approximately 242 employees from daily vehicle trips to work. Assuming each employee who drives to work generates 2.5 vehicle trips per day, this measure would remove approximately 605 vehicle trips per day. Based on URBEMIS2007 emission rates, this trip reduction would reduce GHG emissions by 695 MT/year of CO_2e.

9.18 BAAQMD Mitigation Measure 16: Car Sharing Services Provided. BAAQMD identifies this measure along with a menu of seven other TDM measures as reducing GHG emissions synergistically as a group. The degree of benefit estimated, depends on the number of TDM measures included from the menu. As this measure and the following four measures (BAAQMD 17 -20) of the of the total eight TDM measures on the menu that are not already identified as in operation, the potential GHG reduction benefits for these measures are considered together. Together, these five additional TDM measures were assumed to result in an additional 1 percent reduction, or about 91.4 MT/year of CO_2e.

9.19 BAAQMD Mitigation Measure 17: Information Provided on Transportation Alternatives. See BAAQMD Measure 16 for discussion on reductions from this TDM measure.

9.20 BAAQMD Mitigation Measure 18: Dedicated Employee Transportation Coordinator. See BAAQMD Measure 16 for discussion on reductions from this TDM measure.

9.21 BAAQMD Mitigation Measure 19: Carpool Matching Program. See BAAQMD Measure 16 for discussion on reductions from this TDM measure.

9.22 BAAQMD Mitigation Measure 20: Preferential Carpool/Vanpool Parking. See BAAQMD Measure 16 for discussion on reductions from this TDM measure.

9.23 BAAQMD Mitigation Measure 24: Electrically Powered Landscape Equipment. BAAQMD identifies this measure as reducing GHG emissions associated with operation of landscape maintenance equipment. This measure is similar to CAPCOA measure E-15 above. If we assume that this measure results in no landscape equipment emissions as calculated in the Projects emissions inventory in Table 3, then implementation of this measure would reduce emissions by 0.24 MT/year of CO_2e.

9.24 BAAQMD Mitigation Measure 34: Install Solar Panels on Residential and Commercial Buildings. This measure is addressed relative to CAPCOA Mitigation Measure E-5 above.

9.25 BAAQMD Mitigation Measure 44:Increase Roof/Ceiling Insulation. This measure is likely to be implemented to achieve the 15 percent energy reduction target recommended by CALGreen standards. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.

9.26 BAAQMD Mitigation Measure 45: Rainwater Collection Systems in Commercial Buildings. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.

9.27 BAAQMD Mitigation Measure 47: Restrict Use of Water for Cleaning Outdoor Surfaces. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.

9.28 BAAQMD Mitigation Measure 48: Implement Water-sensitive Urban Design Practices in New Construction. This measure is likely to be implemented by as a required element of CALGreen commercial building standards. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.

9.29 BAAQMD Mitigation Measure 51: Require Provision of Storage Areas for Recyclables and Green Waste in New Construction. BAAQMD does not cite a reduction efficiency associated with this measure. Consequently, this measure is suggested to be implemented but no quantifiable reduction in GHG emissions is estimated.

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GHG EMISSIONS DATA

PROJECT CONSTRUCTION EMISSIONS PHASE 1

	EMISSIONS in tons			
2012 Construction Emissions	**CO2**	**CH4**	**N2O**	
	269 (from URBEMIS)			
				1051

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO2	10.15	kg CO2/gal
	0.00058	kg CH4/gal
	0.00026	kg N2O/gal

So for Mobile sources…	CH4 emission =	5.71E-05	percent of CO2 Emissions
	N2O emissions =	2.56E-05	percent of CO2 Emissions

Total Construction emissions in tons =

	CO2	CH4	N2O	Total GHG
	269.00	0.02	0.01	269.02
Total construction emissions as eCO2 in tons =				
	269.00	0.32	2.14	271.46
Total construction Emissions as eCO2 on Metric tons =				
	244.03	**0.29**	**1.94**	**246.26**

EMISSIONS in tons

2013 Construction Emissions		**CO2**	**CH4**	**N2O**	
		808 (from URBEMIS)			
From CCAR GPR 3.1 (2009)	Table C-6				
Diesel emission of CO2		10.15 kg CO2/gal			
		0.00058 kg CH4/gal			
		0.00026 kg N2O/gal			
So for Mobile sources…	CH4 emission =	5.71E-05 percent of CO2 Emissions			
	N2O emissions =	2.56E-05 percent of CO2 Emissions			
	Total Construction emissions in tons =				
		CO2	**CH4**	**N2O**	**Total GHG**
		808.00	0.05	0.02	808.07
	Total construction emissions as eCO2 in tons =				
		808.00	0.97	6.42	815.39
	Total construction Emissions as eCO2 on Metric tons =				
		733.00	**0.88**	**5.82**	**739.70**

