FEHR PEERS

MEMORANDUM

Date: January 29, 2019

To: Rebecca Auld, Lamphier-Gregory

From: Sam Tabibnia and Jordan Brooks, Fehr & Peers

Subject: West Oakland BART TOD – Transportation Assessment (non-CEQA)

OK18-0294

This memorandum summarizes the non-CEQA transportation assessment that Fehr & Peers completed for the proposed West Oakland BART TOD project in Oakland. This document provides a brief description of the project, an estimate of project trip generation, a review of the project site plan and surrounding areas for access and circulation for various modes, an intersection operations analysis, and a collision analysis. This memorandum also includes recommendations that improve multi-modal access, circulation, and safety.

PROJECT DESCRIPTION

The proposed project would be located adjacent to the West Oakland BART station, bounded by 7th Street to the north, Mandela Parkway to the east, 5th Street to the south, and Chester Street to the west. Based on the project site plan dated January 11, 2019, the project would consist of the following:

- 762 multi-family dwelling units
- approximately 382,000 square feet of office space
- approximately 75,000 square feet of ground-level commercial space

The project would also include 400 automobile parking spaces, with six dedicated carshare spaces, in a garage accessible via a driveway on Chester Street.

The project site is currently occupied by surface parking lots that provide 413 automobile parking spaces for the West Oakland BART station. These spaces for BART riders would be eliminated by the project and would not be replaced.

TRIP GENERATION AND INTERSECTION COUNTS

Automobile Trip Generation

Trip generation is the process of estimating the number of vehicles that would likely access the project on any given day. **Table 1** summarizes the trip generation for the proposed project. Trip generation data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual (10th Edition)* was used as a starting point to estimate the vehicle trip generation.

ITE's *Trip Generation Manual (10th Edition)* is primarily based on data collected at single-use suburban sites where the automobile is often the only travel mode. However, the project site is located in a moderately dense area with streets generally laid out in a grid and sidewalks on most streets. It is located near some existing neighborhood-serving retail and industrial uses, and several projects are proposed in the area that would increase residential and employment densities and provide neighborhood-serving retail uses. Additionally, the project is located within two miles of Downtown Oakland, a dense employment center. Thus, many trips generated by the project may be walking, bicycling, or transit trips.

Since the project borders the West Oakland BART station, this analysis reduces the ITE-based trip generation by about 47 percent to account for non-automobile trips. This reduction is consistent with the City of Oakland's TIRG and is based on US Census commute data for Alameda County from the 2014 5-Year Estimates of the American Community Survey (ACS), which shows that the non-automobile mode share for areas less than 0.5 miles from a BART Station is about 47 percent.

In addition, pass-by adjustments were applied for the retail use. Pass-by trips are trips attracted to the site from adjacent roadways as an interim stop on the way to their ultimate destination. These vehicles would be on the roadway network regardless of the project, so pass-by trips result in changed travel patterns but do not add new vehicle trips to the roadway network. According to the ITE *Trip Generation Handbook (2nd Edition)*, the average weekday PM peak hour pass-by reduction is 34 percent for retail uses (ITE land use category 820). Since AM peak hour and daily pass-by reductions are not available, a pass-by reduction was not applied for the AM peak hour, and a 17-percent reduction (half the PM peak hour pass-by reduction) was applied to daily trips.

The estimated trip generation presented in Table 1 is conservative and likely overestimates the actual trip generation of the project in that it does not account for the following:

- The proposed project would eliminate about 413 surface parking spaces currently used for BART parking. Considering that many streets near the BART station have restricted parking, such as residential parking permit (RPP) which limits on-street parking to two-hours by non-local residents and that many streets and other off-street public parking facilities in the vicinity operate at or near capacity during most weekdays, it is likely that many of the current BART riders that park at the West Oakland BART Station surface parking lot would either shift to other modes, drive to other stations, or not use BART. Thus, it is likely that the elimination of the existing surface lot would reduce the number of BART riders who currently drive to and from the West Oakland BART Station. However, in order to present a conservative analysis, this analysis does not eliminate any trips associated with these existing BART parking spaces, and assumes that all of the BART riders who currently drive to the station would continue to drive and park in nearby surface lots or on-street.
- At least 20 percent of the residential units in the proposed project would be affordable. Although research on the transportation impacts of affordable housing in California shows that for any given location and housing type, lower income residents generate fewer automobile trips than residents of a typical multifamily development, this analysis does not reduce the trip generation for these units.[1]

As summarized in Table 1, the net new automobile trip generation for the proposed development is approximately 6,300 daily, 472 AM peak hour, and 548 PM peak hour automobile trips.

[1] Howell, A., Currans, K., Norton, G., & Clifton, K. (2018). Transportation impacts of affordable housing: Informing development review with travel behavior analysis. *Journal of Transport and Land Use, 11*(1). doi:10.5198/jtlu.2018.1129, https://www.jtlu.org/index.php/jtlu/article/download/1129/986

TABLE 1
WEST OAKLAND BART TOD PROJECT AUTOMOBILE TRIP GENERATION

Land Use	ITE Code	Size[1]	Daily Trips	Weekday AM Peak Hour			Weekday PM Peak Hour		
				In	Out	Total	In	Out	Total
High-Rise Apartment	222[2]	500 DU	2,230	37	118	155	110	70	180
Mid-Rise Apartment	221[3]	240 DU	1,310	23	64	87	65	41	106
Duplex	220[4]	22 DU	130	3	9	12	10	6	16
Office	710[5]	382.5 KSF	3,900	382	62	444	70	370	440
Retail	820[6]	75.0 KSF	4,950	118	72	190	211	229	440
ITE Trip Generation Subtotal			12,520	563	325	888	466	716	1,182
Non-Auto Mode Reduction[7]			-5,870	-264	-152	-416	-219	-336	-554
Retail Pass-By Reduction[8]			-350	0	0	0	-38	-41	-80
Existing Land Use Reduction[9]			-0	-0	-0	-0	-0	-0	-0
Net New Project Trips			**6,300**	**299**	**173**	**472**	**209**	**339**	**548**

Notes:
1. DU = Dwelling Units; KSF = 1,000 square feet.
2. ITE *Trip Generation (10th Edition)* land use category 222 (High-Rise Apartment, General Urban/Suburban):
   Daily: T = 4.45 * X
   AM Peak Hour: T = 0.31 * X (24% in, 76% out)
   PM Peak Hour: T = 0.36 * X (61% in, 39% out)
3. ITE *Trip Generation (10th Edition)* land use category 221 (Mid-Rise Apartment, General Urban/Suburban):
   Daily: T = 5.44 * X
   AM Peak Hour: T = 0.36 * X (26% in, 74% out)
   PM Peak Hour: T = 0.44 * X (61% in, 39% out)
4. ITE *Trip Generation (10th Edition)* land use category 220 (Low-Rise Apartment, General Urban/Suburban):
   Daily: T= 7.56 * X – 40.86
   AM Peak Hour: Ln(T) = 0.95 * ln(X) – 0.51 (23% in, 77% out)
   PM Peak Hour: Ln(T) = 0.89 * ln(X) – 0.02 (63% in, 37% out)
5. ITE *Trip Generation (10th Edition)* land use category 710 (General Office Building, General Urban/Suburban):
   Daily: Ln(T) = 0.97 * ln(X) + 2.5
   AM Peak Hour: T = 1.16 * X (86% in, 14% out)
   PM Peak Hour: T = 1.15 * X (16% in, 84% out)
6. ITE *Trip Generation (10th Edition)* land use category 820 (Shopping Center, General Urban/Suburban):
   Daily: Ln(T) = 0.68 * ln(X) + 5.57
   AM Peak Hour: T = 0.5 * X + 151.78 (62% in, 38% out)
   PM Peak Hour: Ln(T) = 0.74 * ln(X) + 2.89 (48% in, 52% out)
7. Reduction of 47% assumed, based on City of Oakland *Transportation Impact Review Guidelines*, using Census data for urban environments less than 0.5 miles from a BART station.

8. Based on *ITE Trip Generation Handbook (2nd Edition)*, the average PM peak hour pass-by rate for land use category 820 is 34%. A reduction was not applied to the AM peak hour, and a 17% reduction was applied for daily trips.
9. The West Oakland BART TOD project would eliminate 413 surface parking spaces currently used for BART parking. To present a conservative analysis, the project was assumed to not eliminate any trips associated with those parking spaces, because some or all of the BART riders who currently drive to the station would continue to drive and park in nearby surface lots or on-street.

Source: Fehr & Peers, 2019.

Non-Vehicular Trip Generation

Consistent with the City of Oakland TIRG, **Table 2** presents the estimates of project trip generation for all travel modes for the project site. The automobile trip generation shown in Table 2 does not account for pass-by reductions.

TABLE 2
WEST OAKLAND BART TOD PROJECT TRIP GENERATION BY TRAVEL MODE

Mode	Mode Share Adjustment Factors[1]	Daily	AM Peak Hour	PM Peak Hour
Automobile	53.1%	6,650	472	628
Transit	29.7%	3,720	264	351
Bike	5.1%	640	45	60
Walk	10.5%	1,310	93	124
	Total Trips	**12,320**	**874**	**1,163**

Notes:

1. Based on *City of Oakland Transportation Impact Study Guidelines* assuming project site is in an urban environment less than 0.5 miles from a BART station.

Source: Fehr & Peers, 2019.

Trip Distribution and Study Intersection Selection

The trip distribution and assignment process is used to estimate how the trips generated by the project would be distributed across the roadway network. Trip distribution and assignment for the project were developed based on the locations of complementary land uses, existing travel patterns, the street network in the area, and the results of the Alameda County Transportation Commission (CTC) travel demand model. **Table 3** shows the resulting trip distribution.

TABLE 3
WEST OAKLAND BART TOD PROJECT
VEHICLE DISTRIBUTION

Zone	Distribution
To/From West	21%
To/From East	24%
To/From North	17%
To/From South	6%
To/From I-880 South	20%
To/From I-880 North	12%
Total	**100%**

Sources: Fehr & Peers, 2019.

Trips generated by the proposed project, as shown in Table 1, were assigned to the roadway network according to the trip distribution shown on Table 3.

According to the City of Oakland's TIRG, the criteria for selecting study intersections include:

- All intersection(s) of streets adjacent to project site;
- All signalized intersection(s), all-way stop-controlled intersection(s) or roundabouts where 100 or more peak hour trips are added by the project;
- All signalized intersection(s) with 50 or more project-related peak hour trips and existing LOS D-E-F; and
- Side-street stop-controlled intersection(s) where 50 or more peak hour trips are added by the project to any individual movement other than the major-street through movement.

This analysis evaluates the following intersections due to being adjacent to the project site:

1. 7th Street/Chester Street
2. 7th Street/Center Street
3. 7th Street/Mandela Parkway
4. 5th Street/Chester Street
5. 5th Street/Center Street
6. 5th Street/Mandela Parkway

Automobile turning movements, pedestrian counts, and bicycle counts were collected at these intersections during the AM and PM peak commuting hours (7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM) on December 12, 2018, a typical weekday with local schools in normal session, moderate

weather, and no observed traffic incidents. **Figure 1** shows the peak hour intersection volumes, and **Appendix A** provides the raw traffic counts.

SITE ACCESS AND CIRCULATION ANALYSIS

Fehr & Peers reviewed the project site plan dated January 11, 2019 and the existing street network adjacent to the project site to evaluate safety, access, and circulation for all travel modes.

Automobile Access and Circulation

Currently, the project site is occupied by parking facilities for the West Oakland BART Station, which would be demolished by the project. Access to the existing site is provided by driveways on Mandela Parkway, Chester Street, and 5th Street. These driveways would be eliminated by the project. The proposed project would include a 400-space parking garage which would be accessed through a driveway on Chester Street. Each project building would also provide a loading dock for two trucks. The loading dock for Buildings T1 and T4 would be on Mandela Parkway and the loading dock for Building T3 would be on 5th Street. Based on the project site plan, the garage driveway and/or the loading docks may not provide adequate sight distance between exiting vehicles and pedestrians on the adjacent sidewalk.

> **Recommendation 1:** While not required to address a CEQA impact, the following should be considered as part of the final design for the project:
>
> - Review the final site plans for the project to ensure that the garage driveway on Chester Street and the loading docks for each project building would provide adequate sight distance between vehicles exiting the garage and pedestrians on the adjacent sidewalk.

The project would eliminate the existing merge on westbound 7th Street just west of Mandela Parkway in order to accommodate a Class 4 cycletrack along this segment of 7th Street. Thus the existing shared right/through lane on westbound 7th Street at Mandela Parkway would need to be converted to a right-turn lane.

With the addition of the traffic generated by the proposed project, it is expected that the 7th Street/ Chester Street intersection would meet the Manual on Uniform Traffic Control Devices (MUTCD) Peak Hour Signal Warrant, and the intersection may need to be signalized. Signal warrant analysis

is used to determine whether conditions warrant the installation of a new traffic signal. However, meeting one or more signal warrants does not mean that the intersection must be signalized.

Recommendation 2: While not required to address a CEQA impact, the following should be considered as part of the final design for the project:

- Implement the following at the 7th Street/Mandela Parkway intersection:
  - Convert the existing through/right-turn lane on the westbound 7th Street approach to a right-turn/bus only lane, and remove the merge lane on westbound 7th Street west of the intersection
  - Modify the signal timings at the intersection to provide a bus only phase for the westbound approach, and reduce the signal cycle length to 90 seconds
- After the completion of the first phase of the project, conduct a signal warrant analysis at the 7th Street/Chester Street intersection to determine if and when the intersection should be signalized. If signalization is warranted, the project shall signalize the intersection with protected left-turn phasing for the east/west 7th Street approaches. In addition and as determined by the City of Oakland staff, the signal may be interconnected with existing adjacent signals along 7th Street. If signalization is not warranted, the project shall conduct an analysis to determine if other control devices, such as all-way stop controls, or rectangular rapid flash beacon (RRFB) should be installed at the intersection. The project shall implement the recommended improvement at the intersection as approved by the City of Oakland.

Bicycle Access and Bicycle Parking

Currently, Class 2 bicycle lanes are provided along the project frontage on 7th Street and on Mandela Parkway. The 7th Street bicycle lanes connect Peralta Street to the west and about 140 feet west of Mandela Parkway to the east, where they convert to Class 3 bicycle routes with shared-lane markings and continue to Union Street. The bicycle lanes on Mandela Parkway connect 3rd Street in the south and Horton Street in the north. The City's 2007 Bicycle Master Plan proposes Class 2 bicycle lanes on 7th Street between Wood and Union Streets.

The project would include the following modifications that would benefit bicyclists in the project vicinity:

- Raised one-way Class 4 separated bikeways on both sides of 7th Street between Chester Street and Mandela Parkway.
- One-way Class 4 separated bikeways on both sides of Mandela Parkway between 7th and 5th Streets.
- A bike station on the east side of the existing BART station under the BART tracks and adjacent to a mid-block crossing on Mandela Parkway. The bike station is estimated to accommodate at least 500 bicycles, and would provide a repair station.

The nearest Ford GoBike bikeshare station is located adjacent to the site on 7th Street just east of Center Street within the street right-of-way. The project would remove this station to accommodate a bus stop on eastbound 7th Street east of Center Street, but the site plan does not indicate where the bikeshare station would be relocated.

> **Recommendation 3:** While not required to address a CEQA impact, the following should be considered as part of the final design for the project:
>
> - Ensure that the Ford GoBike station currently located in-street on 7th Street just east of Center Street is relocated on the BART Station Plaza to provide close and convenient access to the West Oakland BART station and the bicycle facilities adjacent to the project site.

Chapter 17.117 of the Oakland Municipal Code requires long-term and short-term bicycle parking for new buildings. Long-term bicycle parking includes lockers or locked enclosures, and short-term bicycle parking includes bicycle racks. The Code requires one long-term space for every four multi-family dwelling units and one short-term space for every 20 multi-family dwelling units. The Code does not require any bicycle parking for duplexes. For office uses, the Code requires one long-term space for every 10,000 square feet of floor area and one short-term space for every 20,000 square feet of floor area. For retail uses, the Code requires one long-term space for every 12,000 square feet of floor area and one short-term space for every 5,000 square feet of floor area.

Table 4 presents the bicycle parking requirements for the proposed project. The project would be required to provide at least 229 long-term bicycle parking spaces and 71 short-term spaces.

TABLE 4
BICYCLE PARKING REQUIREMENTS

Land Use	Size[1]	Long-Term		Short-Term	
		Spaces per Unit[2]	Spaces	Spaces per Unit[2]	Spaces
Multi-family Residential	740 DU	1:4 DU	185	1:20 DU	37
Duplex	22 DU	None Required	0	None Required	0
Office	382.5 KSF	1:10 KSF	38	1:20 KSF	19
Retail	75.0 KSF	1:12 KSF	6	1:5 KSF	15
Total Required Bicycle Spaces			229		71
Total Bicycle Parking Provided			252		94
Bicycle Parking Met?			**Yes**		**Yes**

Notes:
1. DU = dwelling unit, KSF = 1,000 square feet
2. Based on Oakland Municipal Code Sections 17.117.090 and 17.117.110

Source: Fehr & Peers, 2019.

The project would provide 252 long-term bicycle parking spaces, which would consist of bike rooms for 150 bicycles in the T1 building (northeast corner of the site), 70 bicycles in the T3 building (southwest corner of the site), and 32 bicycles in the T4 building (southeast corner of the site). Thus, the project would exceed the minimum requirements for long-term bicycle parking.

The project would provide 94 short-term bicycle parking spaces. The short-term spaces would consist of bicycle racks for 34 bicycles along the 5th Street frontage, 40 bicycles along the 7th Street frontage, and 20 bicycles on the pedestrian plaza between 5th Street and the BART station. Thus, the project would exceed the minimum requirements for short-term bicycle parking.

In addition, the bike station at the BART Station would also be available to project residents, workers, and visitors.

Pedestrian Access and Circulation

Most streets in the vicinity of the project site provide sidewalks on both sides of the street, except for the south side of 5th Street between Center Street and Mandela Parkway. The project site currently provides 10-foot sidewalks along the project frontage on Mandela Parkway, 5th Street,

and Chester Street. Along the project site's 7th Street frontage, a 30-foot sidewalk is provided between Chester and Center Streets, and a 20-foot sidewalk is provided between Center Street and Mandela Parkway. The City of Oakland's 2017 Pedestrian Master Plan does not list any planned improvements along the project frontages.

Pedestrian facilities at the intersections adjacent to the site include:

- The 7th Street/Chester Street intersection is stop-controlled on both the northbound and southbound Chester Street approaches and provides directional curb ramps with truncated domes on all four corners. The intersection provides curb extensions at the northwest and northeast corners and provides colored crosswalks for all four approaches.
- The 7th Street/Center Street intersection is a signalized T-intersection that provides directional curb ramps with truncated domes on all corners and approaches. The intersection provides curb extensions at the northwest and northeast corners and provides colored crosswalks, and pedestrian countdown signal heads and push buttons for all three approaches. The signal currently provides continuous green phase for the east/west 7th Street approaches, unless vehicles are detected on the southbound Center Street approach or pedestrians activate the push buttons to cross 7th Street.
- The 7th Street/Mandela Parkway intersection is a signalized intersection that provides directional curb ramps with truncated domes on all four corners. The intersection provides curb extensions at the northwest and northeast corners and provides colored crosswalks, and pedestrian countdown signal heads and push buttons for all four approaches.
- The 5th Street/Chester Street intersection is stop-controlled on both the northbound and southbound Chester Street approaches and provides diagonal curb ramps on the northeast, southeast and southwest corners and a directional curb ramp leading across 5th Street on the northwest corner. None of the curb ramps provide truncated domes, and no marked crosswalks are provided on any approach.
- The 5th Street/Center Street intersection is a T-intersection and stop-controlled on the northbound Center Street approach. The intersection provides diagonal curb ramps at both corners. Neither of the curb ramps provide truncated domes, and no marked crosswalks are provided on any approach. Currently, on-street parking is allowed along the north side of the intersection, blocking pedestrian crossings of 5th Street.
- The 5th Street/Mandela Parkway intersection is a signalized intersection that provides diagonal curb ramps with substandard truncated domes on all four corners. The intersection provides a curb extension across the 5th Street approach at the southeast corner and provides marked crosswalks, and pedestrian countdown signal heads and push buttons for all four approaches.

The project would provide pedestrian access to the BART Station from all the four streets bordering the project site, including a north-south pedestrian plaza aligned with Center Street that would provide direct access to the BART station entrance. The site would also provide internal walkways along the south side of the elevated BART tracks that would connect to Chester Street and Mandela Parkway. Each project building would have a lobby that would be accessed from the adjacent street and/or the internal site plazas. The project would include the following modifications that would benefit pedestrian access and circulation in the areas surrounding the project site:

- The project proposes a 19-foot sidewalk along the project frontage on 5th Street, between Chester Street and Mandela Parkway. The sidewalk would have a minimum eight-foot pedestrian through zone, and the sidewalk width would accommodate the needs of pedestrians, bus passengers, and curbside passenger loading.
- The project proposes a sidewalk along the project frontage on 7th Street with a minimum eight-foot pedestrian through zone between Chester Street and Mandela Parkway. The sidewalk would provide adequate width to accommodate the high level of pedestrians with pedestrian amenities such as seating, real-time bus arrival information, trash receptacles, and pedestrian-lighting.
- The project proposes an 11 to 15-foot sidewalk along the project frontage on Chester Street and a 15-foot sidewalk along Mandela Parkway between 5th and 7th Street. All sidewalks would have a minimum eight-foot pedestrian through zone.
- As part of implementing a Class 4 cycletrack along westbound 7th Street, the project would eliminate the second receiving lane west of Mandela Parkway and shorten the pedestrian crossing distance for the west crosswalk at the 7th Street/Mandela Parkway intersection.
- The sidewalks along the project frontage and the internal pedestrian plazas would provide pedestrian-scale lighting and street trees/plantings.
- At the intersections of 5th Street with Chester Street, Center Street and Mandela Parkway, the project would provide high-visibility crosswalks and directional ramps along all approaches.
- At the 5th Street/Center Street intersection, project would provide curb extensions (bulb-outs) at all four intersection corners.
- High-visibility, mid-block pedestrian crossing would be provided on Mandela Parkway between 5th and 7th Streets to align with the east-west pedestrian path within the project site. The mid-block crossing would also allow access between the bike station and the northbound Class 4 cycletrack on Mandela Parkway.