		EMISSIONS in tons		
2014 Construction Emissions		**CO2**	**CH4**	**N2O**
		827 (from URBEMIS)		
From CCAR GPR 3.1 (2009)	Table C-6			
Diesel emission of CO2		10.15 kg CO2/gal		
		0.00058 kg CH4/gal		

0.00026 kg N_2O/gal

So for Mobile sources…	CH_4 emission =	5.71E-05	percent of CO_2 Emissions
	N_2O emissions =	2.56E-05	percent of CO_2 Emissions

Total Construction emissions in tons =

	CO2	CH4	N2O	Total GHG
	827.00	0.05	0.02	827.07
Total construction emissions as eCO2 in tons =				
	827.00	0.99	6.57	834.56
Total construction Emissions as eCO2 on Metric tons =				
	750.24	**0.90**	**5.96**	**757.10**

EMISSIONS in tons

2015 Construction Emissions	**CO2**	**CH4**	**N2O**
	369 (from URBEMIS)		

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO_2 10.15 kg CO_2/gal

0.00058 kg CH_4/gal

0.00026 kg N_2O/gal

So for Mobile sources…	CH_4 emission =	5.71E-05	percent of CO_2 Emissions
	N_2O emissions =	2.56E-05	percent of CO_2 Emissions

Total Construction emissions in tons =

	CO2	CH4	N2O	Total GHG
	369.00	0.02	0.01	369.03
Total construction emissions as eCO2 in tons =	369.00	0.44	2.93	372.37
Total construction Emissions as eCO2 on Metric tons =	**334.75**	**0.40**	**2.66**	**337.81**

PROJECT CONSTRUCTION EMISSIONS PHASE 2

	EMISSIONS in tons			
2015 Construction Emissions	**CO2**	**CH4**	**N2O**	
	123 (from URBEMIS)			
				1051

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO2	10.15	kg CO2/gal
	0.00058	kg CH4/gal
	0.00026	kg N2O/gal

So for Mobile sources…	CH4 emission =	5.71E-05	percent of CO2 Emissions
	N2O emissions =	2.56E-05	percent of CO2 Emissions

Total Construction emissions in tons =

CO2	CH4	N2O	Total GHG
123.00	0.01	0.00	123.01

Total construction emissions as eCO2 in tons =

123.00	0.15	0.98	124.12

Total construction Emissions as eCO2 on Metric tons =

111.58	**0.13**	**0.89**	**112.60**

EMISSIONS in tons

2016 Construction Emissions	**CO2**	**CH4**	**N2O**	
	1051 (from URBEMIS)			

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO2	10.15	kg CO2/gal
	0.00058	kg CH4/gal
	0.00026	kg N2O/gal

So for Mobile sources…	CH4 emission =	5.71E-05	percent of CO2 Emissions
	N2O emissions =	2.56E-05	percent of CO2 Emissions

Total Construction emissions in tons =				
	CO2	**CH4**	**N2O**	**Total GHG**
	1051.00	0.06	0.03	1051.09
Total construction emissions as eCO2 in tons =				
	1051.00	1.26	8.35	1060.61
Total construction Emissions as eCO2 on Metric tons =				
	953.45	**1.14**	**7.57**	**962.16**

	EMISSIONS in tons		
2017 Construction Emissions	**CO2**	**CH4**	**N2O**
	1045 (from URBEMIS)		

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO2	10.15	kg CO2/gal
	0.00058	kg CH4/gal

0.00026 kg N_2O/gal

So for Mobile sources…	CH_4 emission =	5.71E-05	percent of CO_2 Emissions
	N_2O emissions =	2.56E-05	percent of CO_2 Emissions

Total Construction emissions in tons =

	CO2	CH4	N2O	Total GHG
	1045.00	0.06	0.03	1045.09
Total construction emissions as eCO2 in tons =				
	1045.00	1.25	8.30	1054.55
Total construction Emissions as eCO2 on Metric tons =				
	948.00	**1.14**	**7.53**	**956.67**

2018 Construction Emissions

EMISSIONS in tons

CO2	CH4	N2O
470 (from URBEMIS)		

From CCAR GPR 3.1 (2009) Table C-6

Diesel emission of CO_2	10.15	kg CO_2/gal
	0.00058	kg CH_4/gal
	0.00026	kg N_2O/gal

So for Mobile sources…	CH_4 emission =	5.71E-05	percent of CO_2 Emissions
	N_2O emissions =	2.56E-05	percent of CO_2 Emissions

Total Construction emissions in tons =

	CO2	CH4	N2O	Total GHG
	470.00	0.03	0.01	470.04
Total construction emissions as eCO2 in tons =				
	470.00	0.56	3.73	474.30
Total construction Emissions as eCO2 on Metric tons =				
	426.37	**0.51**	**3.39**	**430.27**

Total Project Construction = **4635.04**
2012-2018

PROJECT MOBILE WITHOUT TDM EMISSIONS

Mitigated Transportation

	Project	Baseline	Project-Baseline
Target Year:	2020	2011	
Operational Vehicles from URBEMIS (CO2 tons/year):	11,045.74	0.00	
Metric Ton Adjustment (CO2 metric tons/year):	10,023.36	0.00	
Pavley Regulation Adjustment (CO2 metric tons/year):	8,557.04	0.00	
US EPA Adjustment (CO2e metric tons/year):	9,007.41	0.00	
Low Carbon Fuels Adjustment (CO2e metric tons/year):	8,358.87	0.00	
Total (CO2e metric tons/year):			**8,358.87**

PROJECT MOBILE WITH TDM

Mitigated Transportation

Target Year:	2020	2011	
	Project	Baseline	Project-Baseline
Operational Vehicles from URBEMIS (CO2 tons/year):	9,930.20	0.00	
Metric Ton Adjustment (CO2 metric tons/year):	9,011.07	0.00	
Pavley Regulation Adjustment (CO2 metric tons/year):	7,692.84	0.00	
US EPA Adjustment (CO2e metric tons/year):	8,097.72	0.00	
Low Carbon Fuels Adjustment (CO2e metric tons/year):	7,514.69	0.00	
Total (CO2e metric tons/year):			**7,514.69**

Mitigated Natural Gas			
	Project	Baseline	Project-Baseline
CO2 metric tons/year:	680.702	0.000	
CH4 metric tons/year:	0.064	0.000	
N2O metric tons/year:	0.001	0.000	
CO2e metric tons/year:	682.446	0.000	
CO2e metric tons/year:			**682.45**


NINE COUNTY JURISDICTION OF THE BAAQMD
Climate Zone 4
Napa
Sonoma
Solano
Contra Costa
SF
Climate Zone 5
San Mateo
Alameda
Santa Clara

Project Climate Zone Location: ○ Zone 4 ◉ Zone 5

Mitigated Area Source

	Project	Baseline	Project-Baseline
Landscaping Emissions from URBEMIS (CO_2 metric tons/year):	0.227	0.000	
Hearth Emissions from URBEMIS (CO_2 metric tons/year):	0.000	0.000	
Wood Burning Fireplaces (N_2O metric tons/year):	0.000	0.000	
Natural Gas Fireplaces (N_2O metric tons/year):	0.000	0.000	
Wood Burning Stoves (CH_4 metric tons/year):	0.000	0.000	
Natural Gas Fireplaces (CH_4 metric tons/year):	0.000	0.000	
Total (CO_2e metric tons/year):	0.227	0.000	
Total (CO_2e metric tons/year):			**0.227**

	Project	Mitigated Solid Waste Baseline	Project - Baseline
Truck Haul CO2 (metric tons/year):	11.03	0.00	
Truck Haul CH4 (metric tons/year):	0.0001	0.0000	
Truck Haul CO2e (metric tons/year):	11.04	0.00	
Landfill Offgasing (CO2e metric tons/year):	395.80	0.00	
Total Solid Waste (CO2e metric tons/year):	406.84	0.00	
Total Solid Waste (CO2e metric tons/year):			**406.84**

***** Select Mitigation Measures on the Mitigation Tab ===>** Mitigation

Baseline Landfill disposal option:

Select 1 of 3 options

- ○ Landfilling only
- ● Landfilling with Flaring to Burn Methane
- ○ Landfilling with Energy Recovery

Greenhouse Gas (GHG) Emissions

Indirect Greenhouse Gas (GHG) Emissions from Proposed Plan

Electricity (Power Plant Emissions)

Estimated Proposed Plan Annual Electrical Use:	18,429,894	kWh (kilowatt hours)/year
	18,430	mWh (megawatt hours)/year