In addition, Recommendation 2 would either signalize or implement other modifications at the 7th Street/Chester Street intersection which would improve pedestrian crossings across 7th Street. The following recommendations are provided to further enhance pedestrian access for the project site:

Recommendation 4: While not required to address a CEQA impact, the following should be considered as part of the final design for the project:

- Explore the feasibility of (and implement, if feasible) installing curb extensions (bulb-outs) and directional curb ramps with truncated domes at the following locations:
    - Southwest corner of the 7th Street/Chester Street intersection.
    - All four corners of the 5th Street/Mandela Parkway intersection and curb extensions (bulb-outs) across the 5th Street approaches of the southwest and northeast corners.
- Provide all-way stop control at the 5th Street/Center Street and 5th Street/Chester Street intersection.
- If reviewed and approved by BART and Oakland Fire Department, provide rolled curb instead of curb cuts for emergency vehicle access points on Chester Street and Mandela Parkway.
- Install a pedestrian scramble at the 7th Street/Center Street intersection.
- Install improvement measures at the proposed mid-block crossing on Mandela Parkway, such as raised crosswalk, RRFB, or other measures as approved by the City of Oakland.

Recommendation 5: While not required to address a CEQA impact, the following should be considered as part of the final design for the project:

- Coordinate with the City of Oakland and the appropriate property owners to determine the feasibility of and if deemed feasible, complete the sidewalk gap on the south side of 5th Street just east of Center Street.

Transit Access

Transit service providers in the vicinity of the proposed project include BART and AC Transit.

BART provides regional rail service throughout the East Bay and across the San Francisco Bay. The proposed project is located adjacent to the West Oakland BART station. The project would eliminate the majority of the existing parking spaces used by BART rider. The project would continue to provide and enhance pedestrian and bicycle access for the BART station as described above.

Currently, the BART station is served by Lines 14, 29, 36, and 62. All bus routes are currently accommodated within the BART station and described in **Table 5**. In addition, 7th Street also accommodates bus stops for Lines 29 and 62, as well as intercity buses (Mega Bus and Bolt), and other shuttle services.

TABLE 5
AC TRANSIT ROUTES AND HEADWAYS

Line	Description	Layover at West Oakland BART	Weekday Hours of Operation	Weekday Headways[1]	Weekend Hours of Operation	Weekend Headways[1]
14	Fruitvale BART to West Oakland BART via 14th Street	10-20 min	5:00 AM – 11:00 PM	15 min	6:30 AM – 11:15 PM	30 min
29	Emeryville Public Market to Lakeshore via Peralta Street and 10th Street	n/a	6:00 AM – 10:45 PM	20 (30) min	6:00 AM – 10:45 PM	30 min
36	UC Berkeley to West Oakland BART via Adeline Street	10-20 min	6:00 AM – 12:45 AM	30 min	6:00 AM – 12:45 AM	30 min
62	Fruitvale BART to West Oakland BART via 7th Street	10-20 min	5:45 AM – 12:45 AM	15 (20) min	6:15 AM – 12:45 AM	20 (30) min

Notes:
1. Headways in parentheses show off-peak headways if different from peak headways.
Source: AC Transit and Fehr & Peers, 2019.

The proposed project would not be able to accommodate the bus stops within the project site and proposes the following modifications:

- The project would provide a bus stop/layover zone along the project frontage on 5th Street just west of Mandela Parkway. The bus zone would be at least 170 feet long and a concrete

bus pad would also be installed in the roadway. The bus stop and layover for AC Transit Lines 36 and 62 could be relocated to this location.

- The existing bus stop on eastbound 7th Street west of Mandel Parkway would be retained and extended for an approximate length of 270 feet. This stop could serve AC Transit Lines 29, 36, and 62 and could serve as both a stop and layover space for AC Transit Line 14. The bus stop would be located on a 10-foot bus island that separates the Class 4 cycletrack along this segment of 7th Street. A new bus stop would be installed on westbound 7th Street just west of Center Street that could serve AC Transit Line 29. The bus stop would be about 130 feet long. The bus stop would be located on a 10-foot bus island that separates the Class 4 cycletrack along this segment of 7th Street.
- The sidewalks along project frontage on 5th and 7th Street would have adequate width and would accommodate a high level of passenger amenities, including shelters with seating, maps and other information, and real-time bus arrival information; trash receptacles; and lighting. In addition, the roadway pavement would be upgraded to provide concrete pads for the bus stops.
- To facilitate buses turning from northbound Chester Street to eastbound 7th Street, Chester Street is redesigned so that buses are positioned closer to the center line of Chester Street, which would improve current conditions for buses. Due to the tight turning radius of the corner, buses cannot make the turn from Chester Street to 7th Street when positioned close to the curb on northbound Chester Street.

  Recommendation 6: While not required to address a CEQA impact, the following should be considered as part of the final design for the project:

  - Consider designating a bus stop for intercity coaches (e.g., Megabus and Bolt) and other shuttles on 7th Street between Henry and Chester Streets.

Off-street Automobile Parking Requirements

The *City of Oakland Municipal Code* sets minimum and maximum parking requirements. According to Section 17.116.060, the residential component of the project has minimum required parking of 0.5 spaces per unit and maximum allowable parking of 1.25 spaces per unit. According to Section 17.116.110, this parking requirement can be reduced by 30 percent for projects within a Transit Accessible Area[2] and by 20 percent for projects that provide on-site carshare spaces at the level

[2] "Transit Accessible Area" means the area within one-half mile of a: (1) BART Station; (2) BRT Station; (3) designated rapid bus line; or (4) transit stop served by a frequency of service interval of fifteen (15) minutes or less during the morning and afternoon peak commute periods. (Section 17.09.040)

described in Section 17.116.105. For projects with 600 to 800 residential units, Section 17.116.105 requires four carshare spaces.

For the retail and office components of the project, Section 17.116.090 does not require any parking to be provided, maximum allowable parking of 1.0 spaces for each 300 square feet of ground floor area and 1.0 spaces per 500 square feet of above ground floor area.

Table 6 presents the off-street automobile parking requirements for the proposed project, per City of Oakland Municipal Code. Because the project is located within one-half mile of a BART station and provides six on-site carshare spaces, residential parking requirements are reduced by a total of 50 percent. Overall, the project is required to provide a minimum of 191 spaces, with a maximum of 1,968 spaces allowed. The proposed project would include 400 off-street parking spaces, more than the minimum requirement and less than the maximum allowed by City Code. Consistent with Code Section 17.116.310, all parking spaces would be leased separately from the rent of the dwelling units.

TABLE 6
AUTOMOBILE PARKING CODE REQUIREMENTS

Land Use	Size[1]	Required Off-Street Parking Supply		Provided Off-Street Parking Supply	Within Range?
		Minimum	Maximum		
Residential[2]	762 DU	191	953		
Office[3]	382.5 DU	0	765		
Retail[3]	75.0 KSF	0	250		
Total		**191**	**1,968**	**400**	**Yes**

Notes:
1. DU = Dwelling Unit, KSF = 1,000 square feet
2. The City of Oakland off-street parking requirement for two-family and multi-family residential in the S-15W zone is a minimum of 0.5 spaces per unit, with a maximum of 1.25 spaces per unit (Section 17.116.060). The minimum is reduced to 0.25 spaces per unit for this project due to its location in a Transit Accessible Area and because it provides at least four carshare space for a project between 600 and 800 multifamily units (Section 17.116.110).
3. The City of Oakland does not have a minimum off-street parking requirement for Commercial Activities in the S-15W zone and allows a maximum of 1.0 spaces per 300 square feet of ground floor area and 1.0 spaces per 500 feet of above ground floor area.

Source: Fehr & Peers, 2019.

On-Street Parking and Curb Use

Most streets currently provide unrestricted parking along both sides of the street in the vicinity of the project side except the following:

- On-street parking is currently prohibited along the project frontage on 7th Street and the east side of Mandela Parkway between 5th and 7th Streets.
- On-street parking along the north side of 7th Street between Mandela Parkway and Center Street is limited to two-hours from 8:00 AM to 6:00 PM Monday through Saturday
- On-Street parking on south side of 5th Street between Chester and Center Street, on the west side Chester Street between 5th and 7th Street and many of the residential streets to the south, west, and north of the site is controlled by residential parking permit (RPP), where vehicles without RPP are restricted to a two-hour time limit between 8:00 AM and 6:00 PM Monday through Saturday except for those with a residential parking permit.

The project site currently contains surface parking lots providing 413 parking spaces for BART riders. About 80 feet of white curb for passenger loading/unloading and about 20 feet of blue curb for accessible loading/unloading is provided on an internal drive aisle adjacent to the BART station entrance. The project would eliminate the internal loading zones and surface parking lots. The project would relocate the passenger loading zones to the streets along the project frontage, which can be used for both BART riders and project residents, workers, and visitors. The project proposes the following uses for the curbs in the project vicinity:

- The following would be designated for passenger loading and unloading:
    - Approximately 100 feet of linear curb along the north side of 5th street east of Center Street and about 200 feet west of Center Street
    - Approximately 250 feet of linear curb along eastbound 7th Street between Chester and Center Streets, with about 50 feet of curb on eastbound 7th Street just west of Center Street designated as a blue accessible loading zone
- Parking would be prohibited at the following locations:
    - On both sides of Mandela Parkway between 5th and 7th Street
    - On the east side of Chester Street between 5th and 7th Streets and on the west side of Chester Street for about 100 feet south of 7th Street.

The proposed space for passenger loading is much greater than the approximately 100 feet of linear white curb currently available at the station. The West Oakland station has one of the highest shares of pick-up/drop-off access modes, and that condition is likely to continue in the future considering the removal of parking and the station's location within the BART system and its proximity to I-880.

INTERSECTION OPERATIONS

Intersection operations under Existing Conditions and Existing Plus Project conditions were analyzed for the six study intersections. The traffic volumes, intersection lane configurations, and traffic controls presented on **Figure 1** form the basis for the intersection level of service (LOS) analysis under Existing Conditions.[3] The project trip assignment was added to the Existing Conditions peak hour traffic volumes to estimate the Existing plus Project peak hour traffic volumes, as shown on **Figure 2**.

The Existing Plus Project analysis also accounts for the modifications to the streets as proposed by the project or as recommended in this memorandum. The main modifications that would affect intersection operations include:

- 7th Street/Mandela Parkway intersection:
    - Convert the existing through/right-turn lane on the westbound 7th Street approach to a right-turn/bus only lane, and remove the merge lane on westbound 7th Street west of the intersection
    - Modify the signal timings at the intersection to provide a bus only phase for the westbound approach, and reduce the signal cycle length to 90 seconds
- 7th Street/Center Street intersection:
    - Modify signal timings at the intersection to provide a pedestrian scramble phase.
- 7th Street/Chester Street intersection:
    - Convert intersection from side-street stop-controlled to signalized operations with protected left-turn phasing for the east/west 7th Street approaches.

[3] The operations of roadway facilities are typically described with the term level of service (LOS), a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, which reflects free-flow conditions where there is very little interaction between vehicles, to LOS F, where the vehicle demand exceeds the capacity and high levels of vehicle delay result. LOS E represents "at-capacity" operations. When traffic volumes exceed the intersection capacity, stop-and-go conditions result and a vehicle may wait through multiple signal cycles before passing through the intersection; these operations are designated as LOS F.

- 5th Street/Chester Street and 5th Street/Center Street:
    - Convert intersections from side-street stop-controlled to all-way stop-controlled.

Table 7 summarizes the results of the intersection operations analysis under Existing Conditions and Existing Plus Project conditions. **Appendix B** provides the detailed intersection LOS calculation worksheets.

TABLE 7
EXISTING AND EXISTING PLUS PROJECT CONDITIONS
STUDY INTERSECTION LOS SUMMARY

Intersection	Traffic Control[1]	Peak Hour	Existing		Exiting Plus Project	
			Delay[2] (seconds)	LOS[2]	Delay[2] (seconds)	LOS[2]
1. 7th Street/Chester Street	SSSC/ Signalized[4]	AM PM	10 (23) 8 (29)	A (C) A (D)	26 27	C C
2. 7th Street/Center Street[3]	Signalized	AM PM	3 4	A A	3 3	A A
3. 7th Street/Mandela Parkway	Signalized	AM PM	33 34	C C	29 28	C C
4. 5th Street/Chester Street	SSSC/ AWSC[5]	AM PM	4 (10) 4 (11)	A (A) A (B)	8 5	A A
5. 5th Street/Center Street	SSSC/ AWSC[5]	AM PM	1 (9) 1 (10)	A (A) A (A)	9 9	A A
6. 5th Street/Mandela Parkway	Signalized	AM PM	8 9	A A	9 9	A A

1. SSSC = Side-Street Stop-Controlled; AWSC = All-Way Stop-Controlled
2. Average intersection delay and LOS based on the 2010 HCM method except where noted. Average delay is reported for signalized intersections. Average and worst-approach delays, respectively, are reported for side-street stop controlled intersections.
3. Average intersection delay and LOS based on HCM 2000 because the intersection cannot be accurately evaluated in the 2010 HCM.
4. Side-street stop-controlled under Existing conditions; signalized under Existing Plus Project conditions.
5. Side-street stop-controlled under Existing conditions; all-way stop-controlled under Existing Plus Project conditions.

Source: Fehr & Peers, 2019.

All study intersections operate at LOS D or better under both Existing Conditions and Existing Plus Project conditions. Note that the northbound approach at the 7th Street/Chester Street intersection would operate at LOS F during both the AM and PM peak hours under Existing Plus Project conditions if the intersection remains side-street stop-controlled. The 7th Street/Chester Street

intersection would meet the MUTCD Peak Hour Signal Warrant under Existing Plus Project conditions. The intersection would operate at LOS C during both AM and PM peak hours with a signalized intersection.

COLLISION ANALYSIS

A five-year history (January 1, 2013 to December 31, 2017) of collision data in the study area was obtained from the Statewide Integrated Traffic Records System (SWITRS) and evaluated for this collision analysis. **Table 8** summarizes the collision data by type and location, and **Table 9** summarizes the collision data by severity and location.

As shown in Table 8, 24 collisions were reported adjacent to the project site during this five-year period. The most common collision type was broadside (25 percent), and the most frequent primary collision factor violation category was vehicles making an improper turn (33 percent). Pedestrians were involved in three (13 percent) and bicyclists were also involved in three (13 percent) of the reported collisions. Of the 24 reported collisions, 12 (50 percent) resulted in injuries, and none resulted in fatalities, as shown in Table 9.

The Highway Safety Manual (HSM, Predictive Method - Volume 2, Part C) provides a methodology to predict the number of collisions for intersections and street segments based on roadway and intersection characteristics like vehicle and pedestrian volumes, number of lanes, signal phasing, on-street parking, and number of driveways. **Table 10** presents the predicted collision frequencies for the six study intersections and six study segments using the HSM Predictive Method for Urban and Suburban Arterials and compares predicted collision frequencies to reported collision frequencies. **Appendix C** provides detailed predicted collision frequency calculation sheets based on the HSM methodology. Intersections or roadway segments with collision frequency greater than the predicted frequency should have their collision trends and potential roadway or intersection modifications evaluated in greater detail.

TABLE 8
SUMMARY OF COLLISIONS BY TYPE

Location	Head-on	Sideswipe	Rear-End	Broadside	Hit Object	Pedestrian-Involved	Bicycle-Involved	Total
Intersection								
7th Street/Chester Street	0	1	1	1	0	0	0	3
7th Street/Center Street	0	0	1	0	0	0	0	1
7th Street/Mandela Parkway	0	3	1	0	0	2	2	8
5th Street/Chester Street	0	0	0	0	0	0	0	0
5th Street/Center Street	0	0	0	0	0	0	0	0
5th Street/Mandela Parkway	0	0	0	1	1	1	0	3
Roadway Segment								
7th Street between Chester Street and Center Street	0	0	0	1	0	0	0	1
7th Street between Center Street and Mandela Parkway	0	0	0	0	0	0	0	0
5th Street between Chester Street and Center Street	0	0	0	0	0	0	0	0
5th Street between Center Street and Mandela Parkway	0	0	0	0	1	0	0	1
Chester Street between 7th Street and 5th Street	0	0	0	0	0	0	1	1
Mandela Parkway between 7th Street and 5th Street	1	1	1	3	0	0	0	6
Total	**1**	**5**	**4**	**6**	**2**	**3**	**3**	**24**

Notes:
1. Based on SWITRS five-year collision data reported from January 1, 2013 to December 31, 2017.

Source: SWITRS, Fehr & Peers, 2019.

TABLE 9
SUMMARY OF COLLISION SEVERITY

Location	Property Damage Only	Injury Collisions	Fatality Collisions	Total	Person-Injuries			
					Bike	Ped	Driver/ Passenger	Total
Intersection								
7th Street/Chester Street	2	1	0	3	0	0	1	1
7th Street/Center Street	1	0	0	1	0	0	0	0
7th Street/Mandela Parkway	2	6	0	8	2	2	3	7
5th Street/Chester Street	0	0	0	0	0	0	0	0
5th Street/Center Street	0	0	0	0	0	0	0	0
5th Street/Mandela Parkway	2	1	0	3	0	1	0	1
Roadway Segment								
7th Street between Chester Street and Center Street	0	1	0	1	0	0	3	3
7th Street between Center Street and Mandela Parkway	0	0	0	0	0	0	0	0
5th Street between Chester Street and Center Street	0	0	0	0	0	0	0	0
5th Street between Center Street and Mandela Parkway	1	0	0	1	0	0	0	0
Chester Street between 7th Street and 5th Street	0	1	0	1	1	0	0	1
Mandela Parkway between 7th Street and 5th Street	4	2	0	6	0	0	2	2
Total	**12**	**12**	**0**	**24**	**3**	**3**	**9**	**15**

Notes:

1. Based on SWITRS five-year collision data reported from January 1, 2013 to December 31, 2017.

Source: SWITRS, Fehr & Peers, 2019.

TABLE 10
PREDICTED AND ACTUAL COLLISION FREQUENCIES

Location	Predicted Collision Frequency[1] (per year)	Actual Collision Frequency[2] (per year)	Difference	Higher Than Predicted?
Intersection				
7th Street/Chester Street	0.8	0.6	-0.2	No
7th Street/Center Street	0.6	0.2	-0.4	No
7th Street/Mandela Parkway	2.0	1.6	-0.4	No
5th Street/Chester Street	0.4	0.0	-0.4	No
5th Street/Center Street	0.2	0.0	-0.2	No
5th Street/Mandela Parkway	1.3	0.6	-0.7	No
Roadway Segment				
7th Street between Chester Street and Center Street	0.3	0.2	-0.1	No
7th Street between Center Street and Mandela Parkway	0.2	0.0	-0.2	No
5th Street between Chester Street and Center Street	0.1	0.0	-0.1	No
5th Street between Center Street and Mandela Parkway	0.6	0.2	-0.4	No
Chester Street between 7th Street and 5th Street	0.1	0.0	-0.1	No
Mandela Parkway between 7th Street and 5th Street	0.4	1.2	0.8	**Yes**

Notes:

1. Based on the Highway Safety Manual Predictive Method (Volume 2, Part C)
2. Based on five-year collision data reported from January 1, 2013 to December 31, 2017.

Source: Fehr & Peers, 2019

As shown in Table 10, all study locations had a lower reported collision frequency than predicted by the HSM, except for Mandela Parkway between 7th Street and 5th Street. The collisions along this segment mostly occurred near the BART station driveway on the west side of the street. Sight distance between the vehicles exiting the BART driveway and vehicles traveling northbound on Mandela Parkway is limited due to on-street parking on the west side street. Half of the collisions along this street segment were broadside collisions, which is consistent with the limited sight distance at the BART driveway. The project would eliminate the BART station driveway, and on-street parking, which would improve safety along this segment of Mandela Parkway. Thus, no additional modifications related to roadway safety beyond the ones provided in this memorandum are recommended.

CONCLUSION

Per the site plan review, the project would have adequate automobile, bicycle, pedestrian, and transit access and circulation with the inclusion of **Recommendations 1** through **6**.

Please contact Sam Tabibnia (s.tabibnia@fehrandpeers.com or 510-835-1943) with questions or comments.