		Annual		CO2	Annual
Indirect GHG gases	Emission Factor lb/mWh	Proposed Plan Electricity mWh	GHGs metric tons	Equivalent Factor	CO2 Equivalent Emissions (metric tons)
eCO2	524	18,430	4,380	1	4380
Nitrous Oxide (N2O)	0	18,430	0.0	296	0
Methane (CH4)	0	18,430	0.0	23	0
Total Indirect GHG Emissions from Project Electricity Use=					**4380**
Net Increase in GHG Emissions (Project -Existing to be Demolished) =					**3099**

Greenhouse Gas (GHG) Emissions from Existing

Indirect Greenhouse Gas (GHG) Emissions from Existing use of Electricity (Power Plant Emissions)

Estimated Project Annual Electrical Use:	4,443,600	kWh (kilowatt hours)/year
	4,444	mWh (megawatt hours)/year

Indirect GHG gases	Emission Factor lb/mWh	Annual Project Electricity mWh	Annual GHGs metric tons	CO2 Equivalent Factor	Annual CO2 Equivalent Emissions (metric tons)
Carbon Dioxide Eq. (eCO2)	635.67	4,444	1,281	1	1281
Nitrous Oxide (N2O)	0	4,444	0.0	296	0
Methane (CH4)	0	4,444	0.0	23	0
Total Indirect GHG Emissions from Existing to be dmolished Electricity Use=					**1281**
	(2007 PG&E eCO2rate)		ALT A Percentage =		102.50

Water Useage Emissions

Water Demand =	0.1136	MGD	(assumes 0.142 MGD of demand and 20 % reduction from CALGREEN standards
	0.025	MGD	water demand for existing uses to be demolished
Water useage =	0.0886	MGD	
=	32.339	MG/year	

Energy use factor = 1450 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
4.69E+04 kW-hr/yr
4.69E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

	CO_2		**CH_4**		**N_2O**		
CALI Subregion	724.12	lbs/MW-hr	0.0302	lbs/MW-hr	0.0081	lbs/MW-hr	
Total Emissions =	3.40E+04	lb/yr	1.42E+00	lb/yr	3.80E-01	lb/yr	
Total emissions as eCO_2 =							
	3.40E+04	lb/yr	2.97E+01	lb/yr	1.18E+02	lb/yr	
	1.70E+01	ton/yr	1.49E-02	ton/yr	5.89E-02	ton/yr	
	1.54E+01	MT/yr	1.35E-02	MT/yr	5.34E-02	MT/yr	1.55E+01

TOTAL WATER USAGE EMISSIONS AS eCO_2 =	**3.41E+04**	**lb/yr**
	1.55E+04	**kg/yr**
	16	**MT/yr**

WasteWater Useage Emissions

Water Output =	0.102285	MGD	(assumes 0.128 MGD of output and 20 % reduction from CALGREEN standards
	0.0225	MGD	water output for existing uses to be demolished
Water outpflow =	0.079785	MGD	
=	29.12145	MG/year	

Energy use factor =	2500	kWh/MG	from CEC 2006 & BAAQMD 2009

Electrical consumption =

7.28E+04	kW-hr/yr
7.28E+01	MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

	CO_2		**CH_4**		**N_2O**	
CALI Subregion	724.12	lbs/MW-hr	0.0302	lbs/MW-hr	0.0081	lbs/MW-hr
Total Emissions =	5.27E+04	lb/yr	2.20E+00	lb/yr	5.90E-01	lb/yr

Total emissions as eCO_2 =

5.27E+04	lb/yr	4.62E+01	lb/yr	1.83E+02	lb/yr
2.64E+01	ton/yr	2.31E-02	ton/yr	9.14E-02	ton/yr
2.39E+01	MT/yr	2.09E-02	MT/yr	8.29E-02	MT/yr

TOTAL WasteWATER USAGE EMISSIONS AS eCO_2 =	**5.29E+04**	**lb/yr**
	2.41E+04	**kg/yr**
	24	**MT/yr**

APPENDIX J
Alternatives Data

AECOM

Memorandum

AECOM
2101 Webster Street
Suite 1900
Oakland, CA 94612
www.aecom.com

510 622 6600 tel
510 834 5220 fax

TABLE 1
PROJECT WEEKDAY PERSON-TRIP GENERATION

	Original Project Description				Alternative 1: South Tower Build Only				Alternative 2: Onsite Max Reduced Impacts			
Land Use	**Size (KSF)**	**Daily Total**	**AM Peak Hour**	**PM Peak Hour**	**Size (KSF)**	**Daily Total**	**AM Peak Hour**	**PM Peak Hour**	**Size (KSF)**	**Daily Total**	**AM Peak Hour**	**PM Peak Hour**
Office (North Tower)	768	7,438	1,111	1,090	0	0	0	0	0	0	0	0
Office (South Tower)	552	5,766	854	809	552	5,766	854	809	222	2,860	412	379
Retail	46	5,210	285	521	46	5,210	285	521	46	5,210	285	521
Existing Retail (to be removed)[a]	(48)	(5,210)	(285)	(521)	(48)	(5,210)	(285)	(521)	(48)	(5,210)	(285)	(521)
Net New Person-Trips		**13,204**	**1,965**	**1,899**		**5,766**	**854**	**809**		**2,860**	**412**	**379**

[a] Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2010.

TABLE 2
PROJECT WEEKDAY VEHICLE-TRIP GENERATION [a]

	Original Project Description				Alternative 1: South Tower Build Only				Alternative 2: Onsite Max Reduced Impacts			
Land Use	**Size (KSF)**	**Daily Total**	**AM Peak Hour**	**PM Peak Hour**	**Size (KSF)**	**Daily Total**	**AM Peak Hour**	**PM Peak Hour**	**Size (KSF)**	**Daily Total**	**AM Peak Hour**	**PM Peak Hour**
Office (North Tower)	768	4,487	671	657	0	0	0	0	0	0	0	0
Office (South Tower)	552	3,479	516	487	552	3,479	516	487	222	1,726	248	229
Retail	46	5,002	246	449	46	5,002	246	449	46	5,002	246	449
Existing Retail (to be removed)[b]	(48)	(5,002)	(246)	(449)	(48)	(5,002)	(246)	(449)	(48)	(5,002)	(246)	(449)
Net New Person-Trips		**7,966**	**1,187**	**1,144**		**3,479**	**516**	**487**		**1,726**	**248**	**229**

a Vehicle-trip calculations based on 70 percent auto mode split and Average Vehicle Occupancy of 1.16.

b Assumed to be no greater than trips generated by newly proposed retail uses under the Project.

SOURCE: AECOM, 2010.

TABLE 3
CUMULATIVE (2030) PLUS PROJECT INTERSECTION LEVELS OF SERVICE

#	Intersection	Traffic Cont.	Cumulative (2030) without Project Conditions				Cumulative (2030) plus Project Conditions				ALTERNATIVE 1: Cumulative plus Project Conditions (South Tower Only)				ALTERNATIVE 2: Cumulative plus Project Conditions (Onsite Maximum Reduced Impacts)			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			LOS	Del.[a]	LOS	Del.[a]	LOS	Del.[a]	LOS	Del.[a]	LOS	Del.[a]	LOS	Del.[a]	LOS	Del.[a]	LOS	Del.[a]
Outside Downtown																		
2	Oakland Ave. / Perry Pl. / I-580 EB Ramps	Signal	E	65.9	F	>120	**F**	**83.7**	**F**	**>120**	**E**	**74.3**	**F**	**>120**	C	27.7	F	>120
45	Grand Avenue / El Embarcadero	Signal	C	23.4	F	>120	C	23.9	**F**	**>120**	C	23.6	F	>120	C	23.4	F	>120
47	Grand Avenue / MacArthur Blvd. (EB)	Signal	E	68.3	F	>120	E	68.6	**F**	**>120**	E	68.3	F	>120	E	68.3	F	>120
48	Lakeshore Avenue / MacArthur Blvd. (EB)	Signal	F	94.5	F	>120	F	94.4	**F**	**>120**	F	94.4	F	>120	F	94.5	F	>120
50	Harrison Street / MacArthur Blvd. (WB)	Signal	F	83.2	C	21.3	**F**	**102.1**	C	21.5	**F**	**88.8**	C	21.4	F	83.6	C	20.8
Within Downtown																		
12	Harrison St. / Grand Ave.	Signal	F	93.8	F	>120	**F**	**>120**	**F**	**>120**	**F**	**>120**	**F**	**>120**	D	53.5	F	>120
13	Harrison St. / 21st St.	Signal	A	7.5	B	19.9	B	11.5	**F**	**98.7**	A	9.8	D	50.7	A	9.0	C	21.0
44	Oak Street / 5th Street / I-880 SB On-Ramp	Signal	F	>120	F	>120	**F**	**>120**	**F**	**>120**	F	>120	F	>120	E	77.3	F	>120

Bold indicates significant impact.
Project contributions under Alternative 2 would not exceed thresholds of significance and, therefore, Alternative 2 would not result in significant impacts at the above locations.

[a] The LOS and delay for signalized intersections represent the average delay for all traffic movements.