ATTACHMENTS

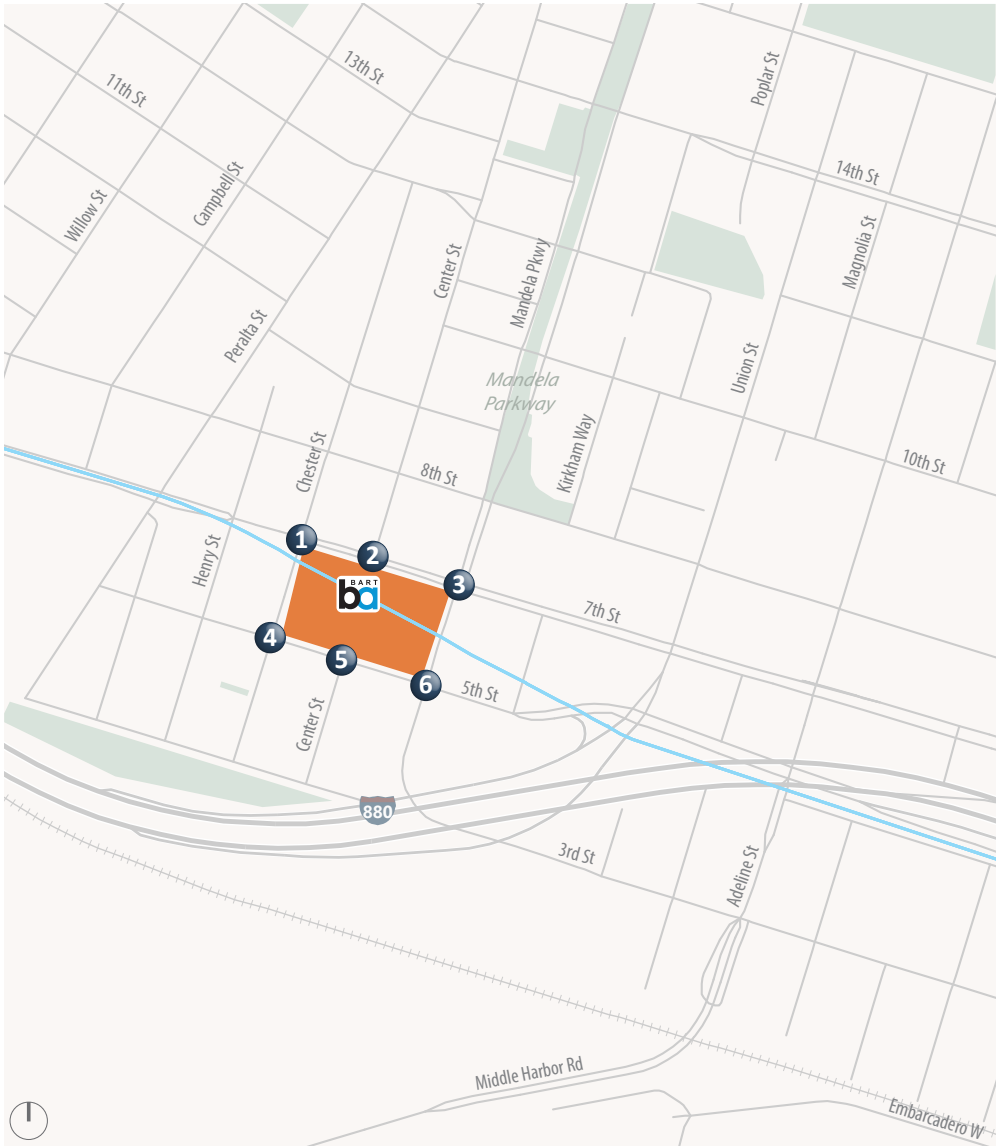
Figure 1 - Existing Conditions Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

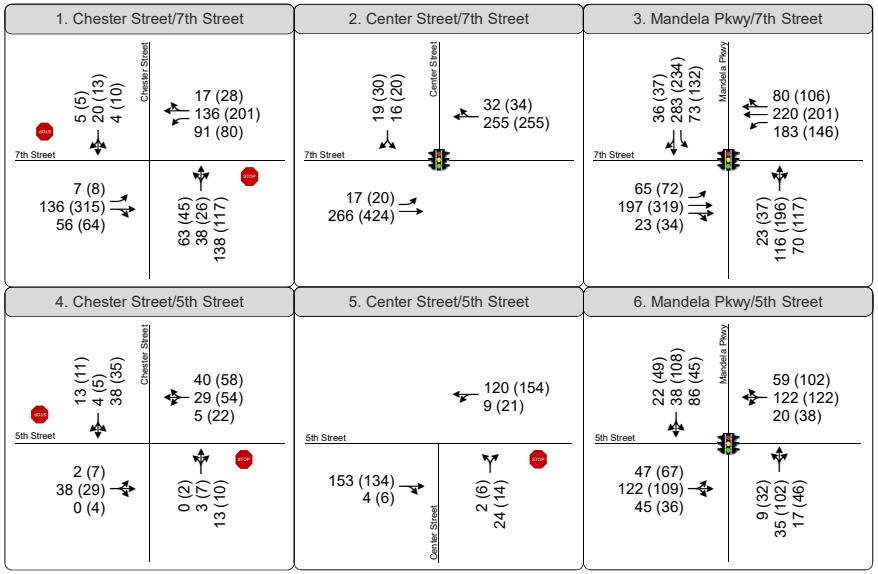
Figure 2 - Existing Plus Project Peak Hour Intersection Traffic Volumes, Lane Configurations and Traffic Controls

Appendix A – Traffic Counts

Appendix B – Intersection Analysis Worksheets

Appendix C – Predicted Crash Frequency Calculation Sheets



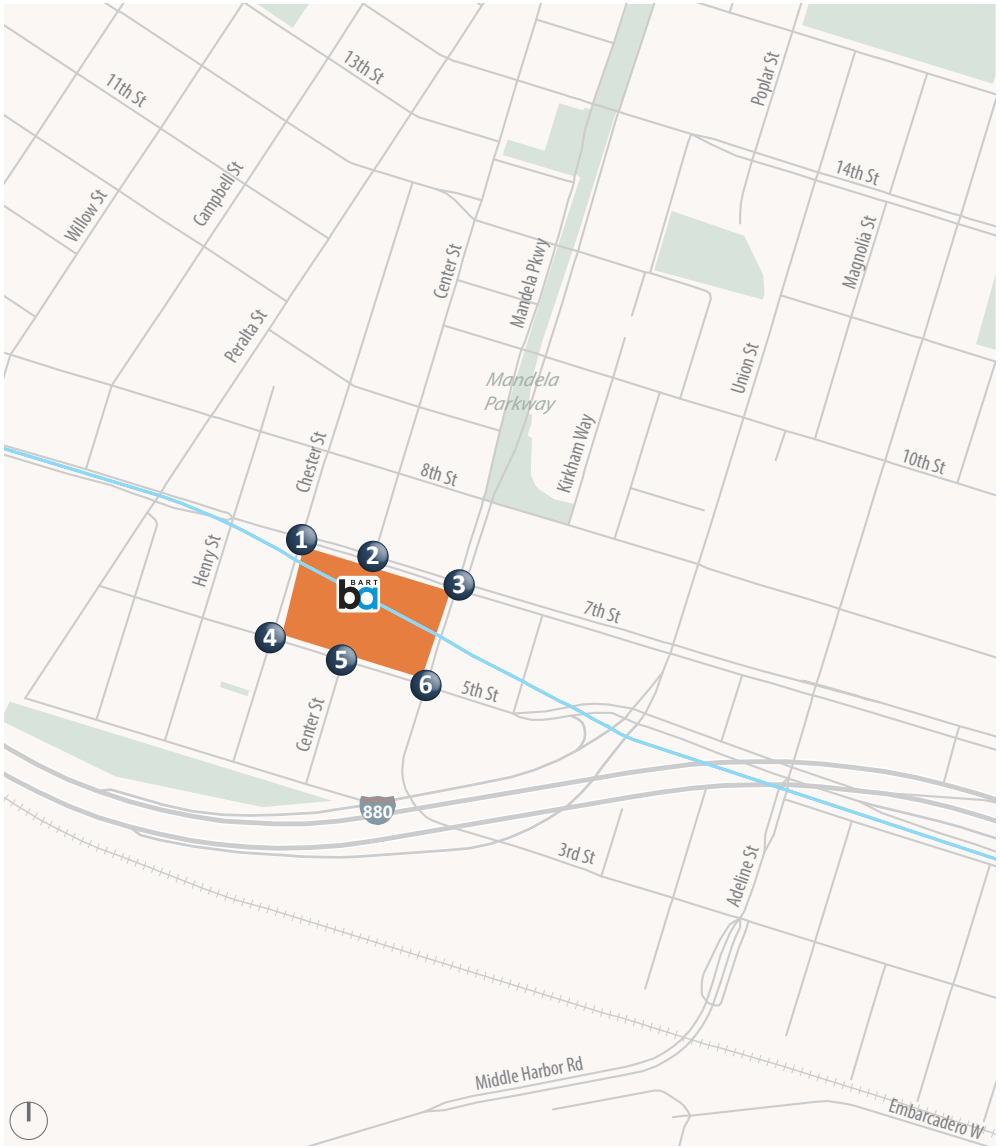


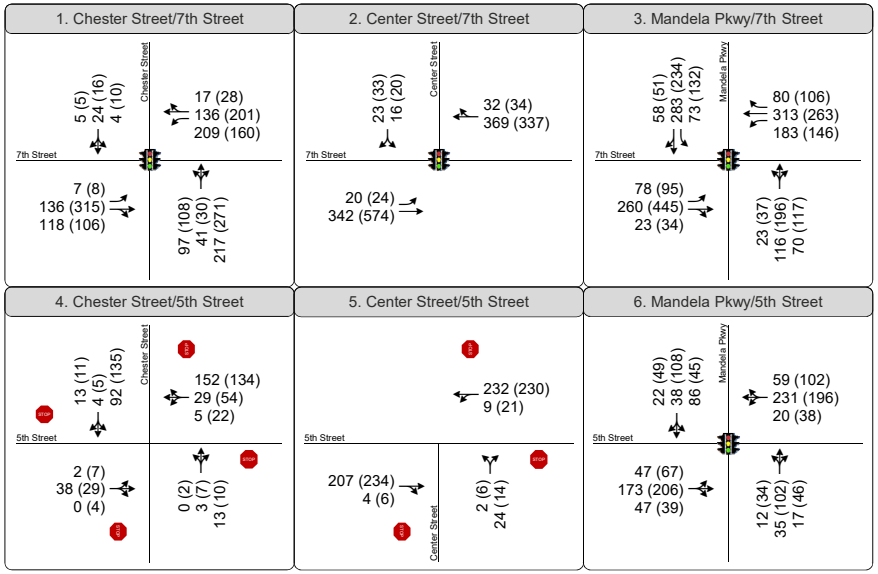
XX (YY) AM (PM) Peak Hour Traffic Volumes Signalized Intersection Stop Sign

Project Site # Study Intersection

Figure 1

Existing Peak Hour
Intersection Traffic Volumes, Lane Configurations and Traffic Controls





XX (YY) AM (PM) Peak Hour Traffic Volumes

Signalized Intersection

Stop Sign

Project Site

Study Intersection

Figure 2

Existing with Project Peak Hour
Intersection Traffic Volumes, Lane Configurations and Traffic Controls

APPENDIX A
TRAFFIC COUNTS

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chester St & 7th St
City: Oakland
Control: 2-Way Stop(NB/SB)

Project ID: 18-08661-001
Date: 12/12/2018

Total

NS/EW Streets:	Chester St				Chester St				7th St				7th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	11	6	16	0	2	4	0	0	0	29	12	0	13	41	4	0	138
7:15 AM	19	4	26	0	2	4	3	0	0	30	13	0	16	24	0	0	141
7:30 AM	9	13	31	2	2	7	1	0	0	35	11	0	20	30	5	1	167
7:45 AM	17	7	41	0	2	2	0	0	0	28	10	0	19	29	6	0	161
8:00 AM	17	6	27	0	0	4	0	0	2	36	13	2	24	33	5	0	169
8:15 AM	18	18	32	0	0	8	2	0	1	33	19	0	20	37	2	1	191
8:30 AM	11	7	38	0	2	6	3	0	2	39	14	0	27	37	4	0	190
8:45 AM	12	12	33	1	1	8	1	0	0	28	4	0	12	29	3	0	144
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	114	73	244	3	11	43	10	0	5	258	96	2	151	260	29	2	1301
APPROACH %'s :	26.27%	16.82%	56.22%	0.69%	17.19%	67.19%	15.63%	0.00%	1.39%	71.47%	26.59%	0.55%	34.16%	58.82%	6.56%	0.45%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	63	38	138	0	4	20	5	0	5	136	56	2	90	136	17	1	711
PEAK HR FACTOR :	0.875	0.528	0.841	0.000	0.500	0.625	0.417	0.000	0.625	0.872	0.737	0.250	0.833	0.919	0.708	0.250	0.931
	0.879				0.659				0.905				0.897				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	9	3	14	0	1	4	2	0	0	54	6	0	8	37	6	1	145
4:15 PM	8	4	27	0	2	6	1	0	4	64	10	0	10	29	3	0	168
4:30 PM	8	7	21	0	2	1	1	0	4	75	18	0	8	45	5	1	196
4:45 PM	10	10	24	0	2	3	3	0	4	87	12	0	10	43	3	0	211
5:00 PM	6	7	25	0	1	1	2	0	2	86	16	0	21	46	6	0	219
5:15 PM	16	8	34	0	2	3	1	0	2	73	17	0	20	58	3	1	238
5:30 PM	9	8	30	0	4	4	1	0	2	77	16	0	19	49	7	0	226
5:45 PM	14	3	28	0	3	5	1	0	2	79	15	0	18	48	12	1	229
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	80	50	203	0	17	27	12	0	20	595	110	0	114	355	45	4	1632
APPROACH %'s :	24.02%	15.02%	60.96%	0.00%	30.36%	48.21%	21.43%	0.00%	2.76%	82.07%	15.17%	0.00%	22.01%	68.53%	8.69%	0.77%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	45	26	117	0	10	13	5	0	8	315	64	0	78	201	28	2	912
PEAK HR FACTOR :	0.703	0.813	0.860	0.000	0.625	0.650	0.625	0.000	1.000	0.916	0.941	0.000	0.929	0.866	0.583	0.500	0.958
	0.810				0.778				0.930				0.942				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chester St & 7th St
City: Oakland
Control: 2-Way Stop(NB/SB)

Project ID: 18-08661-001
Date: 12/12/2018

Bikes

NS/EW Streets:	Chester St				Chester St				7th St				7th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	1 EL	1 ET	0 ER	0 EU	1 WL	1 WT	0 WR	0 WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
7:15 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3
7:30 AM	0	0	0	0	1	1	0	0	0	2	0	0	0	1	1	0	6
7:45 AM	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	3
8:00 AM	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	3
8:15 AM	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0	4
8:30 AM	1	0	0	0	1	1	0	0	0	2	1	0	0	0	0	0	6
8:45 AM	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	4
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	0	0	0	2	5	0	0	0	12	6	0	0	4	1	0	31
APPROACH %'s :	100.00%	0.00%	0.00%	0.00%	28.57%	71.43%	0.00%	0.00%	0.00%	66.67%	33.33%	0.00%	0.00%	80.00%	20.00%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	1	0	0	0	1	4	0	0	0	5	4	0	0	1	0	0	16
PEAK HR FACTOR :	0.250	0.000	0.000	0.000	0.250	1.000	0.000	0.000	0.000	0.625	1.000	0.000	0.000	0.250	0.000	0.000	0.667
	0.250				0.625				0.750				0.250				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	1 EL	1 ET	0 ER	0 EU	1 WL	1 WT	0 WR	0 WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	3	2	0	7
4:15 PM	1	1	2	0	0	0	0	0	0	0	1	0	0	1	0	0	6
4:30 PM	1	0	0	0	0	0	1	0	0	1	0	0	1	2	0	0	6
4:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	3	1	0	5
5:00 PM	0	0	0	0	0	0	1	0	1	0	0	0	1	2	2	0	7
5:15 PM	3	0	4	0	0	0	0	0	0	1	1	0	0	3	0	0	12
5:30 PM	2	0	1	0	1	0	0	0	0	1	2	0	1	4	0	0	12
5:45 PM	0	0	2	0	0	0	0	0	0	2	1	0	0	3	0	0	8
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	7	2	9	0	1	0	2	0	1	7	5	0	3	21	5	0	63
APPROACH %'s :	38.89%	11.11%	50.00%	0.00%	33.33%	0.00%	66.67%	0.00%	7.69%	53.85%	38.46%	0.00%	10.34%	72.41%	17.24%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	5	0	7	0	1	0	1	0	1	4	4	0	2	12	2	0	39
PEAK HR FACTOR :	0.42	0.000	0.438	0.000	0.250	0.000	0.250	0.000	0.250	0.500	0.500	0.000	0.500	0.750	0.250	0.000	0.813
	0.429				0.500				0.750				0.800				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chester St & 7th St
City: Oakland

Project ID: 18-08661-001
Date: 12/12/2018

Pedestrians (Crosswalks)

NS/EW Streets:	Chester St		Chester St		7th St		7th St		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	5	1	19	3	2	9	0	3	42
7:15 AM	6	2	21	3	1	19	0	0	52
7:30 AM	3	2	24	3	2	19	0	3	56
7:45 AM	5	3	18	1	2	18	1	3	51
8:00 AM	6	3	22	3	1	31	1	4	71
8:15 AM	3	2	22	1	1	17	0	2	48
8:30 AM	3	0	21	0	3	22	1	5	55
8:45 AM	4	2	26	5	2	13	1	4	57
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	35	15	173	19	14	148	4	24	432
APPROACH %'s :	70.00%	30.00%	90.10%	9.90%	8.64%	91.36%	14.29%	85.71%	
PEAK HR :	07:45 AM - 08:45 AM								TOTAL
PEAK HR VOL :	17	8	83	5	7	88	3	14	225
PEAK HR FACTOR :	0.708	0.667	0.943	0.417	0.583	0.710	0.750	0.700	0.792
	0.694		0.880		0.742		0.708		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	2	9	4	6	8	2	4	0	35
4:15 PM	5	8	7	9	10	4	0	0	43
4:30 PM	0	10	7	18	14	0	3	0	52
4:45 PM	5	8	9	16	7	3	4	3	55
5:00 PM	4	10	2	14	19	3	3	0	55
5:15 PM	5	12	6	21	22	2	2	2	72
5:30 PM	2	11	13	20	14	9	2	0	71
5:45 PM	8	15	4	13	14	5	1	0	60
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	31	83	52	117	108	28	19	5	443
APPROACH %'s :	27.19%	72.81%	30.77%	69.23%	79.41%	20.59%	79.17%	20.83%	
PEAK HR :	05:00 PM - 06:00 PM								TOTAL
PEAK HR VOL :	19	48	25	68	69	19	8	2	258
PEAK HR FACTOR :	0.594	0.800	0.481	0.810	0.784	0.528	0.667	0.250	0.896
	0.728		0.705		0.917		0.625		

National Data & Surveying Services

Intersection Turning Movement Count

Location: Center St & 7th St
City: Oakland
Control: Signalized

Project ID: 18-08661-002
Date: 12/12/2018

Total

NS/EW Streets:	Center St				Center St				7th St				7th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	0 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	1 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
7:00 AM	0	0	0	0	0	0	3	0	2	42	0	0	0	46	3	0	96
7:15 AM	0	0	0	0	6	0	4	0	2	58	0	0	0	41	7	0	118
7:30 AM	0	0	0	0	7	0	5	0	6	58	0	0	0	59	9	0	144
7:45 AM	0	0	0	0	2	0	3	0	3	73	0	0	0	58	3	0	142
8:00 AM	0	0	0	0	5	0	6	0	3	61	0	1	0	64	15	0	155
8:15 AM	0	0	0	0	4	0	7	0	5	59	0	0	0	59	10	0	144
8:30 AM	0	0	0	0	5	0	3	0	5	73	0	0	0	74	4	0	164
8:45 AM	0	0	0	0	5	0	4	0	1	62	0	0	0	50	10	0	132
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	34	0	35	0	27	486	0	1	0	451	61	0	1095
APPROACH %'s :					49.28%	0.00%	50.72%	0.00%	5.25%	94.55%	0.00%	0.19%	0.00%	88.09%	11.91%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	0	0	0	0	16	0	19	0	16	266	0	1	0	255	32	0	605
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.800	0.000	0.679	0.000	0.800	0.911	0.000	0.250	0.000	0.861	0.533	0.000	0.922
					0.795				0.907				0.908				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	0 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	1 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
4:00 PM	0	0	0	0	7	0	6	0	3	67	0	0	0	40	13	0	136
4:15 PM	0	0	0	0	6	0	5	0	2	101	0	0	0	36	11	1	162
4:30 PM	0	0	0	0	6	0	3	0	1	99	0	0	0	49	12	0	170
4:45 PM	0	0	0	0	5	0	4	0	6	101	0	1	0	48	10	0	175
5:00 PM	0	0	0	0	7	0	8	0	6	114	0	0	0	61	7	1	204
5:15 PM	0	0	0	0	6	0	10	0	3	102	0	0	0	68	11	0	200
5:30 PM	0	0	0	0	3	0	8	0	6	101	0	0	0	64	8	0	190
5:45 PM	0	0	0	0	4	0	4	0	3	107	0	2	0	61	8	0	189
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	44	0	48	0	30	792	0	3	0	427	80	2	1426
APPROACH %'s :					47.83%	0.00%	52.17%	0.00%	3.64%	96.00%	0.00%	0.36%	0.00%	83.89%	15.72%	0.39%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	0	0	0	0	20	0	30	0	18	424	0	2	0	254	34	1	783
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.714	0.000	0.750	0.000	0.750	0.930	0.000	0.250	0.000	0.934	0.773	0.250	0.960
					0.781				0.925				0.915				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Center St & 7th St
City: Oakland
Control: Signalized