SOURCE: AECOM, 2010.

TABLE 4
CUMULATIVE (2030) PLUS PROJECT (PHASE I AND PHASE II) ROADWAY SEGMENT LEVELS OF SERVICE

					Cumulative (2030) without Project Conditions						Cumulative (2030) plus Project (Phase I and Phase II) Conditions					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Capacity (veh/hr)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
3	**I-880** from Oak Street to 5th Avenue	EB	4	8,000	E	7,390	0.92	E	7,920	0.99	E	7,405	0.93	**F**	**8,014**	**1.00**
		WB	4	8,000	E	7,925	0.99	E	7,217	0.90	**F**	**8,029**	**1.00**	E	7,237	0.90
Non-Caltrans Facilities																
9	**Grand Avenue** from Harrison St. to El Embarcadero	EB	2	1,800	C	936	0.52	F	2,284	1.27	C	940	0.52	**F**	**2,425**	**1.35**
		WB	2	1,800	E	1,782	0.99	D	1,326	0.74	**F**	**2,010**	**1.12**	D	1,373	0.76
10	**Harrison Street / Oakland Avenue** from I-580 to 27th Street	NB	2	1,800	E	1,718	0.95	F	2,342	1.30	E	1,776	0.99	**F**	**2,614**	**1.45**
		SB	2	1,800	E	1,571	0.87	C	987	0.55	**F**	**1,808**	**1.00**	C	1,027	0.57

					ALTERNATIVE 1: Cumulative plus Project Conditions (South Tower Only)						ALTERNATIVE 2: Cumulative plus Project Conditions (Onsite Maximum Reduced Impacts)					
					AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour		
No.	Roadway Segment	Dir.	Ln.	Capacity (veh/hr)	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c	LOS	Vol.	v/c
Caltrans Facilities																
3	**I-880** from Oak Street to 5th Avenue	EB	4	8,000	E	7,405	0.93	**F**	**8,014**	**1.00**	E	7,393	0.92	E	7,939	0.99
		WB	4	8,000	**F**	**8,029**	**1.00**	E	7,237	0.90	E	7,946	0.99	E	7,221	0.90
Non-Caltrans Facilities																
9	**Grand Avenue** from Harrison St. to El Embarcadero	EB	2	1,800	C	940	0.52	**F**	**2,425**	**1.35**	C	937	0.52	F	2,312	1.28
		WB	2	1,800	**F**	**2,010**	**1.12**	D	1,373	0.76	E	1,789	0.99	D	1,335	0.74
10	**Harrison Street / Oakland Avenue** from I-580 to 27th Street	NB	2	1,800	E	1,776	0.99	**F**	**2,614**	**1.45**	E	1,730	0.96	F	2,396	1.33
		SB	2	1,800	**F**	**1,808**	**1.00**	C	1,027	0.57	E	1,618	0.90	C	995	0.55

Bold indicates significant impact.
Project contributions under Alternative 2 would not exceed thresholds of significance and, therefore, Alternative 2 would not result in significant impacts at the above locations.

SOURCE: AECOM, 2010.

GHG EMISSIONS INVENTORY AND DATA – ALTERNATIVE 1

	Target Year: 2015	2011	
Mitigated Transportation	**Project**	**Baseline**	**Project-Baseline**
Operational Vehicles from URBEMIS (CO_2 tons/year):	4,831.10	0.00	
Metric Ton Adjustment (CO_2 metric tons/year):	4,383.94	0.00	
Pavley Regulation Adjustment (CO_2 metric tons/year):	4,053.25	0.00	
US EPA Adjustment (CO_2e metric tons/year):	4,266.58	0.00	
Low Carbon Fuels Adjustment (CO_2e metric tons/year):	4,189.78	0.00	
Total (CO_2e metric tons/year):			**4,189.78**

	Mitigated Natural Gas		
	Project	Baseline	Project-Baseline
CO2 metric tons/year:	680.702	0.000	
CH4 metric tons/year:	0.064	0.000	
N2O metric tons/year:	0.001	0.000	
CO2e metric tons/year:	682.446	0.000	
CO2e metric tons/year:			**682.45**

	Project	Mitigated Solid Waste Baseline	Project - Baseline
Truck Haul CO2 (metric tons/year):	4.84	0.00	
Truck Haul CH4 (metric tons/year):	0.0001	0.0000	
Truck Haul CO2e (metric tons/year):	4.85	0.00	
Landfill Offgasing (CO2e metric tons/year):	165.52	0.00	
Total Solid Waste (CO2e metric tons/year):	170.36	0.00	
Total Solid Waste (CO2e metric tons/year):			**170.36**