Project ID: 18-08661-002
Date: 12/12/2018

Bikes

NS/EW Streets:	Center St				Center St				7th St				7th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	4	0	0	0	0	1	0	3	2	0	0	10
7:15 AM	0	6	0	0	0	2	0	0	0	0	0	0	2	2	0	0	12
7:30 AM	0	1	4	0	0	0	0	0	0	2	0	0	8	0	0	0	15
7:45 AM	0	0	1	0	0	7	0	0	0	1	0	0	0	1	0	0	10
8:00 AM	0	10	2	0	0	5	0	0	0	0	0	0	11	1	0	0	29
8:15 AM	0	2	1	0	0	3	0	0	0	0	0	0	8	0	0	0	14
8:30 AM	0	5	6	0	0	6	0	0	0	1	0	0	7	0	0	0	25
8:45 AM	0	1	1	0	0	4	0	0	0	1	0	0	10	0	0	0	17
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	25	15	0	0	31	0	0	0	5	1	0	49	6	0	0	132
APPROACH %'s :	0.00%	62.50%	37.50%	0.00%	0.00%	100.00%	0.00%	0.00%	0.00%	83.33%	16.67%	0.00%	89.09%	10.91%	0.00%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	0	17	10	0	0	21	0	0	0	2	0	0	26	2	0	0	78
PEAK HR FACTOR :	0.000	0.425	0.417	0.000	0.000	0.750	0.000	0.000	0.000	0.500	0.000	0.000	0.591	0.500	0.000	0.000	0.672
	0.563				0.750				0.500				0.583				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	2	1	2	0	0	1	0	0	1	1	0	0	0	0	0	0	8
4:15 PM	0	1	4	0	0	1	0	0	0	2	0	0	2	1	0	0	11
4:30 PM	2	1	5	0	0	4	1	0	0	1	0	0	2	0	0	0	16
4:45 PM	1	3	8	0	0	4	1	0	0	0	0	0	3	1	0	0	21
5:00 PM	1	1	8	0	1	2	0	0	0	1	0	0	6	1	0	1	22
5:15 PM	1	2	9	0	0	1	0	0	0	1	0	0	5	4	0	0	23
5:30 PM	0	4	3	0	0	1	0	0	0	2	0	0	7	2	1	0	20
5:45 PM	0	6	6	0	0	3	0	0	0	0	0	0	3	3	0	0	21
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	7	19	45	0	1	17	2	0	1	8	0	0	28	12	1	1	142
APPROACH %'s :	9.86%	26.76%	63.38%	0.00%	5.00%	85.00%	10.00%	0.00%	11.11%	88.89%	0.00%	0.00%	66.67%	28.57%	2.38%	2.38%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	2	13	26	0	1	7	0	0	0	4	0	0	21	10	1	1	86
PEAK HR FACTOR :	0.50	0.542	0.722	0.000	0.250	0.583	0.000	0.000	0.000	0.500	0.000	0.000	0.750	0.625	0.250	0.250	0.935
	0.854				0.667				0.500				0.825				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Center St & 7th St
City: Oakland

Project ID: 18-08661-002
Date: 12/12/2018

Pedestrians (Crosswalks)

NS/EW Streets:	Center St		Center St		7th St		7th St		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	4	1	0	0	1	7	7	14	34
7:15 AM	5	5	0	0	5	10	19	32	76
7:30 AM	3	1	0	0	3	17	15	26	65
7:45 AM	2	3	0	0	4	12	8	22	51
8:00 AM	1	1	0	0	6	17	5	29	59
8:15 AM	2	2	0	0	4	17	11	33	69
8:30 AM	2	2	0	0	5	17	1	25	52
8:45 AM	3	3	0	0	2	16	5	19	48
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	22	18	0	0	30	113	71	200	454
APPROACH %'s :	55.00%	45.00%			20.98%	79.02%	26.20%	73.80%	
PEAK HR :	**07:45 AM - 08:45 AM**								TOTAL
PEAK HR VOL :	7	8	0	0	19	63	25	109	231
PEAK HR FACTOR :	0.875	0.667			0.792	0.926	0.568	0.826	0.837
	0.750				0.891		0.761		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	7	3	0	0	7	4	17	7	45
4:15 PM	4	10	0	0	11	0	26	4	55
4:30 PM	9	5	0	0	8	4	32	11	69
4:45 PM	8	2	0	0	8	8	32	10	68
5:00 PM	9	5	0	0	8	4	32	18	76
5:15 PM	10	4	0	0	16	5	29	9	73
5:30 PM	6	7	0	0	15	6	15	9	58
5:45 PM	9	5	0	0	26	2	42	10	94
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	62	41	0	0	99	33	225	78	538
APPROACH %'s :	60.19%	39.81%			75.00%	25.00%	74.26%	25.74%	
PEAK HR :	**05:00 PM - 06:00 PM**								TOTAL
PEAK HR VOL :	34	21	0	0	65	17	118	46	301
PEAK HR FACTOR :	0.850	0.750			0.625	0.708	0.702	0.639	0.801
	0.982				0.732		0.788		

National Data & Surveying Services

Intersection Turning Movement Count

Location: Mandela Pkwy & 7th St
City: Oakland
Control: Signalized

Project ID: 18-08661-003
Date: 12/12/2018

Total

NS/EW Streets:	Mandela Pkwy					Mandela Pkwy					7th St					7th St											
AM	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					NORTHBOUND2						
	0	1	0	0	0	1	1	0	0	0	1	2	0	0	0	1	2	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
7:00 AM	5	17	14	0	0	10	44	4	2	3	10	30	6	0	2	30	42	8	0	5		0	0	0	1	0	233
7:15 AM	3	11	18	0	0	7	53	1	1	0	13	40	5	0	1	35	45	14	0	1		0	0	0	2	0	250
7:30 AM	2	23	15	0	0	13	55	9	0	2	11	51	7	0	0	40	57	9	1	4		0	0	0	0	0	299
7:45 AM	3	19	16	0	0	11	60	6	1	3	14	56	7	0	1	39	52	22	0	7		0	0	0	1	0	318
8:00 AM	8	29	18	0	0	13	79	5	2	4	21	40	3	0	0	44	58	20	0	9		0	0	0	0	0	353
8:15 AM	7	23	20	0	0	19	69	10	4	1	13	44	7	0	0	49	49	22	0	6		0	0	1	0	0	344
8:30 AM	5	45	16	0	0	22	75	15	1	5	17	57	6	0	0	51	61	16	0	10		0	0	0	0	0	402
8:45 AM	7	31	13	0	0	20	55	7	1	2	13	41	7	0	2	34	44	15	0	4		0	0	0	0	0	296
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
TOTAL VOLUMES :	40	198	130	0	0	115	490	57	12	20	112	359	48	0	6	322	408	126	1	46	0	0	0	1	4	0	2495
APPROACH %'s :	10.87%	53.80%	35.33%	0.00%	0.00%	16.57%	70.61%	8.21%	1.73%	2.88%	21.33%	68.38%	9.14%	0.00%	1.14%	35.66%	45.18%	13.95%	0.11%	5.09%	0.00%	0.00%	0.00%	20.00%	80.00%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																										TOTAL
PEAK HR VOL :	23	116	70	0	0	65	283	36	8	13	65	197	23	0	1	183	220	80	0	32	0	0	0	1	1	0	1417
PEAK HR FACTOR :	0.719	0.644	0.875	0.000	0.000	0.739	0.896	0.600	0.500	0.650	0.774	0.864	0.821	0.000	0.250	0.897	0.902	0.909	0.000	0.800	0.000	0.000	0.000	0.250	0.250	0.000	0.881
			0.792					0.858					0.894					0.933						0.500			

PM	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					NORTHBOUND2						
	0	1	0	0	0	1	1	0	0	0	1	2	0	0	0	1	2	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
4:00 PM	7	40	20	0	0	25	38	8	1	4	19	56	4	0	2	23	39	20	0	1		0	0	0	0	0	307
4:15 PM	6	42	26	0	0	26	28	8	0	3	24	68	8	0	0	26	32	11	0	2		0	0	0	0	0	310
4:30 PM	6	42	34	0	0	31	50	10	0	5	11	93	3	0	3	34	43	23	1	0		0	0	1	0	0	390
4:45 PM	7	47	26	0	0	32	51	10	3	4	17	82	6	0	1	33	46	35	0	4		0	0	0	0	0	404
5:00 PM	8	50	36	0	0	34	51	10	1	1	21	81	6	0	3	25	41	25	1	7		0	0	1	1	0	403
5:15 PM	13	53	23	0	0	25	59	7	5	2	20	84	9	0	3	43	61	21	0	3		0	0	0	8	0	439
5:30 PM	9	46	32	0	0	31	73	10	1	4	14	72	13	0	2	43	53	25	1	3		0	0	0	2	0	434
5:45 PM	9	56	30	0	0	25	52	10	0	2	20	75	14	0	0	26	43	15	2	5		0	1	0	1	0	386
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
TOTAL VOLUMES :	65	376	227	0	0	229	402	73	11	25	146	611	63	0	14	253	358	175	5	25	0	0	1	2	12	0	3073
APPROACH %'s :	9.73%	56.29%	33.98%	0.00%	0.00%	30.95%	54.32%	9.86%	1.49%	3.38%	17.51%	73.26%	7.55%	0.00%	1.68%	31.00%	43.87%	21.45%	0.61%	3.06%	0.00%	0.00%	6.67%	13.33%	80.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																										TOTAL
PEAK HR VOL :	37	196	117	0	0	122	234	37	10	11	72	319	34	0	9	144	201	106	2	17	0	0	0	1	11	0	1680
PEAK HR FACTOR :	0.712	0.925	0.813	0.000	0.000	0.897	0.801	0.925	0.500	0.688	0.857	0.949	0.654	0.000	0.750	0.837	0.824	0.757	0.500	0.607	0.000	0.000	0.000	0.250	0.344	0.000	0.957
			0.931					0.870					0.935					0.918						0.375			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Mandela Pkwy & 7th St
City: Oakland
Control: Signalized

Project ID: 18-08661-003
Date: 12/12/2018

Bikes

NS/EW Streets:	Mandela Pkwy					Mandela Pkwy					7th St					7th St											
AM	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					NORTHBOUND2						
	0	1	0	0	0	1	1	0	0	0	1	2	0	0	0	1	2	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
7:00 AM	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	1	0	0	0	0		0	0	0	0	0	9
7:15 AM	0	1	0	0	0	0	1	2	0	0	0	1	2	0	0	0	1	0	0	0		0	0	0	0	0	8
7:30 AM	1	0	0	0	0	0	5	8	0	0	5	1	1	0	0	0	1	0	0	0		0	0	0	0	0	22
7:45 AM	0	1	0	0	0	0	3	4	0	0	3	2	0	0	0	0	0	0	0	0		0	0	0	0	0	13
8:00 AM	0	0	0	0	0	0	9	12	0	0	1	0	0	0	0	0	3	2	0	0		0	0	0	0	0	27
8:15 AM	0	1	0	0	0	0	10	6	0	0	2	0	0	0	0	0	2	0	0	0		0	0	0	0	0	21
8:30 AM	0	0	0	0	0	0	9	8	0	0	4	1	0	0	0	0	0	0	0	0		0	0	0	0	0	22
8:45 AM	0	0	0	0	0	0	8	8	0	0	5	0	0	0	0	0	0	0	0	0		0	0	0	0	0	21
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
TOTAL VOLUMES :	1	3	0	0	0	0	49	52	0	0	20	5	3	0	0	1	7	2	0	0	0	0	0	0	0	0	143
APPROACH %'s :	25.00%	75.00%	0.00%	0.00%	0.00%	0.00%	48.51%	51.49%	0.00%	0.00%	71.43%	17.86%	10.71%	0.00%	0.00%	10.00%	70.00%	20.00%	0.00%	0.00%							
PEAK HR :	07:45 AM - 08:45 AM																										TOTAL
PEAK HR VOL :	0	2	0	0	0	0	31	30	0	0	10	3	0	0	0	0	5	2	0	0	0	0	0	0	0	0	83
PEAK HR FACTOR :	0.000	0.500	0.000	0.000	0.000	0.000	0.775	0.625	0.000	0.000	0.625	0.375	0.000	0.000	0.000	0.000	0.417	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.769
			0.500					0.726					0.650					0.350									

PM	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					NORTHBOUND2						
	0	1	0	0	0	1	1	0	0	0	1	2	0	0	0	1	2	0	0	0	0	0	0	0	0	0	
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
4:00 PM	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0		0	0	0	0	0	3
4:15 PM	0	4	0	0	0	0	0	0	0	0	5	3	0	0	0	0	1	0	0	0		0	0	0	0	0	13
4:30 PM	0	6	0	0	0	0	0	3	0	0	6	1	0	0	0	0	1	0	0	0		0	0	0	0	0	17
4:45 PM	0	2	0	0	0	0	2	4	0	0	6	0	0	0	0	0	1	0	0	0		0	0	0	1	0	16
5:00 PM	0	3	0	0	0	0	0	3	0	0	10	1	0	0	0	0	5	2	0	0		0	0	0	0	0	24
5:15 PM	1	8	1	0	0	0	1	5	0	0	7	1	0	0	0	0	3	0	0	0		0	0	0	0	0	27
5:30 PM	1	7	0	0	0	0	3	6	0	0	5	2	0	0	0	1	2	0	0	0		0	0	0	0	0	27
5:45 PM	0	10	1	0	0	0	1	4	0	0	5	1	0	0	0	0	0	0	0	0		0	0	0	0	0	22
	NL	NT	NR	NU	NU2	SL	ST	SR	SU	ST2	EL	ET	ER	EU	ER2	WL	WT	WR	WU	WL2	N2L	N2U	N2L2	N2T2	N2R2	N2U2	TOTAL
TOTAL VOLUMES :	2	41	2	0	0	0	8	25	0	0	45	9	0	0	0	1	13	2	0	0	0	0	0	0	1	0	149
APPROACH %'s :	4.44%	91.11%	4.44%	0.00%	0.00%	0.00%	24.24%	75.76%	0.00%	0.00%	83.33%	16.67%	0.00%	0.00%	0.00%	6.25%	81.25%	12.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																										TOTAL
PEAK HR VOL :	2	20	1	0	0	0	6	18	0	0	28	4	0	0	0	1	11	2	0	0	0	0	0	0	1	0	94
PEAK HR FACTOR :	0.50	0.625	0.250	0.000	0.000	0.000	0.500	0.750	0.000	0.000	0.700	0.500	0.000	0.000	0.000	0.250	0.550	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.870
			0.575					0.667					0.727					0.500						0.250			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Mandela Pkwy & 7th St
City: Oakland
Project ID: 18-08611003
Date: 12/12/2018

Pedestrians (Crosswalks)

NS/EW Streets:	Mandela Pkwy		Mandela Pkwy		7th St		7th St				
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		SOUTH LEG 2		
	EB	WB	EB	WB	NB	SB	NB	SB	EB	WB	TOTAL
7:00 AM	0	0	2	5	0	0	0	0	2	5	14
7:15 AM	0	0	4	17	0	0	0	0	4	17	42
7:30 AM	0	0	5	15	0	0	0	0	5	15	40
7:45 AM	0	0	6	23	0	0	0	0	6	23	58
8:00 AM	0	0	3	7	0	0	0	0	3	7	20
8:15 AM	0	0	3	24	0	0	0	0	3	24	54
8:30 AM	0	0	1	12	0	0	0	0	1	12	26
8:45 AM	0	0	3	17	0	0	0	0	3	17	40
	EB	WB	EB	WB	NB	SB	NB	SB	EB	WB	TOTAL
TOTAL VOLUMES :	0	0	27	120	0	0	0	0	27	120	294
APPROACH %'s :			18.37%	81.63%					18.37%	81.63%	
PEAK HR :	**07:45 AM - 08:45 AM**										TOTAL
PEAK HR VOL :	0	0	13	66	0	0	0	0	13	66	158
PEAK HR FACTOR :			0.542	0.688					0.542	0.688	0.681
			0.681						0.681		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		SOUTH LEG 2		
	EB	WB	EB	WB	NB	SB	NB	SB	EB	WB	TOTAL
4:00 PM	0	0	7	1	0	0	0	0	7	1	16
4:15 PM	0	0	10	1	0	0	0	0	10	1	22
4:30 PM	0	0	13	5	0	0	0	0	13	5	36
4:45 PM	0	0	10	5	0	0	0	0	10	5	30
5:00 PM	0	0	14	1	0	0	0	0	14	1	30
5:15 PM	0	0	18	5	0	0	0	0	18	5	46
5:30 PM	0	0	29	1	0	0	0	0	29	1	60
5:45 PM	0	0	14	2	0	0	0	0	14	2	32
	EB	WB	EB	WB	NB	SB	NB	SB	EB	WB	TOTAL
TOTAL VOLUMES :	0	0	115	21	0	0	0	0	115	21	272
APPROACH %'s :			84.56%	15.44%					84.56%	15.44%	
PEAK HR :	**04:45 PM - 05:45 PM**										TOTAL
PEAK HR VOL :	0	0	71	12	0	0	0	0	71	12	166
PEAK HR FACTOR :			0.612	0.600					0.612	0.600	0.692
			0.692						0.692		

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chester St & 5th St
City: Oakland
Control: 2-Way Stop(NB/SB)

Project ID: 18-08661-004
Date: 12/12/2018

Total

NS/EW Streets:	Chester St				Chester St				5th St				5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	1	0	0	10	3	0	0	1	5	1	0	1	2	5	0	29
7:15 AM	0	1	2	0	8	1	2	0	1	14	0	0	1	7	6	0	43
7:30 AM	0	1	2	0	9	3	1	0	0	10	0	0	4	4	10	0	44
7:45 AM	1	0	2	0	5	2	0	0	1	10	0	0	2	6	6	0	35
8:00 AM	0	1	3	0	7	1	0	0	0	11	0	0	0	5	8	0	36
8:15 AM	0	0	4	0	9	0	4	0	2	9	0	0	4	5	12	0	49
8:30 AM	0	2	1	0	10	3	6	0	0	11	0	0	0	12	7	0	52
8:45 AM	0	0	5	0	12	0	3	0	0	7	0	0	1	7	13	0	48
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	6	19	0	70	13	16	0	5	77	1	0	13	48	67	0	336
APPROACH %'s :	3.85%	23.08%	73.08%	0.00%	70.71%	13.13%	16.16%	0.00%	6.02%	92.77%	1.20%	0.00%	10.16%	37.50%	52.34%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	3	13	0	38	4	13	0	2	38	0	0	5	29	40	0	185
PEAK HR FACTOR :	0.000	0.375	0.650	0.000	0.792	0.333	0.542	0.000	0.250	0.864	0.000	0.000	0.313	0.604	0.769	0.000	0.889
	0.800				0.724				0.909				0.881				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	3	1	0	1	0	2	0	2	8	2	0	3	8	7	0	37
4:15 PM	2	3	1	0	7	1	0	0	1	8	0	0	1	4	5	0	33
4:30 PM	0	3	3	0	6	2	1	0	3	13	0	0	1	7	9	0	48
4:45 PM	0	2	2	0	7	2	2	0	1	7	0	0	3	8	7	0	41
5:00 PM	1	0	1	0	9	0	0	0	1	5	2	0	4	14	17	1	55
5:15 PM	0	3	3	0	9	1	5	0	3	6	1	0	2	12	9	1	55
5:30 PM	0	1	3	0	10	1	4	0	1	10	1	0	7	10	18	2	68
5:45 PM	1	3	3	0	7	3	2	0	1	8	0	1	4	18	14	1	66
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	4	18	17	0	56	10	16	0	13	65	6	1	25	81	86	5	403
APPROACH %'s :	10.26%	46.15%	43.59%	0.00%	68.29%	12.20%	19.51%	0.00%	15.29%	76.47%	7.06%	1.18%	12.69%	41.12%	43.65%	2.54%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	2	7	10	0	35	5	11	0	6	29	4	1	17	54	58	5	244
PEAK HR FACTOR :	0.500	0.583	0.833	0.000	0.875	0.417	0.550	0.000	0.500	0.725	0.500	0.250	0.607	0.750	0.806	0.625	0.897
	0.679				0.850				0.833				0.905				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chester St & 5th St
City: Oakland
Control: 2-Way Stop(NB/SB)

Project ID: 18-08661-004
Date: 12/12/2018

Bikes

NS/EW Streets:	Chester St				Chester St				5th St				5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
7:45 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	1	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	5
APPROACH %'s :	50.00%	50.00%	0.00%	0.00%					66.67%	33.33%	0.00%	0.00%					
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
PEAK HR FACTOR :	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.500
	0.250								0.250								

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0	0	4
5:00 PM	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	2
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
5:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	2	0	1	0	2	4	1	0	0	2	0	0	12
APPROACH %'s :					66.67%	0.00%	33.33%	0.00%	28.57%	57.14%	14.29%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	0	0	0	0	2	0	0	0	0	2	1	0	0	1	0	0	6
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.500	0.250	0.000	0.000	0.250	0.000	0.000	0.750
					0.500				0.750				0.250				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Chester St & 5th St
City: Oakland

Project ID: 18-08661-004
Date: 12/12/2018

Pedestrians (Crosswalks)

NS/EW Streets:	Chester St		Chester St		5th St		5th St		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	1	0	0	0	0	0	0	0	1
7:15 AM	3	0	0	0	0	0	0	0	3
7:30 AM	3	1	0	0	0	0	0	0	4
7:45 AM	4	0	0	0	0	0	0	0	4
8:00 AM	9	0	0	0	0	0	0	0	9
8:15 AM	3	0	0	0	0	0	0	0	3
8:30 AM	11	0	0	0	0	0	0	0	11
8:45 AM	8	0	0	0	0	0	0	0	8
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	42	1	0	0	0	0	0	0	43
APPROACH %'s :	97.67%	2.33%							
PEAK HR :	**08:00 AM - 09:00 AM**								TOTAL
PEAK HR VOL :	31	0	0	0	0	0	0	0	31
PEAK HR FACTOR :	0.705								0.705
	0.705								

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	0	6	0	0	2	1	0	5	14
4:15 PM	0	3	1	1	1	1	0	1	8
4:30 PM	1	4	0	0	0	0	0	0	5
4:45 PM	1	1	0	1	0	2	0	0	5
5:00 PM	2	5	0	1	0	0	1	3	12
5:15 PM	2	4	0	4	0	4	2	1	17
5:30 PM	4	4	0	0	2	2	2	3	17
5:45 PM	3	7	0	6	2	5	3	4	30
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	13	34	1	13	7	15	8	17	108
APPROACH %'s :	27.66%	72.34%	7.14%	92.86%	31.82%	68.18%	32.00%	68.00%	
PEAK HR :	**05:00 PM - 06:00 PM**								TOTAL
PEAK HR VOL :	11	20	0	11	4	11	8	11	76
PEAK HR FACTOR :	0.688	0.714		0.458	0.500	0.550	0.667	0.688	0.633
	0.775		0.458		0.536		0.679		

National Data & Surveying Services

Intersection Turning Movement Count

Location: Center St & 5th St
City: Oakland
Control: 1-Way Stop(NB)

Project ID: 18-08661-005
Date: 12/12/2018

Total

NS/EW Streets:	Center St				Center St				5th St				5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	0 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
7:00 AM	1	0	1	0	0	0	0	0	0	23	1	0	3	18	0	2	49
7:15 AM	0	0	4	0	0	0	0	0	0	30	3	0	2	22	0	2	63
7:30 AM	1	0	3	0	0	0	0	0	0	25	4	0	2	29	0	0	64
7:45 AM	0	0	7	0	0	0	0	0	0	30	1	0	4	28	0	0	70
8:00 AM	0	0	5	0	0	0	0	0	0	29	0	0	2	17	0	0	53
8:15 AM	1	0	5	0	0	0	0	0	0	47	1	0	2	34	0	2	92
8:30 AM	1	0	5	0	0	0	0	0	0	37	2	0	2	34	0	0	81
8:45 AM	0	0	9	0	0	0	0	0	0	39	1	1	1	35	0	0	86
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	4	0	39	0	0	0	0	0	0	260	13	1	18	217	0	6	558
APPROACH %'s :	9.30%	0.00%	90.70%	0.00%					0.00%	94.89%	4.74%	0.36%	7.47%	90.04%	0.00%	2.49%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	2	0	24	0	0	0	0	0	0	152	4	1	7	120	0	2	312
PEAK HR FACTOR :	0.500	0.000	0.667	0.000	0.000	0.000	0.000	0.000	0.000	0.809	0.500	0.250	0.875	0.857	0.000	0.250	0.848
	0.722								0.818				0.849				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	0 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
4:00 PM	2	0	7	0	0	0	0	0	0	18	0	0	5	18	0	0	50
4:15 PM	0	0	7	0	0	0	0	0	0	21	0	0	3	13	0	0	44
4:30 PM	1	0	6	0	0	0	0	0	0	33	1	0	5	23	0	1	70
4:45 PM	0	0	4	0	0	0	0	0	0	24	0	0	6	28	0	0	62
5:00 PM	2	0	0	0	0	0	0	0	0	29	1	0	1	40	0	0	73
5:15 PM	2	0	6	0	0	0	0	0	0	27	1	0	6	34	0	2	78
5:30 PM	2	0	6	0	0	0	0	0	0	43	1	0	3	36	0	3	94
5:45 PM	0	0	2	0	0	0	0	0	0	35	3	0	6	44	0	0	90
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	9	0	38	0	0	0	0	0	0	230	7	0	35	236	0	6	561
APPROACH %'s :	19.15%	0.00%	80.85%	0.00%					0.00%	97.05%	2.95%	0.00%	12.64%	85.20%	0.00%	2.17%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	6	0	14	0	0	0	0	0	0	134	6	0	16	154	0	5	335
PEAK HR FACTOR :	0.750	0.000	0.583	0.000	0.000	0.000	0.000	0.000	0.000	0.779	0.500	0.000	0.667	0.875	0.000	0.417	0.891
	0.625								0.795				0.875				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Center St & 5th St
City: Oakland
Control: 1-Way Stop(NB)

Project ID: 18-08661-005
Date: 12/12/2018

Bikes

NS/EW Streets:	Center St				Center St				5th St				5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
7:45 AM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2
8:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	1	0	0	0	0	0	0	3	0	0	1	2	0	0	7
APPROACH %'s :	0.00%	0.00%	100.00%	0.00%					0.00%	100.00%	0.00%	0.00%	33.33%	66.67%	0.00%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	4
PEAK HR FACTOR :	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.000	0.000	0.000	0.250	0.000	0.000	0.500
									0.500				0.250				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	2
5:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	0	0	0	0	0	0	0	0	0	5	1	0	0	3	0	0	9
APPROACH %'s :									0.00%	83.33%	16.67%	0.00%	0.00%	100.00%	0.00%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	5
PEAK HR FACTOR :	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.750	0.000	0.000	0.000	0.500	0.000	0.000	0.625
									0.750				0.500				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Center St & 5th St
City: Oakland

Project ID: 18-08661-005
Date: 12/12/2018

Pedestrians (Crosswalks)

NS/EW Streets:	Center St		Center St		5th St		5th St		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	0	0	1	0	0	1	0	1	3
7:15 AM	0	0	2	0	3	0	0	0	5
7:30 AM	0	0	0	0	1	0	3	0	4
7:45 AM	0	0	0	0	1	0	3	0	4
8:00 AM	0	0	0	0	1	0	1	0	2
8:15 AM	0	0	0	0	0	0	3	0	3
8:30 AM	0	0	0	0	0	0	0	1	1
8:45 AM	0	0	0	0	0	0	2	2	4
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	3	0	6	1	12	4	26
APPROACH %'s :			100.00%	0.00%	85.71%	14.29%	75.00%	25.00%	
PEAK HR :	**08:00 AM - 09:00 AM**								TOTAL
PEAK HR VOL :	0	0	0	0	1	0	6	3	10
PEAK HR FACTOR :					0.250		0.500	0.375	0.625
					0.250		0.563		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	0	0	0	1	0	0	0	1	2
4:15 PM	0	0	0	0	0	1	0	1	2
4:30 PM	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	1	0	0	0	4	2	7
5:00 PM	0	0	0	0	1	1	0	1	3
5:15 PM	0	0	2	0	0	0	0	3	5
5:30 PM	0	0	0	1	0	0	2	1	4
5:45 PM	0	0	0	0	1	0	2	0	3
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	0	0	3	2	2	2	8	9	26
APPROACH %'s :			60.00%	40.00%	50.00%	50.00%	47.06%	52.94%	
PEAK HR :	**05:00 PM - 06:00 PM**								TOTAL
PEAK HR VOL :	0	0	2	1	2	1	4	5	15
PEAK HR FACTOR :			0.250	0.250	0.500	0.250	0.500	0.417	0.750
			0.375		0.375		0.750		

National Data & Surveying Services

Intersection Turning Movement Count

Location: Mandela Pkwy & 5th St
City: Oakland
Control: Signalized

Project ID: 18-08661-006
Date: 12/12/2018

Total

NS/EW Streets:	Mandela Pkwy				Mandela Pkwy				5th St				5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
7:00 AM	3	6	6	0	22	8	5	0	6	23	3	0	3	23	10	0	118
7:15 AM	0	9	3	0	23	4	6	0	7	31	5	0	10	22	21	0	141
7:30 AM	2	6	2	0	20	11	10	0	3	28	3	0	10	29	19	0	143
7:45 AM	3	4	8	0	17	12	8	0	6	31	7	0	1	23	19	0	139
8:00 AM	1	7	3	0	23	7	4	0	8	26	9	0	3	19	13	0	123
8:15 AM	4	10	4	0	17	11	9	0	11	41	10	0	8	35	13	1	174
8:30 AM	3	12	7	0	30	10	7	0	13	31	8	0	5	36	17	0	179
8:45 AM	1	6	3	0	16	10	2	0	15	24	18	0	3	32	16	0	146
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	17	60	36	0	168	73	51	0	69	235	63	0	43	219	128	1	1163
APPROACH %'s :	15.04%	53.10%	31.86%	0.00%	57.53%	25.00%	17.47%	0.00%	18.80%	64.03%	17.17%	0.00%	11.00%	56.01%	32.74%	0.26%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	9	35	17	0	86	38	22	0	47	122	45	0	19	122	59	1	622
PEAK HR FACTOR :	0.563	0.729	0.607	0.000	0.717	0.864	0.611	0.000	0.783	0.744	0.625	0.000	0.594	0.847	0.868	0.250	0.869
		0.693				0.777				0.863				0.866			

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	2	12	4	0	11	12	9	1	13	14	7	0	1	17	9	0	112
4:15 PM	0	19	4	0	9	15	4	0	10	29	7	0	6	19	18	0	140
4:30 PM	8	17	10	0	16	19	10	0	15	24	7	0	9	22	28	0	185
4:45 PM	6	16	16	0	11	18	6	0	9	20	3	0	4	26	27	0	162
5:00 PM	13	31	20	0	11	15	12	0	8	25	11	0	9	31	31	0	217
5:15 PM	3	28	16	0	13	25	13	0	21	24	9	0	4	37	26	0	219
5:30 PM	7	18	6	0	10	35	12	0	19	37	13	0	13	23	23	0	216
5:45 PM	9	25	4	0	11	33	12	0	19	23	3	0	12	31	22	0	204
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	48	166	80	0	92	172	78	1	114	196	60	0	58	206	184	0	1455
APPROACH %'s :	16.33%	56.46%	27.21%	0.00%	26.82%	50.15%	22.74%	0.29%	30.81%	52.97%	16.22%	0.00%	12.95%	45.98%	41.07%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	32	102	46	0	45	108	49	0	67	109	36	0	38	122	102	0	856
PEAK HR FACTOR :	0.615	0.823	0.575	0.000	0.865	0.771	0.942	0.000	0.798	0.736	0.692	0.000	0.731	0.824	0.823	0.000	0.977
		0.703				0.886				0.768				0.923			

National Data & Surveying Services

Intersection Turning Movement Count

Location: Mandela Pkwy & 5th St
City: Oakland
Control: Signalized

Project ID: 18-08661-006
Date: 12/12/2018

Bikes

NS/EW Streets:	Mandela Pkwy				Mandela Pkwy				5th St				5th St				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
7:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	3
7:30 AM	0	1	0	0	0	2	0	0	0	1	0	0	0	0	0	0	4
7:45 AM	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	3
8:00 AM	0	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0	6
8:15 AM	0	2	0	0	0	4	0	0	0	0	2	0	0	0	0	0	8
8:30 AM	2	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	5
8:45 AM	0	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	4
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	2	5	0	0	0	17	1	0	0	3	2	0	0	1	3	0	34
APPROACH %'s :	28.57%	71.43%	0.00%	0.00%	0.00%	94.44%	5.56%	0.00%	0.00%	60.00%	40.00%	0.00%	0.00%	25.00%	75.00%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	2	3	0	0	0	11	1	0	0	1	2	0	0	0	3	0	23
PEAK HR FACTOR :	0.250	0.375	0.000	0.000	0.000	0.550	0.250	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.375	0.000	0.719
	0.625				0.600				0.375				0.375				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0 NL	1 NT	0 NR	0 NU	0 SL	1 ST	0 SR	0 SU	0 EL	1 ET	0 ER	0 EU	0 WL	1 WT	0 WR	0 WU	TOTAL
4:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
4:15 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
4:30 PM	2	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4
4:45 PM	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	3
5:00 PM	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4
5:15 PM	2	4	0	0	0	0	0	0	0	0	2	0	0	0	1	0	9
5:30 PM	1	3	0	0	2	4	0	0	0	1	0	0	0	0	0	0	11
5:45 PM	0	2	0	0	0	3	0	0	0	0	1	0	0	0	0	0	6
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	6	13	0	0	3	11	0	0	2	1	3	0	0	0	1	0	40
APPROACH %'s :	31.58%	68.42%	0.00%	0.00%	21.43%	78.57%	0.00%	0.00%	33.33%	16.67%	50.00%	0.00%	0.00%	0.00%	100.00%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	4	11	0	0	3	7	0	0	0	1	3	0	0	0	1	0	30
PEAK HR FACTOR :	0.50	0.688	0.000	0.000	0.375	0.438	0.000	0.000	0.000	0.250	0.375	0.000	0.000	0.000	0.250	0.000	0.682
	0.625				0.417				0.500				0.250				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Mandela Pkwy & 5th St
City: Oakland
Project ID: 18-08661-006
Date: 12/12/2018

Pedestrians (Crosswalks)

NS/EW Streets:	Mandela Pkwy		Mandela Pkwy		5th St		5th St		
AM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
7:00 AM	2	9	0	5	7	2	6	2	33
7:15 AM	0	7	0	14	8	2	13	2	46
7:30 AM	1	7	0	18	7	0	20	1	54
7:45 AM	2	19	1	22	16	2	20	8	90
8:00 AM	0	23	1	25	18	0	24	5	96
8:15 AM	3	28	0	24	24	3	24	0	106
8:30 AM	0	28	0	19	28	0	19	1	95
8:45 AM	0	29	1	21	28	0	20	5	104
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	8	150	3	148	136	9	146	24	624
APPROACH %'s :	5.06%	94.94%	1.99%	98.01%	93.79%	6.21%	85.88%	14.12%	
PEAK HR :	**08:00 AM - 09:00 AM**								TOTAL
PEAK HR VOL :	3	108	2	89	98	3	87	11	401
PEAK HR FACTOR :	0.250	0.931	0.500	0.890	0.875	0.250	0.906	0.550	0.946
	0.895		0.875		0.902		0.845		

PM	NORTH LEG		SOUTH LEG		EAST LEG		WEST LEG		
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
4:00 PM	6	0	7	0	0	8	1	4	26
4:15 PM	15	3	8	1	1	12	6	8	54
4:30 PM	21	1	18	0	2	20	3	15	80
4:45 PM	15	1	12	1	0	13	3	13	58
5:00 PM	26	1	4	2	1	21	5	5	65
5:15 PM	14	2	8	1	2	18	6	9	60
5:30 PM	25	5	17	4	1	18	2	20	92
5:45 PM	17	6	10	0	3	20	1	11	68
	EB	WB	EB	WB	NB	SB	NB	SB	TOTAL
TOTAL VOLUMES :	139	19	84	9	10	130	27	85	503
APPROACH %'s :	87.97%	12.03%	90.32%	9.68%	7.14%	92.86%	24.11%	75.89%	
PEAK HR :	**05:00 PM - 06:00 PM**								TOTAL
PEAK HR VOL :	82	14	39	7	7	77	14	45	285
PEAK HR FACTOR :	0.788	0.583	0.574	0.438	0.583	0.917	0.583	0.563	0.774
	0.800		0.548		0.913		0.670		

APPENDIX B
INTERSECTION OPERATIONS
WORKSHEETS

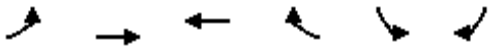
Intersection	
Int Delay, s/veh	9.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	7	136	56	91	136	17	63	38	138	4	20	5
Future Vol, veh/h	7	136	56	91	136	17	63	38	138	4	20	5
Conflicting Peds, #/hr	67	0	93	93	0	67	10	0	88	88	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	55	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	7	136	56	91	136	17	63	38	138	4	20	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	220	0	0	285	0	0	620	673	345	748	693	222
Stage 1	-	-	-	-	-	-	271	271	-	394	394	-
Stage 2	-	-	-	-	-	-	349	402	-	354	299	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1343	-	-	1271	-	-	399	375	696	327	366	815
Stage 1	-	-	-	-	-	-	733	683	-	629	603	-
Stage 2	-	-	-	-	-	-	665	599	-	661	664	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1332	-	-	1178	-	-	322	300	595	186	293	763
Mov Cap-2 Maneuver	-	-	-	-	-	-	322	300	-	186	293	-
Stage 1	-	-	-	-	-	-	673	627	-	591	525	-
Stage 2	-	-	-	-	-	-	581	522	-	440	609	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	3.1	23.3	18.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	431	1332	-	-	1178	-	-	301
HCM Lane V/C Ratio	0.555	0.005	-	-	0.077	-	-	0.096
HCM Control Delay (s)	23.3	7.7	-	-	8.3	-	-	18.2
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	3.3	0	-	-	0.3	-	-	0.3



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	17	266	255	32	16	19
Future Volume (vph)	17	266	255	32	16	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		3.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.90	
Flpb, ped/bikes	0.94	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.93	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1656	1845	1796		1501	
Flt Permitted	0.58	1.00	1.00		0.98	
Satd. Flow (perm)	1018	1845	1796		1501	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	266	255	32	16	19
RTOR Reduction (vph)	0	0	5	0	17	0
Lane Group Flow (vph)	17	266	282	0	18	0
Confl. Peds. (#/hr)	55			55	82	164
Confl. Bikes (#/hr)				10		7
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	24.4	24.4	24.4		3.4	
Effective Green, g (s)	24.4	24.4	24.4		3.4	
Actuated g/C Ratio	0.68	0.68	0.68		0.09	
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)	693	1257	1224		142	
v/s Ratio Prot		0.14	c0.16		c0.01	
v/s Ratio Perm	0.02					
v/c Ratio	0.02	0.21	0.23		0.13	
Uniform Delay, d1	1.8	2.1	2.2		14.8	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.0	0.0		0.1	
Delay (s)	1.9	2.2	2.2		15.0	
Level of Service	A	A	A		B	
Approach Delay (s)		2.1	2.2		15.0	
Approach LOS		A	A		B	

Intersection Summary			
HCM 2000 Control Delay	2.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	35.8	Sum of lost time (s)	8.0
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												
Traffic Volume (veh/h)	65	197	23	183	220	80	23	116	70	73	283	36
Future Volume (veh/h)	65	197	23	183	220	80	23	116	70	73	283	36
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.90	1.00		0.97	1.00		0.98
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1900	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	65	197	23	183	220	80	23	116	70	73	283	36
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	139	1721	198	214	1438	498	49	156	83	190	353	45
Arrive On Green	0.08	0.55	0.55	0.12	0.58	0.58	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1757	3146	361	1757	2479	859	42	709	378	1181	1601	204
Grp Volume(v), veh/h	65	108	112	183	152	148	209	0	0	73	0	319
Grp Sat Flow(s),veh/h/ln	1757	1752	1755	1757	1752	1585	1129	0	0	1181	0	1804
Q Serve(g_s), s	3.5	3.0	3.1	10.2	4.0	4.3	2.4	0.0	0.0	0.0	0.0	16.7
Cycle Q Clear(g_c), s	3.5	3.0	3.1	10.2	4.0	4.3	19.2	0.0	0.0	15.5	0.0	16.7
Prop In Lane	1.00		0.21	1.00		0.54	0.11		0.33	1.00		0.11
Lane Grp Cap(c), veh/h	139	959	960	214	1016	919	289	0	0	190	0	398
V/C Ratio(X)	0.47	0.11	0.12	0.85	0.15	0.16	0.72	0.00	0.00	0.38	0.00	0.80
Avail Cap(c_a), veh/h	139	959	960	264	1016	919	336	0	0	225	0	451
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.0	10.9	10.9	43.0	9.7	9.7	35.6	0.0	0.0	36.4	0.0	36.9
Incr Delay (d2), s/veh	0.9	0.2	0.2	17.0	0.3	0.4	4.8	0.0	0.0	0.5	0.0	7.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	1.5	1.6	5.9	2.0	2.0	6.0	0.0	0.0	1.9	0.0	9.2
LnGrp Delay(d),s/veh	44.9	11.2	11.2	60.1	10.0	10.1	40.4	0.0	0.0	36.9	0.0	44.6
LnGrp LOS	D	B	B	E	A	B	D			D		D
Approach Vol, veh/h		285			483			209			392	
Approach Delay, s/veh		18.9			29.0			40.4			43.2	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.9	62.0		26.1	15.2	58.7		26.1
Change Period (Y+Rc), s	4.0	* 4		4.0	3.0	4.0		4.0
Max Green Setting (Gmax), s	6.0	* 58		25.0	15.0	49.0		25.0
Max Q Clear Time (g_c+I1), s	5.5	6.3		18.7	12.2	5.1		21.2
Green Ext Time (p_c), s	0.0	1.3		1.3	0.1	0.9		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C

Notes

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	38	0	5	29	40	0	3	13	38	4	13
Future Vol, veh/h	2	38	0	5	29	40	0	3	13	38	4	13
Conflicting Peds, #/hr	31	0	11	11	0	31	19	0	15	15	0	19
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	2	38	0	5	29	40	0	3	13	38	4	13

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	100	0	0	49	0	0	140	163	64	155	143	99
Stage 1	-	-	-	-	-	-	53	53	-	90	90	-
Stage 2	-	-	-	-	-	-	87	110	-	65	53	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1486	-	-	1551	-	-	828	728	998	809	746	954
Stage 1	-	-	-	-	-	-	957	849	-	915	818	-
Stage 2	-	-	-	-	-	-	918	802	-	943	849	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1462	-	-	1532	-	-	790	700	976	763	717	915
Mov Cap-2 Maneuver	-	-	-	-	-	-	790	700	-	763	717	-
Stage 1	-	-	-	-	-	-	947	840	-	890	794	-
Stage 2	-	-	-	-	-	-	883	779	-	915	840	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.5	9	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	909	1462	-	-	1532	-	-	790
HCM Lane V/C Ratio	0.018	0.001	-	-	0.003	-	-	0.07
HCM Control Delay (s)	9	7.5	0	-	7.4	0	-	9.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	153	4	9	120	2	24
Future Vol, veh/h	153	4	9	120	2	24
Conflicting Peds, #/hr	0	3	3	0	9	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	153	4	9	120	2	24