***** Select Mitigation Measures on the Mitigation Tab ===>** Mitigation

Baseline Landfill disposal option:

Select 1 of 3 options

- ○ Landfilling only
- ● Landfilling with Flaring to Burn Methane
- ○ Landfilling with Energy Recovery

Indirect Greenhouse Gas (GHG) Emissions from Alternative 1
Electricity (Power Plant Emissions)

Estimated Proposed Plan Annual Electrical Use: 8,689,936 kWh (kilowatt hours)/year
8,690 mWh (megawatt hours)/year

Indirect GHG gases	Emission Factor lb/mWh	Annual Proposed Plan Electricity mWh	Annual GHGs metric tons	CO2 Equivalent Factor	Annual CO2 Equivalent Emissions (metric tons)
eCO2	524	8,690	2,065	1	2065
Nitrous Oxide (N2O)	0	8,690	0.0	296	0
Methane (CH4)	0	8,690	0.0	23	0
		Total Indirect GHG Emissions from Project Electricity Use=			**2065**
	Net Increase in GHG Emissions (Alt A -Existing to be Demolished) =				**1995**

Alternative 1
Water Useage Emissions

Water Demand =	0.049984	MGD	(assumes 44% of Project 0.142 MGD of demand based on area and 20 % reduction from CALGREEN standards
	0.002	MGD	water demand for existing uses to be demolished (0.92% less than project
Water useage =	0.047984	MGD	
=	17.51416	MG/year	

Energy use factor = 1450 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =

2.54E+04 kW-hr/yr
2.54E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

	CO2		**CH4**		**N2O**	
CALI Subregion	724.12	lbs/MW-hr	0.0302	lbs/MW-hr	0.0081	lbs/MW-hr
Total Emissions =	1.84E+04	lb/yr	7.67E-01	lb/yr	2.06E-01	lb/yr
Total emissions as eCO2 =						
	1.84E+04	lb/yr	1.61E+01	lb/yr	6.38E+01	lb/yr
	9.19E+00	ton/yr	8.05E-03	ton/yr	3.19E-02	ton/yr
	8.34E+00	MT/yr	7.30E-03	MT/yr	2.89E-02	MT/yr

TOTAL WATER USAGE EMISSIONS AS eCO2 =	**1.85E+04**	**lb/yr**
	8.40E+03	**kg/yr**
	8	**MT/yr**

Alternative 1
Waste Water Useage Emissions

			(assumes 44% of Project 0.128 MGD output based on area
Water Outflow =	0.045005	MGD	and 20 % reduction from CALGREEN standards
	0.002	MGD	water demand for existing uses to be demolished (92% less than project)
Water Outflow =	0.043005	MGD	
=	15.69694	MG/year	

Energy use factor = 2500 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
3.92E+04 kW-hr/yr
3.92E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

	CO_2		**CH_4**		**N_2O**	
CALI Subregion	724.12	lbs/MW-hr	0.0302	lbs/MW-hr	0.0081	lbs/MW-hr
Total Emissions =	2.84E+04	lb/yr	1.19E+00	lb/yr	3.18E-01	lb/yr

Total emissions as eCO_2 =

2.84E+04	lb/yr	2.49E+01	lb/yr	9.85E+01	lb/yr
1.42E+01	ton/yr	1.24E-02	ton/yr	4.93E-02	ton/yr
1.29E+01	MT/yr	1.13E-02	MT/yr	4.47E-02	MT/yr

TOTAL WATER USAGE EMISSIONS AS eCO_2 = **2.85E+04 lb/yr**

1.30E+04 kg/yr

13 MT/yr

GHG EMISSIONS INVENTORY AND DATA – ALTERNATIVE 2

Mitigated Transportation

	Project	Baseline	Project-Baseline
Target Year:	2015	2011	
Operational Vehicles from URBEMIS (CO_2 tons/year):	2,396.29	0.00	
Metric Ton Adjustment (CO_2 metric tons/year):	2,174.49	0.00	
Pavley Regulation Adjustment (CO_2 metric tons/year):	2,010.47	0.00	
US EPA Adjustment (CO_2e metric tons/year):	2,116.28	0.00	
Low Carbon Fuels Adjustment (CO_2e metric tons/year):	2,078.19	0.00	
Total (CO_2e metric tons/year):			**2,078.19**