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	160	0	305	161
Stage 1	-	-	-	-	158	-
Stage 2	-	-	-	-	147	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1413	-	685	881
Stage 1	-	-	-	-	868	-
Stage 2	-	-	-	-	878	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1409	-	673	877
Mov Cap-2 Maneuver	-	-	-	-	673	-
Stage 1	-	-	-	-	866	-
Stage 2	-	-	-	-	865	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	857	-	-	1409	-
HCM Lane V/C Ratio	0.03	-	-	0.006	-
HCM Control Delay (s)	9.3	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	122	45	20	122	59	9	35	17	86	38	22
Future Volume (veh/h)	47	122	45	20	122	59	9	35	17	86	38	22
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.92		0.87	0.92		0.88	0.91		0.87	0.90		0.87
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1900	1845	1900	1900	1845	1900	1900	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	47	122	45	20	122	59	9	35	17	86	38	22
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	193	432	138	122	456	201	143	414	177	422	176	81
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	210	1038	332	64	1097	482	111	1059	452	726	449	209
Grp Volume(v), veh/h	214	0	0	201	0	0	61	0	0	146	0	0
Grp Sat Flow(s),veh/h/ln	1580	0	0	1643	0	0	1623	0	0	1385	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0
Cycle Q Clear(g_c), s	3.4	0.0	0.0	3.3	0.0	0.0	1.0	0.0	0.0	2.6	0.0	0.0
Prop In Lane	0.22		0.21	0.10		0.29	0.15		0.28	0.59		0.15
Lane Grp Cap(c), veh/h	763	0	0	779	0	0	734	0	0	679	0	0
V/C Ratio(X)	0.28	0.00	0.00	0.26	0.00	0.00	0.08	0.00	0.00	0.21	0.00	0.00
Avail Cap(c_a), veh/h	1047	0	0	1078	0	0	1258	0	0	1131	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	0.0	0.0	8.0	0.0	0.0	8.0	0.0	0.0	8.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	1.5	0.0	0.0	0.4	0.0	0.0	1.1	0.0	0.0
LnGrp Delay(d),s/veh	8.1	0.0	0.0	8.1	0.0	0.0	8.0	0.0	0.0	8.5	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		214			201			61			146	
Approach Delay, s/veh		8.1			8.1			8.0			8.5	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.1		21.2		20.1		21.2
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		30.0		25.0		30.0		25.0
Max Q Clear Time (g_c+I1), s		3.0		5.4		4.6		5.3
Green Ext Time (p_c), s		0.8		1.8		0.8		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	8.2
HCM 2010 LOS	A

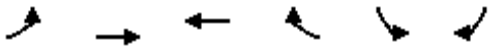
Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	315	64	80	201	28	45	26	117	10	13	5
Future Vol, veh/h	8	315	64	80	201	28	45	26	117	10	13	5
Conflicting Peds, #/hr	67	0	93	93	0	67	10	0	88	88	0	10
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	55	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	8	315	64	80	201	28	45	26	117	10	13	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	296	0	0	472	0	0	850	912	528	965	930	292
Stage 1	-	-	-	-	-	-	456	456	-	442	442	-
Stage 2	-	-	-	-	-	-	394	456	-	523	488	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1260	-	-	1085	-	-	279	273	548	233	266	745
Stage 1	-	-	-	-	-	-	582	566	-	592	575	-
Stage 2	-	-	-	-	-	-	629	566	-	535	548	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1250	-	-	1005	-	-	226	217	468	130	212	698
Mov Cap-2 Maneuver	-	-	-	-	-	-	226	217	-	130	212	-
Stage 1	-	-	-	-	-	-	533	519	-	555	500	-
Stage 2	-	-	-	-	-	-	555	492	-	351	502	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	2.3	29.4	26.8
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	330	1250	-	-	1005	-	-	193
HCM Lane V/C Ratio	0.57	0.006	-	-	0.08	-	-	0.145
HCM Control Delay (s)	29.4	7.9	-	-	8.9	-	-	26.8
HCM Lane LOS	D	A	-	-	A	-	-	D
HCM 95th %tile Q(veh)	3.3	0	-	-	0.3	-	-	0.5



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	424	255	34	20	30
Future Volume (vph)	20	424	255	34	20	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		3.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.88	
Flpb, ped/bikes	0.94	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.92	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1648	1845	1791		1468	
Flt Permitted	0.58	1.00	1.00		0.98	
Satd. Flow (perm)	1011	1845	1791		1468	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	424	255	34	20	30
RTOR Reduction (vph)	0	0	6	0	26	0
Lane Group Flow (vph)	20	424	283	0	24	0
Confl. Peds. (#/hr)	55			55	82	164
Confl. Bikes (#/hr)				10		7
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	26.2	26.2	26.2		4.7	
Effective Green, g (s)	26.2	26.2	26.2		4.7	
Actuated g/C Ratio	0.67	0.67	0.67		0.12	
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)	680	1242	1206		177	
v/s Ratio Prot		c0.23	0.16		c0.02	
v/s Ratio Perm	0.02					
v/c Ratio	0.03	0.34	0.24		0.13	
Uniform Delay, d1	2.1	2.7	2.5		15.3	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.1	0.0		0.1	
Delay (s)	2.1	2.8	2.5		15.4	
Level of Service	A	A	A		B	
Approach Delay (s)		2.7	2.5		15.4	
Approach LOS		A	A		B	

Intersection Summary			
HCM 2000 Control Delay	3.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	38.9	Sum of lost time (s)	8.0
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												
Traffic Volume (veh/h)	72	319	34	146	201	106	37	196	117	132	234	37
Future Volume (veh/h)	72	319	34	146	201	106	37	196	117	132	234	37
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.94	1.00		0.88	1.00		0.97	1.00		0.98
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1900	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	72	319	34	146	201	106	37	196	117	132	234	37
Adj No. of Lanes	1	2	0	1	2	0	0	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	196	1626	172	137	1017	498	72	267	148	251	447	71
Arrive On Green	0.11	0.51	0.51	0.08	0.47	0.47	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	1757	3177	335	1757	2179	1067	96	926	513	1052	1551	245
Grp Volume(v), veh/h	72	174	179	146	159	148	350	0	0	132	0	271
Grp Sat Flow(s),veh/h/ln	1757	1752	1760	1757	1752	1493	1536	0	0	1052	0	1796
Q Serve(g_s), s	3.4	4.9	5.0	7.0	4.8	5.3	8.0	0.0	0.0	2.9	0.0	11.4
Cycle Q Clear(g_c), s	3.4	4.9	5.0	7.0	4.8	5.3	19.3	0.0	0.0	22.2	0.0	11.4
Prop In Lane	1.00		0.19	1.00		0.71	0.11		0.33	1.00		0.14
Lane Grp Cap(c), veh/h	196	897	901	137	818	697	487	0	0	251	0	518
V/C Ratio(X)	0.37	0.19	0.20	1.07	0.19	0.21	0.72	0.00	0.00	0.53	0.00	0.52
Avail Cap(c_a), veh/h	196	897	901	137	818	697	578	0	0	310	0	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.0	11.9	11.9	41.5	14.1	14.2	29.5	0.0	0.0	32.1	0.0	26.9
Incr Delay (d2), s/veh	0.4	0.5	0.5	96.5	0.5	0.7	2.5	0.0	0.0	0.6	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.4	2.5	7.0	2.4	2.3	8.4	0.0	0.0	3.2	0.0	5.7
LnGrp Delay(d),s/veh	37.4	12.4	12.4	138.0	14.6	14.9	31.9	0.0	0.0	32.8	0.0	27.2
LnGrp LOS	D	B	B	F	B	B	C			C		C
Approach Vol, veh/h		425			453			350			403	
Approach Delay, s/veh		16.7			54.5			31.9			29.0	
Approach LOS		B			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.1	46.0		29.9	10.0	50.1		29.9
Change Period (Y+Rc), s	4.0	* 4		4.0	3.0	4.0		4.0
Max Green Setting (Gmax), s	6.0	* 42		31.0	7.0	41.0		31.0
Max Q Clear Time (g_c+I1), s	5.4	7.3		24.2	9.0	7.0		21.3
Green Ext Time (p_c), s	0.1	1.3		1.8	0.0	1.5		2.1

Intersection Summary	
HCM 2010 Ctrl Delay	33.5
HCM 2010 LOS	C

Notes

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	29	4	22	54	58	2	7	10	35	5	11
Future Vol, veh/h	7	29	4	22	54	58	2	7	10	35	5	11
Conflicting Peds, #/hr	31	0	11	11	0	31	19	0	15	15	0	19
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	7	29	4	22	54	58	2	7	10	35	5	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	143	0	0	44	0	0	210	243	57	227	216	133
Stage 1	-	-	-	-	-	-	56	56	-	158	158	-
Stage 2	-	-	-	-	-	-	154	187	-	69	58	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1434	-	-	1558	-	-	745	657	1006	726	680	913
Stage 1	-	-	-	-	-	-	954	846	-	842	765	-
Stage 2	-	-	-	-	-	-	846	743	-	939	845	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1411	-	-	1539	-	-	702	622	984	675	643	875
Mov Cap-2 Maneuver	-	-	-	-	-	-	702	622	-	675	643	-
Stage 1	-	-	-	-	-	-	941	834	-	816	734	-
Stage 2	-	-	-	-	-	-	804	713	-	906	833	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	1.2	9.7	10.5
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	783	1411	-	-	1539	-	-	706
HCM Lane V/C Ratio	0.024	0.005	-	-	0.014	-	-	0.072
HCM Control Delay (s)	9.7	7.6	0	-	7.4	0	-	10.5
HCM Lane LOS	A	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Intersection	
Int Delay, s/veh	1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	134	6	21	154	6	14
Future Vol, veh/h	134	6	21	154	6	14
Conflicting Peds, #/hr	0	3	3	0	9	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	134	6	21	154	6	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	143	0	345	143
Stage 1	-	-	-	-	140	-
Stage 2	-	-	-	-	205	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	1434	-	650	902
Stage 1	-	-	-	-	884	-
Stage 2	-	-	-	-	827	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1430	-	633	897
Mov Cap-2 Maneuver	-	-	-	-	633	-
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	808	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	797	-	-	1430	-
HCM Lane V/C Ratio	0.025	-	-	0.015	-
HCM Control Delay (s)	9.6	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	109	36	38	122	102	32	102	46	45	108	49
Future Volume (veh/h)	67	109	36	38	122	102	32	102	46	45	108	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.93		0.87	0.92		0.89	0.92		0.87	0.92		0.87
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1900	1845	1900	1900	1845	1900	1900	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	67	109	36	38	122	102	32	102	46	45	108	49
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	258	381	108	145	356	258	159	406	159	186	383	149
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	347	904	256	113	846	612	150	1042	409	211	982	382
Grp Volume(v), veh/h	212	0	0	262	0	0	180	0	0	202	0	0
Grp Sat Flow(s),veh/h/ln	1508	0	0	1571	0	0	1600	0	0	1575	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	3.4	0.0	0.0	4.7	0.0	0.0	3.1	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.32		0.17	0.15		0.39	0.18		0.26	0.22		0.24
Lane Grp Cap(c), veh/h	747	0	0	759	0	0	724	0	0	718	0	0
V/C Ratio(X)	0.28	0.00	0.00	0.35	0.00	0.00	0.25	0.00	0.00	0.28	0.00	0.00
Avail Cap(c_a), veh/h	988	0	0	1015	0	0	1211	0	0	1197	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.1	0.0	0.0	8.4	0.0	0.0	8.8	0.0	0.0	8.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	0.0	2.1	0.0	0.0	1.4	0.0	0.0	1.6	0.0	0.0
LnGrp Delay(d),s/veh	8.2	0.0	0.0	8.5	0.0	0.0	8.9	0.0	0.0	9.0	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		212			262			180			202	
Approach Delay, s/veh		8.2			8.5			8.9			9.0	
Approach LOS		A			A			A			A	

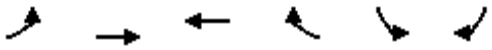
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.5		21.8		20.5		21.8
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		30.0		25.0		30.0		25.0
Max Q Clear Time (g_c+I1), s		5.1		5.4		5.5		6.7
Green Ext Time (p_c), s		1.6		2.2		1.6		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	8.6
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	136	118	209	136	17	97	41	217	4	24	5
Future Volume (veh/h)	7	136	118	209	136	17	97	41	217	4	24	5
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.80	1.00		0.88	0.87		0.86	0.98		0.86
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1900	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	7	136	118	209	136	17	97	41	217	4	24	5
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	13	208	181	452	802	100	159	74	263	90	425	82
Arrive On Green	0.01	0.26	0.26	0.26	0.51	0.51	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	1757	809	702	1757	1581	198	298	235	837	102	1354	260
Grp Volume(v), veh/h	7	0	254	209	0	153	355	0	0	33	0	0
Grp Sat Flow(s),veh/h/ln	1757	0	1512	1757	0	1779	1370	0	0	1716	0	0
Q Serve(g_s), s	0.3	0.0	10.5	7.0	0.0	3.2	12.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	0.0	10.5	7.0	0.0	3.2	16.6	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.46	1.00		0.11	0.27		0.61	0.12		0.15
Lane Grp Cap(c), veh/h	13	0	389	452	0	902	496	0	0	597	0	0
V/C Ratio(X)	0.55	0.00	0.65	0.46	0.00	0.17	0.72	0.00	0.00	0.06	0.00	0.00
Avail Cap(c_a), veh/h	100	0	389	452	0	902	496	0	0	597	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.97	0.00	0.97	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	34.6	0.0	23.2	21.9	0.0	9.3	22.0	0.0	0.0	16.8	0.0	0.0
Incr Delay (d2), s/veh	12.9	0.0	8.3	0.3	0.0	0.4	8.6	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	5.3	3.4	0.0	1.7	7.5	0.0	0.0	0.5	0.0	0.0
LnGrp Delay(d),s/veh	47.5	0.0	31.5	22.2	0.0	9.7	30.5	0.0	0.0	17.0	0.0	0.0
LnGrp LOS	D		C	C		A	C			B		
Approach Vol, veh/h		261			362			355			33	
Approach Delay, s/veh		31.9			16.9			30.5			17.0	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.5	39.5		26.0	22.0	22.0		26.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	32.0		22.0	18.0	18.0		22.0
Max Q Clear Time (g_c+I1), s	2.3	5.2		2.9	9.0	12.5		18.6
Green Ext Time (p_c), s	0.0	0.8		1.9	0.6	0.5		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	25.6
HCM 2010 LOS	C



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	342	369	32	16	23
Future Volume (vph)	20	342	369	32	16	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		3.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.88	
Flpb, ped/bikes	0.95	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.92	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1659	1845	1808		1465	
Flt Permitted	0.53	1.00	1.00		0.98	
Satd. Flow (perm)	918	1845	1808		1465	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	20	342	369	32	16	23
RTOR Reduction (vph)	0	0	2	0	20	0
Lane Group Flow (vph)	20	342	399	0	19	0
Confl. Peds. (#/hr)	55			55	82	164
Confl. Bikes (#/hr)				10		7
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	28.1	28.1	28.1		4.7	
Effective Green, g (s)	28.1	28.1	28.1		4.7	
Actuated g/C Ratio	0.69	0.69	0.69		0.12	
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)	632	1270	1245		168	
v/s Ratio Prot		0.19	c0.22		c0.01	
v/s Ratio Perm	0.02					
v/c Ratio	0.03	0.27	0.32		0.11	
Uniform Delay, d1	2.0	2.4	2.5		16.2	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.0	0.1		0.1	
Delay (s)	2.0	2.5	2.6		16.3	
Level of Service	A	A	A		B	
Approach Delay (s)		2.4	2.6		16.3	
Approach LOS		A	A		B	

Intersection Summary			
HCM 2000 Control Delay	3.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	40.8	Sum of lost time (s)	10.0
Intersection Capacity Utilization	45.8%	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												
Traffic Volume (veh/h)	78	260	23	183	313	80	23	116	70	73	283	58
Future Volume (veh/h)	78	260	23	183	313	80	23	116	70	73	283	58
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	1.00		0.87	1.00		0.95	1.00		0.98
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1845	1900	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	78	260	23	183	313	80	23	116	70	73	283	58
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	310	769	68	218	738	545	54	167	89	220	348	71
Arrive On Green	0.18	0.46	0.46	0.12	0.40	0.40	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1757	1660	147	1757	1845	1363	40	713	379	1181	1481	304
Grp Volume(v), veh/h	78	0	283	183	313	80	209	0	0	73	0	341
Grp Sat Flow(s),veh/h/ln	1757	0	1806	1757	1845	1363	1132	0	0	1181	0	1785
Q Serve(g_s), s	3.4	0.0	9.0	9.2	11.0	3.4	1.1	0.0	0.0	0.0	0.0	16.3
Cycle Q Clear(g_c), s	3.4	0.0	9.0	9.2	11.0	3.4	17.4	0.0	0.0	12.6	0.0	16.3
Prop In Lane	1.00		0.08	1.00		1.00	0.11		0.33	1.00		0.17
Lane Grp Cap(c), veh/h	310	0	837	218	738	545	310	0	0	220	0	419
V/C Ratio(X)	0.25	0.00	0.34	0.84	0.42	0.15	0.67	0.00	0.00	0.33	0.00	0.81
Avail Cap(c_a), veh/h	310	0	837	332	738	545	448	0	0	323	0	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.9	0.0	15.4	38.5	19.5	17.2	30.4	0.0	0.0	31.2	0.0	32.6
Incr Delay (d2), s/veh	0.2	0.0	1.1	6.9	1.8	0.6	1.0	0.0	0.0	0.3	0.0	4.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	4.7	4.8	5.9	1.4	5.1	0.0	0.0	1.7	0.0	8.5
LnGrp Delay(d),s/veh	32.1	0.0	16.5	45.4	21.3	17.8	31.3	0.0	0.0	31.5	0.0	37.1
LnGrp LOS	C		B	D	C	B	C			C		D
Approach Vol, veh/h		361			576			209			414	
Approach Delay, s/veh		19.8			28.5			31.3			36.1	
Approach LOS		B			C			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	19.9	40.0		30.1	14.2	45.7		30.1
Change Period (Y+Rc), s	4.0	* 4		9.0	3.0	4.0		9.0
Max Green Setting (Gmax), s	9.0	* 36		29.0	17.0	28.0		29.0
Max Q Clear Time (g_c+I1), s	5.4	13.0		18.3	11.2	11.0		19.4
Green Ext Time (p_c), s	0.1	1.4		1.8	0.1	1.1		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	28.9
HCM 2010 LOS	C

Notes

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	38	0	5	29	152	0	3	13	92	4	13
Future Vol, veh/h	2	38	0	5	29	152	0	3	13	92	4	13
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	2	38	0	5	29	152	0	3	13	92	4	13
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	7.7	7.7	7.1	8.2
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	5%	3%	84%
Vol Thru, %	19%	95%	16%	4%
Vol Right, %	81%	0%	82%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	40	186	109
LT Vol	0	2	5	92
Through Vol	3	38	29	4
RT Vol	13	0	152	13
Lane Flow Rate	16	40	186	109
Geometry Grp	1	1	1	1
Degree of Util (X)	0.018	0.049	0.192	0.135
Departure Headway (Hd)	4.053	4.433	3.713	4.452
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	888	813	949	796
Service Time	2.055	2.433	1.807	2.532
HCM Lane V/C Ratio	0.018	0.049	0.196	0.137
HCM Control Delay	7.1	7.7	7.7	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.1	0.2	0.7	0.5

Intersection	
Intersection Delay, s/veh	8.7
Intersection LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	207	4	9	232	2	24
Future Vol, veh/h	207	4	9	232	2	24
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	207	4	9	232	2	24
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.6	8.9	7.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	8%	0%	4%
Vol Thru, %	0%	98%	96%
Vol Right, %	92%	2%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	26	211	241
LT Vol	2	0	9
Through Vol	0	207	232
RT Vol	24	4	0
Lane Flow Rate	26	211	241
Geometry Grp	1	1	1
Degree of Util (X)	0.032	0.244	0.279
Departure Headway (Hd)	4.383	4.165	4.162
Convergence, Y/N	Yes	Yes	Yes
Cap	822	852	856
Service Time	2.383	2.239	2.228
HCM Lane V/C Ratio	0.032	0.248	0.282
HCM Control Delay	7.5	8.6	8.9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	1	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	47	173	47	20	231	59	12	35	17	86	38	22
Future Volume (veh/h)	47	173	47	20	231	59	12	35	17	86	38	22
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.87	0.93		0.89	0.91		0.86	0.90		0.87
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1900	1845	1900	1900	1845	1900	1900	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	47	173	47	20	231	59	12	35	17	86	38	22
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	165	503	122	109	572	139	164	389	164	414	172	80
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.38	0.38	0.38	0.38	0.38	0.38
Sat Flow, veh/h	154	1177	284	43	1339	325	164	1013	426	726	448	208
Grp Volume(v), veh/h	267	0	0	310	0	0	64	0	0	146	0	0
Grp Sat Flow(s),veh/h/ln	1616	0	0	1707	0	0	1603	0	0	1382	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0
Cycle Q Clear(g_c), s	4.4	0.0	0.0	5.3	0.0	0.0	1.0	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.18		0.18	0.06		0.19	0.19		0.27	0.59		0.15
Lane Grp Cap(c), veh/h	790	0	0	820	0	0	717	0	0	666	0	0
V/C Ratio(X)	0.34	0.00	0.00	0.38	0.00	0.00	0.09	0.00	0.00	0.22	0.00	0.00
Avail Cap(c_a), veh/h	1036	0	0	1087	0	0	1212	0	0	1100	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.2	0.0	0.0	8.5	0.0	0.0	8.4	0.0	0.0	8.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	0.0	2.5	0.0	0.0	0.5	0.0	0.0	1.1	0.0	0.0
LnGrp Delay(d),s/veh	8.3	0.0	0.0	8.6	0.0	0.0	8.4	0.0	0.0	8.9	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		267			310			64			146	
Approach Delay, s/veh		8.3			8.6			8.4			8.9	
Approach LOS		A			A			A			A	

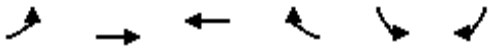
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.3		22.2		20.3		22.2
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		30.0		25.0		30.0		25.0
Max Q Clear Time (g_c+I1), s		3.0		6.4		4.7		7.3
Green Ext Time (p_c), s		0.8		2.6		0.8		2.5

Intersection Summary	
HCM 2010 Ctrl Delay	8.5
HCM 2010 LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	315	106	160	201	28	108	30	271	10	16	5
Future Volume (veh/h)	8	315	106	160	201	28	108	30	271	10	16	5
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.84	1.00		0.88	0.87		0.87	1.00		0.87
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1900	1900	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	8	315	106	160	201	28	108	30	271	10	16	5
Adj No. of Lanes	1	1	0	1	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	14	430	145	276	765	107	162	54	297	173	254	69
Arrive On Green	0.01	0.34	0.34	0.16	0.49	0.49	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	1757	1255	422	1757	1555	217	294	166	903	318	773	210
Grp Volume(v), veh/h	8	0	421	160	0	229	409	0	0	31	0	0
Grp Sat Flow(s),veh/h/ln	1757	0	1678	1757	0	1771	1362	0	0	1302	0	0
Q Serve(g_s), s	0.3	0.0	15.4	5.9	0.0	5.3	16.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.3	0.0	15.4	5.9	0.0	5.3	20.1	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.12	0.26		0.66	0.32		0.16
Lane Grp Cap(c), veh/h	14	0	575	276	0	871	513	0	0	496	0	0
V/C Ratio(X)	0.55	0.00	0.73	0.58	0.00	0.26	0.80	0.00	0.00	0.06	0.00	0.00
Avail Cap(c_a), veh/h	100	0	575	276	0	871	513	0	0	496	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.98	0.00	0.98	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	34.6	0.0	20.2	27.4	0.0	10.4	22.4	0.0	0.0	16.1	0.0	0.0
Incr Delay (d2), s/veh	11.7	0.0	8.0	2.0	0.0	0.7	12.2	0.0	0.0	0.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	8.4	3.0	0.0	2.7	9.2	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	46.3	0.0	28.2	29.3	0.0	11.1	34.6	0.0	0.0	16.3	0.0	0.0
LnGrp LOS	D		C	C		B	C			B		
Approach Vol, veh/h		429			389			409			31	
Approach Delay, s/veh		28.5			18.6			34.6			16.3	
Approach LOS		C			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	4.6	38.4		27.0	15.0	28.0		27.0
Change Period (Y+Rc), s	4.0	4.0		4.0	4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	31.0		23.0	11.0	24.0		23.0
Max Q Clear Time (g_c+I1), s	2.3	7.3		2.9	7.9	17.4		22.1
Green Ext Time (p_c), s	0.0	1.1		2.3	0.2	1.1		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.1
HCM 2010 LOS	C



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	24	574	337	34	20	33
Future Volume (vph)	24	574	337	34	20	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		3.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.85	
Flpb, ped/bikes	0.93	1.00	1.00		1.00	
Frt	1.00	1.00	0.99		0.92	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1631	1845	1799		1407	
Flt Permitted	0.54	1.00	1.00		0.98	
Satd. Flow (perm)	928	1845	1799		1407	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	24	574	337	34	20	33
RTOR Reduction (vph)	0	0	2	0	29	0
Lane Group Flow (vph)	24	574	369	0	24	0
Confl. Peds. (#/hr)	55			55	82	164
Confl. Bikes (#/hr)				10		7
Turn Type	Perm	NA	NA		Prot	
Protected Phases		6	2		4	
Permitted Phases	6					
Actuated Green, G (s)	37.4	37.4	37.4		5.4	
Effective Green, g (s)	37.4	37.4	37.4		5.4	
Actuated g/C Ratio	0.74	0.74	0.74		0.11	
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)	683	1358	1324		149	
v/s Ratio Prot		c0.31	0.21		c0.02	
v/s Ratio Perm	0.03					
v/c Ratio	0.04	0.42	0.28		0.16	
Uniform Delay, d1	1.8	2.6	2.2		20.6	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	0.1	0.0		0.2	
Delay (s)	1.8	2.6	2.3		20.8	
Level of Service	A	A	A		C	
Approach Delay (s)		2.6	2.3		20.8	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	3.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	10.0
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												
Traffic Volume (veh/h)	95	445	34	146	263	106	37	196	117	132	234	51
Future Volume (veh/h)	95	445	34	146	263	106	37	196	117	132	234	51
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.93	1.00		0.87	1.00		0.95	1.00		0.98
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1845	1845	1900	1845	1845	1845	1900	1845	1900	1845	1845	1900
Adj Flow Rate, veh/h	95	445	34	146	263	106	37	196	117	132	234	51
Adj No. of Lanes	1	1	0	1	1	1	0	1	0	1	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	209	720	55	179	738	545	71	262	145	245	427	93
Arrive On Green	0.12	0.43	0.43	0.10	0.40	0.40	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	1757	1682	129	1757	1845	1363	91	899	497	1052	1463	319
Grp Volume(v), veh/h	95	0	479	146	263	106	350	0	0	132	0	285
Grp Sat Flow(s),veh/h/ln	1757	0	1810	1757	1845	1363	1487	0	0	1052	0	1782
Q Serve(g_s), s	4.5	0.0	18.5	7.3	9.0	4.6	8.1	0.0	0.0	2.8	0.0	12.1
Cycle Q Clear(g_c), s	4.5	0.0	18.5	7.3	9.0	4.6	20.2	0.0	0.0	23.0	0.0	12.1
Prop In Lane	1.00		0.07	1.00		1.00	0.11		0.33	1.00		0.18
Lane Grp Cap(c), veh/h	209	0	775	179	738	545	478	0	0	245	0	520
V/C Ratio(X)	0.45	0.00	0.62	0.81	0.36	0.19	0.73	0.00	0.00	0.54	0.00	0.55
Avail Cap(c_a), veh/h	209	0	775	332	738	545	527	0	0	277	0	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	0.97	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.9	0.0	20.0	39.6	18.9	17.6	29.4	0.0	0.0	32.2	0.0	26.9
Incr Delay (d2), s/veh	0.6	0.0	3.7	3.4	1.3	0.8	3.7	0.0	0.0	0.7	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	10.0	3.7	4.8	1.8	8.6	0.0	0.0	3.2	0.0	6.0
LnGrp Delay(d),s/veh	37.5	0.0	23.7	43.0	20.2	18.4	33.1	0.0	0.0	32.9	0.0	27.2
LnGrp LOS	D		C	D	C	B	C			C		C
Approach Vol, veh/h		574			515			350			417	
Approach Delay, s/veh		26.0			26.3			33.1			29.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	14.7	40.0		35.3	12.2	42.5		35.3
Change Period (Y+Rc), s	4.0	* 4		9.0	3.0	4.0		9.0
Max Green Setting (Gmax), s	9.0	* 36		29.0	17.0	28.0		29.0
Max Q Clear Time (g_c+I1), s	6.5	11.0		25.0	9.3	20.5		22.2
Green Ext Time (p_c), s	0.1	1.2		1.2	0.1	1.4		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

Notes

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	7	29	4	22	54	134	2	7	10	135	5	11
Future Vol, veh/h	7	29	4	22	54	134	2	7	10	135	5	11
Conflicting Peds, #/hr	31	0	11	11	0	31	19	0	15	15	0	19
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	7	29	4	22	54	134	2	7	10	135	5	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	219	0	0	44	0	0	248	319	57	265	254	171
Stage 1	-	-	-	-	-	-	56	56	-	196	196	-
Stage 2	-	-	-	-	-	-	192	263	-	69	58	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1344	-	-	1558	-	-	704	596	1006	686	648	870
Stage 1	-	-	-	-	-	-	954	846	-	803	737	-
Stage 2	-	-	-	-	-	-	807	689	-	939	845	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1323	-	-	1539	-	-	662	563	984	637	612	834
Mov Cap-2 Maneuver	-	-	-	-	-	-	662	563	-	637	612	-
Stage 1	-	-	-	-	-	-	941	834	-	778	706	-
Stage 2	-	-	-	-	-	-	766	660	-	906	833	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0.8	10	12.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	742	1323	-	-	1539	-	-	647
HCM Lane V/C Ratio	0.026	0.005	-	-	0.014	-	-	0.233
HCM Control Delay (s)	10	7.7	0	-	7.4	0	-	12.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.9

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	234	6	21	230	6	14
Future Vol, veh/h	234	6	21	230	6	14
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	234	6	21	230	6	14
Number of Lanes	1	0	0	1	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.8	9	7.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	30%	0%	8%
Vol Thru, %	0%	97%	92%
Vol Right, %	70%	3%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	20	240	251
LT Vol	6	0	21
Through Vol	0	234	230
RT Vol	14	6	0
Lane Flow Rate	20	240	251
Geometry Grp	1	1	1
Degree of Util (X)	0.026	0.277	0.292
Departure Headway (Hd)	4.644	4.159	4.182
Convergence, Y/N	Yes	Yes	Yes
Cap	775	854	851
Service Time	2.644	2.234	2.253
HCM Lane V/C Ratio	0.026	0.281	0.295
HCM Control Delay	7.8	8.8	9
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	1.1	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	206	39	38	196	102	34	102	46	45	108	49
Future Volume (veh/h)	67	206	39	38	196	102	34	102	46	45	108	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.94		0.87	0.93		0.89	0.92		0.86	0.92		0.87
Parking Bus, 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
Adj Sat Flow, veh/h/ln	1900	1845	1900	1900	1845	1900	1900	1845	1900	1900	1845	1900
Adj Flow Rate, veh/h	67	206	39	38	196	102	34	102	46	45	108	49
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	191	511	86	132	445	211	161	396	155	183	377	147
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	210	1188	200	91	1034	491	162	1028	403	212	980	382
Grp Volume(v), veh/h	312	0	0	336	0	0	182	0	0	202	0	0
Grp Sat Flow(s),veh/h/ln	1597	0	0	1616	0	0	1593	0	0	1573	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.3	0.0	0.0	6.2	0.0	0.0	3.2	0.0	0.0	3.6	0.0	0.0
Prop In Lane	0.21		0.12	0.11		0.30	0.19		0.25	0.22		0.24
Lane Grp Cap(c), veh/h	788	0	0	788	0	0	712	0	0	707	0	0
V/C Ratio(X)	0.40	0.00	0.00	0.43	0.00	0.00	0.26	0.00	0.00	0.29	0.00	0.00
Avail Cap(c_a), veh/h	1009	0	0	1016	0	0	1179	0	0	1168	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.5	0.0	0.0	8.8	0.0	0.0	9.2	0.0	0.0	9.3	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	0.0	2.8	0.0	0.0	1.5	0.0	0.0	1.7	0.0	0.0
LnGrp Delay(d),s/veh	8.7	0.0	0.0	8.9	0.0	0.0	9.3	0.0	0.0	9.4	0.0	0.0
LnGrp LOS	A			A			A			A		
Approach Vol, veh/h		312			336			182			202	
Approach Delay, s/veh		8.7			8.9			9.3			9.4	
Approach LOS		A			A			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		20.7		22.6		20.7		22.6
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0
Max Green Setting (Gmax), s		30.0		25.0		30.0		25.0
Max Q Clear Time (g_c+I1), s		5.2		7.3		5.6		8.2
Green Ext Time (p_c), s		1.6		3.0		1.6		2.9

Intersection Summary		
HCM 2010 Ctrl Delay		9.0
HCM 2010 LOS		A

APPENDIX C
PREDICTED CRASH FREQUENCY CALCULATION

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	7th Street
Agency or Company	Fehr & Peers	Roadway Section	Between Chester Street and Center Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.06
AADT (veh/day)	$AADT_{MAX}$ = 32,900 (veh/day)	--	7,415
Type of on-street parking (none/parallel/angle)		None	Parallel (Comm/Ind)
Proportion of curb length with on-street parking		--	0.34
Median width (ft) - for divided only		15	Not Present
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	3
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		0	132
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	14
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.36	1.28	1.00	0.93	1.00	1.63

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients** from Table 12-3 a	b	**Overdispersion Parameter, k** from Table 12-3	**Initial N_{brmv}** from Equation 12-10	**Proportion of Total Crashes**	**Adjusted N_{brmv}** $(4)_{TOTAL}$*(5)	**Combined CMFs** (6) from Worksheet 1B	**Calibration Factor, Cr**	**Predicted N_{brmv}** (6)*(7)*(8)
Total	-12.40	1.41	0.66	0.073	1.000	0.073	1.63	1.00	0.119
Fatal and Injury (FI)	-16.45	1.69	0.59	0.015	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.216	0.016	1.63	1.00	0.026
Property Damage Only (PDO)	-11.95	1.33	0.59	0.056	$(5)_{TOTAL}-(5)_{FI}$ = 0.784	0.057	1.63	1.00	0.093

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.026	1.000	0.093	0.119
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.845	0.022	0.842	0.078	0.100
Head-on collision	0.034	0.001	0.020	0.002	0.003
Angle collision	0.069	0.002	0.020	0.002	0.004
Sideswipe, same direction	0.001	0.000	0.078	0.007	0.007
Sideswipe, opposite direction	0.017	0.000	0.020	0.002	0.002
Other multiple-vehicle collision	0.034	0.001	0.020	0.002	0.003

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.74	0.54	1.37	0.024	1.000	0.024	1.63	1.00	0.040
Fatal and Injury (FI)	-6.37	0.47	1.06	0.007	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.293	0.007	1.63	1.00	0.012
Property Damage Only (PDO)	-6.29	0.56	1.93	0.017	$(5)_{TOTAL}-(5)_{FI}$ = 0.707	0.017	1.63	1.00	0.028

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.012	1.000	0.028	0.040
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.001	0.000	0.000
Collision with fixed object	0.688	0.008	0.963	0.027	0.035
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.004	0.035	0.001	0.005

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.102	1.000	0.000	--
Minor commercial	3	0.032	1.000	0.047	
Major industrial/institutional	0	0.110	1.000	0.000	
Minor industrial/institutional	0	0.015	1.000	0.000	
Major residential	0	0.053	1.000	0.000	
Minor residential	0	0.010	1.000	0.000	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.047	1.10

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.047	1.000	0.047	1.63	1.00	0.078
Fatal and injury (FI)	--	0.243	0.012	1.63	1.00	0.019
Property damage only (PDO)	--	0.757	0.036	1.63	1.00	0.059

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.119	0.040	0.078	0.236	0.041	1.00	0.010
Fatal and injury (FI)	--	--	--	--	--	1.00	0.010

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.119	0.040	0.078	0.236	0.027	1.00	0.006
Fatal and injury (FI)	--	--	--	--	--	1.00	0.006

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.022	0.078	0.100
Head-on collisions (from Worksheet 1D)	0.001	0.002	0.003
Angle collisions (from Worksheet 1D)	0.002	0.002	0.004
Sideswipe, same direction (from Worksheet 1D)	0.000	0.007	0.007
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.002	0.002
Driveway-related collisions (from Worksheet 1H)	0.019	0.059	0.078
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.002	0.003
Subtotal	0.044	0.152	0.196
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.008	0.027	0.035
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.004	0.001	0.005
Collision with pedestrian (from Worksheet 1I)	0.010	0.000	0.010
Collision with bicycle (from Worksheet 1J)	0.006	0.000	0.006
Subtotal	0.028	0.028	0.056
Total	0.072	0.180	0.252

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.252	0.06	4.1
Fatal and injury (FI)	0.1	0.06	1.2
Property damage only (PDO)	0.2	0.06	2.9

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	7th Street
Agency or Company	Fehr & Peers	Roadway Section	Between Center Street and Mandela Parkway
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	3T
Length of segment, L (mi)		--	0.08
AADT (veh/day)	$AADT_{MAX}$ = 32,900 (veh/day)	--	7,170
Type of on-street parking (none/parallel/angle)		None	Parallel (Comm/Ind)
Proportion of curb length with on-street parking		--	0.35
Median width (ft) - for divided only		15	Not Present
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	0
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		0	151
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	19
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.37	1.27	1.00	0.93	1.00	1.62

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-12.40	1.41	0.66	0.085	1.000	0.085	1.62	1.00	0.138
Fatal and Injury (FI)	-16.45	1.69	0.59	0.018	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.213	0.018	1.62	1.00	0.030
Property Damage Only (PDO)	-11.95	1.33	0.59	0.066	$(5)_{TOTAL}-(5)_{FI}$ = 0.787	0.067	1.62	1.00	0.109

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.030	1.000	0.109	0.138
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.845	0.025	0.842	0.092	0.117
Head-on collision	0.034	0.001	0.020	0.002	0.003
Angle collision	0.069	0.002	0.020	0.002	0.004
Sideswipe, same direction	0.001	0.000	0.078	0.008	0.009
Sideswipe, opposite direction	0.017	0.001	0.020	0.002	0.003
Other multiple-vehicle collision	0.034	0.001	0.020	0.002	0.003

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.74	0.54	1.37	0.029	1.000	0.029	1.62	1.00	0.048
Fatal and Injury (FI)	-6.37	0.47	1.06	0.008	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.293	0.009	1.62	1.00	0.014
Property Damage Only (PDO)	-6.29	0.56	1.93	0.020	$(5)_{TOTAL}-(5)_{FI}$ = 0.707	0.021	1.62	1.00	0.034

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.014	1.000	0.034	0.048
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.001	0.000	0.001	0.000	0.000
Collision with fixed object	0.688	0.010	0.963	0.033	0.042
Collision with other object	0.001	0.000	0.001	0.000	0.000
Other single-vehicle collision	0.310	0.004	0.035	0.001	0.006

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.102	1.000	0.000	--
Minor commercial	0	0.032	1.000	0.000	
Major industrial/institutional	0	0.110	1.000	0.000	
Minor industrial/institutional	0	0.015	1.000	0.000	
Major residential	0	0.053	1.000	0.000	
Minor residential	0	0.010	1.000	0.000	
Other	0	0.016	1.000	0.000	
Total	--	--	--	0.000	1.10

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.000	1.000	0.000	1.62	1.00	0.000
Fatal and injury (FI)	--	0.243	0.000	1.62	1.00	0.000
Property damage only (PDO)	--	0.757	0.000	1.62	1.00	0.000

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.138	0.048	0.000	0.186	0.041	1.00	0.008
Fatal and injury (FI)	--	--	--	--	--	1.00	0.008

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.138	0.048	0.000	0.186	0.027	1.00	0.005
Fatal and injury (FI)	--	--	--	--	--	1.00	0.005

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.025	0.092	0.117
Head-on collisions (from Worksheet 1D)	0.001	0.002	0.003
Angle collisions (from Worksheet 1D)	0.002	0.002	0.004
Sideswipe, same direction (from Worksheet 1D)	0.000	0.008	0.009
Sideswipe, opposite direction (from Worksheet 1D)	0.001	0.002	0.003
Driveway-related collisions (from Worksheet 1H)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.002	0.003
Subtotal	0.030	0.109	0.138
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 1F)	0.010	0.033	0.042
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.004	0.001	0.006
Collision with pedestrian (from Worksheet 1I)	0.008	0.000	0.008
Collision with bicycle (from Worksheet 1J)	0.005	0.000	0.005
Subtotal	0.027	0.034	0.060
Total	0.056	0.143	0.199

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.199	0.08	2.6
Fatal and injury (FI)	0.1	0.08	0.7
Property damage only (PDO)	0.1	0.08	1.9

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	5th Street
Agency or Company	Fehr & Peers	Roadway Section	Between Chester Street and Center Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.06
AADT (veh/day)	$AADT_{MAX}$ = 32,600 (veh/day)	--	2,565
Type of on-street parking (none/parallel/angle)		None	Parallel (Residential)
Proportion of curb length with on-street parking		--	0.95
Median width (ft) - for divided only		15	Not Present
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		0	27
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	15
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.44	1.05	1.00	0.93	1.00	1.41

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-15.22	1.68	0.84	0.008	1.000	0.008	1.41	1.00	0.012
Fatal and Injury (FI)	-16.22	1.66	0.65	0.003	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.302	0.002	1.41	1.00	0.003
Property Damage Only (PDO)	-15.62	1.69	0.87	0.006	$(5)_{TOTAL}-(5)_{FI}$ = 0.698	0.006	1.41	1.00	0.008

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.003	1.000	0.008	0.012
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.730	0.003	0.778	0.006	0.009
Head-on collision	0.068	0.000	0.004	0.000	0.000
Angle collision	0.085	0.000	0.079	0.001	0.001
Sideswipe, same direction	0.015	0.000	0.031	0.000	0.000
Sideswipe, opposite direction	0.073	0.000	0.055	0.000	0.001
Other multiple-vehicle collision	0.029	0.000	0.053	0.000	0.001

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.021	1.000	0.021	1.41	1.00	0.030
Fatal and Injury (FI)	-3.96	0.23	0.50	0.007	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.339	0.007	1.41	1.00	0.010
Property Damage Only (PDO)	-6.51	0.64	0.87	0.014	$(5)_{TOTAL}-(5)_{FI}$ = 0.661	0.014	1.41	1.00	0.020

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.010	1.000	0.020	0.030
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.026	0.000	0.066	0.001	0.002
Collision with fixed object	0.723	0.007	0.759	0.015	0.022
Collision with other object	0.010	0.000	0.013	0.000	0.000
Other single-vehicle collision	0.241	0.002	0.162	0.003	0.006

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	1	0.172	1.000	0.029	
Minor industrial/institutional	0	0.023	1.000	0.000	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.011	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.040	0.81

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.040	1.000	0.040	1.41	1.00	0.057
Fatal and injury (FI)	--	0.323	0.013	1.41	1.00	0.018
Property damage only (PDO)	--	0.677	0.027	1.41	1.00	0.039

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.012	0.030	0.057	0.099	0.036	1.00	0.004
Fatal and injury (FI)	--	--	--	--	--	1.00	0.004

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.012	0.030	0.057	0.099	0.018	1.00	0.002
Fatal and injury (FI)	--	--	--	--	--	1.00	0.002

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.003	0.006	0.009
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.000
Angle collisions (from Worksheet 1D)	0.000	0.001	0.001
Sideswipe, same direction (from Worksheet 1D)	0.000	0.000	0.000
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.000	0.001
Driveway-related collisions (from Worksheet 1H)	0.018	0.039	0.057
Other multiple-vehicle collision (from Worksheet 1D)	0.000	0.000	0.001
Subtotal	0.022	0.047	0.068
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.001	0.002
Collision with fixed object (from Worksheet 1F)	0.007	0.015	0.022
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.002	0.003	0.006
Collision with pedestrian (from Worksheet 1I)	0.004	0.000	0.004
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.016	0.020	0.035
Total	0.037	0.066	0.104