Mitigated Natural Gas			
	Project	**Baseline**	**Project-Baseline**
CO_2 metric tons/year:	273.760	0.000	
CH_4 metric tons/year:	0.026	0.000	
N_2O metric tons/year:	0.001	0.000	
CO_2e metric tons/year:	274.462	0.000	
CO_2e metric tons/year:			**274.46**

	Mitigated Solid Waste		
	Project	Baseline	Project - Baseline
Truck Haul CO2 (metric tons/year):	1.95	0.00	
Truck Haul CH4 (metric tons/year):	0.0000	0.0000	
Truck Haul CO2e (metric tons/year):	1.95	0.00	
Landfill Offgasing (CO2e metric tons/year):	66.57	0.00	
Total Solid Waste (CO2e metric tons/year):	68.52	0.00	
Total Solid Waste (CO2e metric tons/year):			**68.52**

***** Select Mitigation Measures on the Mitigation Tab ===>** Mitigation

Baseline Landfill disposal option:

Select 1 of 3 options

- ○ Landfilling only
- ● Landfilling with Flaring to Burn Methane
- ○ Landfilling with Energy Recovery

Indirect Greenhouse Gas (GHG) Emissions from Alternative 2
Electricity (Power Plant Emissions)

Estimated Proposed Plan Annual Electrical Use: 296,769 kWh (kilowatt hours)/year
297 mWh (megawatt hours)/year

Indirect GHG gases	Emission Factor lb/mWh	Annual Proposed Plan Electricity mWh	Annual GHGs metric tons	CO2 Equivalent Factor	Annual CO2 Equivalent Emissions (metric tons)
eCO2	524	297	71	1	70.5
Nitrous Oxide (N2O)	0.0037	297	0.0	296	0.00E+00
Methane (CH4)	0.0067	297	0.0	23	0.00E+00
Total Indirect GHG Emissions from Project Electricity Use=					**71**

No Demolition

Alternative 2
Water Useage Emissions

Water Demand =	0.02272	MGD	(assumes 20% of Project 0.142 MGD of demand based on area and 20 % reduction from CALGREEN standards
	0	MGD	water demand for existing uses to be demolished
Water useage =	0.02272	MGD	
=	8.2928	MG/year	

Energy use factor =	1450	kWh/MG	from CEC 2006 & BAAQMD 2009

Electrical consumption =

1.20E+04	kW-hr/yr
1.20E+01	MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

	CO2		**CH4**		**N2O**	
CALI Subregion	724.12	lbs/MW-hr	0.0302	lbs/MW-hr	0.0081	lbs/MW-hr
Total Emissions =	8.71E+03	lb/yr	3.63E-01	lb/yr	9.74E-02	lb/yr

Total emissions as eCO2 =

8.71E+03	lb/yr	7.63E+00	lb/yr	3.02E+01	lb/yr
4.35E+00	ton/yr	3.81E-03	ton/yr	1.51E-02	ton/yr
3.95E+00	MT/yr	3.46E-03	MT/yr	1.37E-02	MT/yr

TOTAL WATER USAGE EMISSIONS AS eCO2 =	**8.75E+03**	**lb/yr**
	3.98E+03	**kg/yr**
	4.E+00	**MT/yr**

Alternative 2
Water Useage Emissions

Water Outflow =	0.020457	MGD	(assumes 20% of Project 0.142 MGD of demand based on area and 20 % reduction from CALGREEN standards
	0	MGD	water demand for existing uses to be demolished
Water Outflow =	0.020457	MGD	
=	7.46679	MG/year	

Energy use factor = 2500 kWh/MG from CEC 2006 & BAAQMD 2009

Electrical consumption =
1.87E+04 kW-hr/yr
1.87E+01 MW-hr/yr

Emission factors for electricity use from California Climate Action Registry General Reporting Protocol January 2009 Version 3.1

	CO2		**CH4**		**N2O**	
CALI Subregion	724.12	lbs/MW-hr	0.0302	lbs/MW-hr	0.0081	lbs/MW-hr
Total Emissions =	1.35E+04	lb/yr	5.64E-01	lb/yr	1.51E-01	lb/yr
Total emissions as eCO2 =						
	1.35E+04	lb/yr	1.18E+01	lb/yr	4.69E+01	lb/yr
	6.76E+00	ton/yr	5.92E-03	ton/yr	2.34E-02	ton/yr
	6.13E+00	MT/yr	5.37E-03	MT/yr	2.13E-02	MT/yr

TOTAL WATER USAGE EMISSIONS AS eCO2 =	**1.36E+04**	**lb/yr**
	6.17E+03	**kg/yr**
	6.17E+00	**MT/yr**