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.104	0.06	1.7
Fatal and injury (FI)	0.0	0.06	0.6
Property damage only (PDO)	0.1	0.06	1.1

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	5th Street
Agency or Company	Fehr & Peers	Roadway Section	Between Center Street and Mandela Parkway
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.07
AADT (veh/day)	$AADT_{MAX}$ = 32,600 (veh/day)	--	3,715
Type of on-street parking (none/parallel/angle)		None	Angle (Comm/Ind)
Proportion of curb length with on-street parking		--	0.84
Median width (ft) - for divided only		15	Not Present
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	4
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		0	75
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	20
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
4.23	1.19	1.00	0.93	1.00	4.70

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients** from Table 12-3 a	b	**Overdispersion Parameter, k** from Table 12-3	**Initial N_{brmv}** from Equation 12-10	**Proportion of Total Crashes**	**Adjusted N_{brmv}** $(4)_{TOTAL}$*(5)	**Combined CMFs** (6) from Worksheet 1B	**Calibration Factor, Cr**	**Predicted N_{brmv}** (6)*(7)*(8)
Total	-15.22	1.68	0.84	0.017	1.000	0.017	4.70	1.00	0.082
Fatal and Injury (FI)	-16.22	1.66	0.65	0.005	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.300	0.005	4.70	1.00	0.024
Property Damage Only (PDO)	-15.62	1.69	0.87	0.013	$(5)_{TOTAL}-(5)_{FI}$ = 0.700	0.012	4.70	1.00	0.057

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.024	1.000	0.057	0.082
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.730	0.018	0.778	0.044	0.062
Head-on collision	0.068	0.002	0.004	0.000	0.002
Angle collision	0.085	0.002	0.079	0.005	0.007
Sideswipe, same direction	0.015	0.000	0.031	0.002	0.002
Sideswipe, opposite direction	0.073	0.002	0.055	0.003	0.005
Other multiple-vehicle collision	0.029	0.001	0.053	0.003	0.004

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.030	1.000	0.030	4.70	1.00	0.140
Fatal and Injury (FI)	-3.96	0.23	0.50	0.009	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.306	0.009	4.70	1.00	0.043
Property Damage Only (PDO)	-6.51	0.64	0.87	0.020	$(5)_{TOTAL}-(5)_{FI}$ = 0.694	0.021	4.70	1.00	0.097

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.043	1.000	0.097	0.140
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.006	0.008
Collision with fixed object	0.723	0.031	0.759	0.074	0.105
Collision with other object	0.010	0.000	0.013	0.001	0.002
Other single-vehicle collision	0.241	0.010	0.162	0.016	0.026

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	1	0.172	1.000	0.043	
Minor industrial/institutional	4	0.023	1.000	0.023	
Major residential	0	0.083	1.000	0.000	
Minor residential	0	0.016	1.000	0.000	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.065	0.81

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.065	1.000	0.065	4.70	1.00	0.307
Fatal and injury (FI)	--	0.323	0.021	4.70	1.00	0.099
Property damage only (PDO)	--	0.677	0.044	4.70	1.00	0.208

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.082	0.140	0.307	0.529	0.036	1.00	0.019
Fatal and injury (FI)	--	--	--	--	--	1.00	0.019

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.082	0.140	0.307	0.529	0.018	1.00	0.010
Fatal and injury (FI)	--	--	--	--	--	1.00	0.010

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.018	0.044	0.062
Head-on collisions (from Worksheet 1D)	0.002	0.000	0.002
Angle collisions (from Worksheet 1D)	0.002	0.005	0.007
Sideswipe, same direction (from Worksheet 1D)	0.000	0.002	0.002
Sideswipe, opposite direction (from Worksheet 1D)	0.002	0.003	0.005
Driveway-related collisions (from Worksheet 1H)	0.099	0.208	0.307
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.003	0.004
Subtotal	0.124	0.265	0.389
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.006	0.008
Collision with fixed object (from Worksheet 1F)	0.031	0.074	0.105
Collision with other object (from Worksheet 1F)	0.000	0.001	0.002
Other single-vehicle collision (from Worksheet 1F)	0.010	0.016	0.026
Collision with pedestrian (from Worksheet 1I)	0.019	0.000	0.019
Collision with bicycle (from Worksheet 1J)	0.010	0.000	0.010
Subtotal	0.071	0.097	0.169
Total	0.195	0.363	0.558

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.558	0.07	7.9
Fatal and injury (FI)	0.2	0.07	2.7
Property damage only (PDO)	0.4	0.07	5.1

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	Chester Street
Agency or Company	Fehr & Peers	Roadway Section	Between 7th Street and 5th Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.09
AADT (veh/day)	$AADT_{MAX}$ = 32,600 (veh/day)	--	2,325
Type of on-street parking (none/parallel/angle)		None	Parallel (Residential)
Proportion of curb length with on-street parking		--	0.76
Median width (ft) - for divided only		15	Not Present
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	0
Minor commercial driveways (number)		--	0
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	1
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	4
Other driveways (number)		--	0
Speed Category		--	Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		0	39
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	15
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.35	1.10	1.00	0.93	1.00	1.38

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-15.22	1.68	0.84	0.010	1.000	0.010	1.38	1.00	0.013
Fatal and Injury (FI)	-16.22	1.66	0.65	0.003	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.303	0.003	1.38	1.00	0.004
Property Damage Only (PDO)	-15.62	1.69	0.87	0.007	$(5)_{TOTAL}-(5)_{FI}$ = 0.697	0.007	1.38	1.00	0.009

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.004	1.000	0.009	0.013
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.730	0.003	0.778	0.007	0.010
Head-on collision	0.068	0.000	0.004	0.000	0.000
Angle collision	0.085	0.000	0.079	0.001	0.001
Sideswipe, same direction	0.015	0.000	0.031	0.000	0.000
Sideswipe, opposite direction	0.073	0.000	0.055	0.001	0.001
Other multiple-vehicle collision	0.029	0.000	0.053	0.000	0.001

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.028	1.000	0.028	1.38	1.00	0.039
Fatal and Injury (FI)	-3.96	0.23	0.50	0.010	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.348	0.010	1.38	1.00	0.014
Property Damage Only (PDO)	-6.51	0.64	0.87	0.019	$(5)_{TOTAL}-(5)_{FI}$ = 0.652	0.018	1.38	1.00	0.025

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.014	1.000	0.025	0.039
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.026	0.000	0.066	0.002	0.002
Collision with fixed object	0.723	0.010	0.759	0.019	0.029
Collision with other object	0.010	0.000	0.013	0.000	0.000
Other single-vehicle collision	0.241	0.003	0.162	0.004	0.007

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	0	0.158	1.000	0.000	--
Minor commercial	0	0.050	1.000	0.000	
Major industrial/institutional	1	0.172	1.000	0.027	
Minor industrial/institutional	1	0.023	1.000	0.004	
Major residential	0	0.083	1.000	0.000	
Minor residential	4	0.016	1.000	0.010	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.040	0.81

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.040	1.000	0.040	1.38	1.00	0.055
Fatal and injury (FI)	--	0.323	0.013	1.38	1.00	0.018
Property damage only (PDO)	--	0.677	0.027	1.38	1.00	0.037

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.013	0.039	0.055	0.108	0.036	1.00	0.004
Fatal and injury (FI)	--	--	--	--	--	1.00	0.004

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.013	0.039	0.055	0.108	0.018	1.00	0.002
Fatal and injury (FI)	--	--	--	--	--	1.00	0.002

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.003	0.007	0.010
Head-on collisions (from Worksheet 1D)	0.000	0.000	0.000
Angle collisions (from Worksheet 1D)	0.000	0.001	0.001
Sideswipe, same direction (from Worksheet 1D)	0.000	0.000	0.000
Sideswipe, opposite direction (from Worksheet 1D)	0.000	0.001	0.001
Driveway-related collisions (from Worksheet 1H)	0.018	0.037	0.055
Other multiple-vehicle collision (from Worksheet 1D)	0.000	0.000	0.001
Subtotal	0.022	0.047	0.069
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 1F)	0.010	0.019	0.029
Collision with other object (from Worksheet 1F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 1F)	0.003	0.004	0.007
Collision with pedestrian (from Worksheet 1I)	0.004	0.000	0.004
Collision with bicycle (from Worksheet 1J)	0.002	0.000	0.002
Subtotal	0.019	0.025	0.045
Total	0.041	0.072	0.113

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.113	0.09	1.3
Fatal and injury (FI)	0.0	0.09	0.5
Property damage only (PDO)	0.1	0.09	0.8

Worksheet 1A -- General Information and Input Data for Urban and Suburban Roadway Segments

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	Mandela Parkway
Agency or Company	Fehr & Peers	Roadway Section	Between 7th Street and 5th Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Roadway type (2U, 3T, 4U, 4D, ST)		--	2U
Length of segment, L (mi)		--	0.09
AADT (veh/day)	$AADT_{MAX}$ = 32,600 (veh/day)	--	6,175
Type of on-street parking (none/parallel/angle)		None	Parallel (Comm/Ind)
Proportion of curb length with on-street parking		--	0.36
Median width (ft) - for divided only		15	Not Present
Lighting (present / not present)		Not Present	Present
Auto speed enforcement (present / not present)		Not Present	Not Present
Major commercial driveways (number)		--	1
Minor commercial driveways (number)		--	2
Major industrial / institutional driveways (number)		--	1
Minor industrial / institutional driveways (number)		--	0
Major residential driveways (number)		--	0
Minor residential driveways (number)		--	0
Other driveways (number)		--	0
Speed Category		--	Posted Speed 30 mph or Lower
Roadside fixed object density (fixed objects / mi)		0	79
Offset to roadside fixed objects (ft) [If greater than 30 or Not Present, input 30]		30	25
Calibration Factor, Cr		1.00	1.00

Worksheet 1B -- Crash Modification Factors for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for On-Street Parking	CMF for Roadside Fixed Objects	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMF 5r*	*CMF comb*
from Equation 12-32	from Equation 12-33	from Table 12-22	from Equation 12-34	from Section 12.7.1	(1)*(2)*(3)*(4)*(5)
1.39	1.17	1.00	0.93	1.00	1.52

Worksheet 1C -- Multiple-Vehicle Nondriveway Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brmv}**	**Proportion of Total Crashes**	**Adjusted N_{brmv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brmv}**
	from Table 12-3		from Table 12-3	from Equation 12-10		$(4)_{TOTAL}$*(5)	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-15.22	1.68	0.84	0.050	1.000	0.050	1.52	1.00	0.076
Fatal and Injury (FI)	-16.22	1.66	0.65	0.015	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.297	0.015	1.52	1.00	0.022
Property Damage Only (PDO)	-15.62	1.69	0.87	0.037	$(5)_{TOTAL}-(5)_{FI}$ = 0.703	0.035	1.52	1.00	0.053

Worksheet 1D -- Multiple-Vehicle Nondriveway Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brmv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brmv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brmv\ (TOTAL)}$ (crashes/year)**
	from Table 12-4	$(9)_{FI}$ from Worksheet 1C	from Table 12-4	$(9)_{PDO}$ from Worksheet 1C	$(9)_{TOTAL}$ from Worksheet 1C
Total	1.000	0.022	1.000	0.053	0.076
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.730	0.016	0.778	0.041	0.058
Head-on collision	0.068	0.002	0.004	0.000	0.002
Angle collision	0.085	0.002	0.079	0.004	0.006
Sideswipe, same direction	0.015	0.000	0.031	0.002	0.002
Sideswipe, opposite direction	0.073	0.002	0.055	0.003	0.005
Other multiple-vehicle collision	0.029	0.001	0.053	0.003	0.003

Worksheet 1E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**		**Overdispersion Parameter, k**	**Initial N_{brsv}**	**Proportion of Total Crashes**	**Adjusted N_{brsv}**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted N_{brsv}**
	from Table 12-5		from Table 12-5	from Equation 12-13		$(4)_{TOTAL}*(5)$	(6) from Worksheet 1B		(6)*(7)*(8)
	a	b							
Total	-5.47	0.56	0.81	0.049	1.000	0.049	1.52	1.00	0.074
Fatal and Injury (FI)	-3.96	0.23	0.50	0.012	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.263	0.013	1.52	1.00	0.019
Property Damage Only (PDO)	-6.51	0.64	0.87	0.035	$(5)_{TOTAL}-(5)_{FI}$ = 0.737	0.036	1.52	1.00	0.054

Worksheet 1F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{brsv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{brsv\ (PDO)}$ (crashes/year)**	**Predicted N $_{brsv\ (TOTAL)}$ (crashes/year)**
	from Table 12-6	$(9)_{FI}$ from Worksheet 1E	from Table 12-6	$(9)_{PDO}$ from Worksheet 1E	$(9)_{TOTAL}$ from Worksheet 1E
Total	1.000	0.019	1.000	0.054	0.074
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with animal	0.026	0.001	0.066	0.004	0.004
Collision with fixed object	0.723	0.014	0.759	0.041	0.055
Collision with other object	0.010	0.000	0.013	0.001	0.001
Other single-vehicle collision	0.241	0.005	0.162	0.009	0.013

Worksheet 1G -- Multiple-Vehicle Driveway-Related Collisions by Driveway Type for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
Driveway Type	**Number of driveways, n_j**	**Crashes per driveway per year, N_j**	**Coefficient for traffic adjustment, t**	**Initial N_{brdwy}**	**Overdispersion parameter, k**
		from Table 12-7	from Table 12-7	Equation 12-16 $n_j * N_j * (AADT/15,000)^t$	from Table 12-7
Major commercial	1	0.158	1.000	0.065	
Minor commercial	2	0.050	1.000	0.041	
Major industrial/institutional	1	0.172	1.000	0.071	
Minor industrial/institutional	0	0.023	1.000	0.000	--
Major residential	0	0.083	1.000	0.000	
Minor residential	0	0.016	1.000	0.000	
Other	0	0.025	1.000	0.000	
Total	--	--	--	0.177	0.81

Worksheet 1H -- Multiple-Vehicle Driveway-Related Collisions by Severity Level for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Initial N_{brdwy}**	**Proportion of total crashes (f_{dwy})**	**Adjusted N_{brdwy}**	**Combined CMFs**	**Calibration factor, C_r**	**Predicted N_{brdwy}**
	$(5)_{TOTAL}$ from Worksheet 1G	from Table 12-7	$(2)_{TOTAL}$ * (3)	(6) from Worksheet 1B		(4)*(5)*(6)
Total	0.177	1.000	0.177	1.52	1.00	0.268
Fatal and injury (FI)	--	0.323	0.057	1.52	1.00	0.087
Property damage only (PDO)	--	0.677	0.120	1.52	1.00	0.182

Worksheet 1I -- Vehicle-Pedestrian Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{pedr}**	**Calibration factor, C_r**	**Predicted N_{pedr}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-8		(5)*(6)*(7)
Total	0.076	0.074	0.268	0.418	0.036	1.00	0.015
Fatal and injury (FI)	--	--	--	--	--	1.00	0.015

Worksheet 1J -- Vehicle-Bicycle Collisions for Urban and Suburban Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**Predicted N_{brmv}**	**Predicted N_{brsv}**	**Predicted N_{brdwy}**	**Predicted N_{br}**	**f_{biker}**	**Calibration factor, C_r**	**Predicted N_{biker}**
	(9) from Worksheet 1C	(9) from Worksheet 1E	(7) from Worksheet 1H	(2)+(3)+(4)	from Table 12-9		(5)*(6)*(7)
Total	0.076	0.074	0.268	0.418	0.018	1.00	0.008
Fatal and injury (FI)	--	--	--	--	--	1.00	0.008

Worksheet 1K -- Crash Severity Distribution for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J	(5) from Worksheet 1D and 1F; and (7) from Worksheet 1H	(6) from Worksheet 1D and 1F; (7) from Worksheet 1H; and (8) from Worksheet 1I and 1J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 1D)	0.016	0.041	0.058
Head-on collisions (from Worksheet 1D)	0.002	0.000	0.002
Angle collisions (from Worksheet 1D)	0.002	0.004	0.006
Sideswipe, same direction (from Worksheet 1D)	0.000	0.002	0.002
Sideswipe, opposite direction (from Worksheet 1D)	0.002	0.003	0.005
Driveway-related collisions (from Worksheet 1H)	0.087	0.182	0.268
Other multiple-vehicle collision (from Worksheet 1D)	0.001	0.003	0.003
Subtotal	0.109	0.235	0.344
SINGLE-VEHICLE			
Collision with animal (from Worksheet 1F)	0.001	0.004	0.004
Collision with fixed object (from Worksheet 1F)	0.014	0.041	0.055
Collision with other object (from Worksheet 1F)	0.000	0.001	0.001
Other single-vehicle collision (from Worksheet 1F)	0.005	0.009	0.013
Collision with pedestrian (from Worksheet 1I)	0.015	0.000	0.015
Collision with bicycle (from Worksheet 1J)	0.008	0.000	0.008
Subtotal	0.042	0.054	0.096
Total	0.151	0.289	0.441

Worksheet 1L -- Summary Results for Urban and Suburban Roadway Segments			
(1)	(2)	(3)	(4)
Crash Severity Level	**Predicted average crash frequency, $N_{predicted\ rs}$ (crashes/year)**	**Roadway segment length, L (mi)**	**Crash rate (crashes/mi/year)**
	(Total) from Worksheet 1K		(2) / (3)
Total	0.441	0.09	5.1
Fatal and injury (FI)	0.2	0.09	1.7
Property damage only (PDO)	0.3	0.09	3.3

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	
Agency or Company	Fehr & Peers	Intersection	7th Street and Chester Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4ST
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 46,800 (veh/day)	--	6,960
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 5,900 (veh/day)	--	2,160
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	2
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	
Type of left-turn signal phasing for Leg #1		Permissive	
Type of left-turn signal phasing for Leg #2		--	
Type of left-turn signal phasing for Leg #3		--	
Type of left-turn signal phasing for Leg #4 (if applicable)		--	
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	
Intersection red light cameras (present/not present)		Not Present	
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	
Number of bus stops within 300 m (1,000 ft) of the intersection		0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.53	1.00	1.00	1.00	0.91	0.97	0.47

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-8.90	0.82	0.25	0.40	1.316	1.000	1.316	0.47	1.00	0.620
Fatal and Injury (FI)	-11.13	0.93	0.28	0.48	0.472	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.357	0.469	0.47	1.00	0.221
Property Damage Only (PDO)	-8.74	0.77	0.23	0.40	0.851	$(5)_{TOTAL}-(5)_{FI}$ = 0.643	0.847	0.47	1.00	0.399

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.221	1.000	0.399	0.620
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.338	0.075	0.374	0.149	0.224
Head-on collision	0.041	0.009	0.030	0.012	0.021
Angle collision	0.440	0.097	0.335	0.134	0.231
Sideswipe	0.121	0.027	0.044	0.018	0.044
Other multiple-vehicle collision	0.060	0.013	0.217	0.087	0.100

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-5.33	0.33	0.12	0.65	0.226	1.000	0.226	0.47	1.00	0.106
Fatal and Injury (FI)	--	--	--	--	0.063	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.304	0.069	0.47	1.00	0.032
Property Damage Only (PDO)	-7.04	0.36	0.25	0.54	0.144	$(5)_{TOTAL}-(5)_{FI}$ = 0.696	0.157	0.47	1.00	0.074

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.032	1.000	0.074	0.106
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.026	0.002	0.002
Collision with fixed object	0.679	0.022	0.847	0.063	0.085
Collision with other object	0.089	0.003	0.070	0.005	0.008
Other single-vehicle collision	0.051	0.002	0.007	0.001	0.002
Single-vehicle noncollision	0.179	0.006	0.049	0.004	0.009

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	0.620	0.106	0.726	0.022	1.00	0.016
Fatal and injury (FI)	--	--	--	--	1.00	0.016

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
--	--	--	--

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.620	0.106	0.726	0.018	1.00	0.013
Fatal and injury (FI)	--	--	--	--	1.00	0.013

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.075	0.149	0.224
Head-on collisions (from Worksheet 2D)	0.009	0.012	0.021
Angle collisions (from Worksheet 2D)	0.097	0.134	0.231
Sideswipe (from Worksheet 2D)	0.027	0.018	0.044
Other multiple-vehicle collision (from Worksheet 2D)	0.013	0.087	0.100
Subtotal	0.221	0.399	0.620
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 2F)	0.022	0.063	0.085
Collision with other object (from Worksheet 2F)	0.003	0.005	0.008
Other single-vehicle collision (from Worksheet 2F)	0.002	0.001	0.002
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.004	0.009
Collision with pedestrian (from Worksheet 2G or 2I)	0.016	0.000	0.016
Collision with bicycle (from Worksheet 2J)	0.013	0.000	0.013
Subtotal	0.061	0.074	0.135
Total	0.282	0.473	0.755

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	0.8
Fatal and injury (FI)	0.3
Property damage only (PDO)	0.5

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	
Agency or Company	Fehr & Peers	Intersection	7th Street and Center Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 58,100 (veh/day)	--	7,330
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 16,400 (veh/day)	--	500
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	
Number of major-road approaches with right-turn lanes (0,1,2)		0	
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	0
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2		--	Permissive
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			3,010
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	3
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	2

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.93	1.00	1.00	1.00	0.91	1.00	0.85

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-12.13	1.11	0.26	0.33	0.530	1.000	0.530	0.85	1.00	0.449
Fatal and Injury (FI)	-11.58	1.02	0.17	0.30	0.236	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.446	0.236	0.85	1.00	0.200
Property Damage Only (PDO)	-13.24	1.14	0.30	0.36	0.292	$(5)_{TOTAL}-(5)_{FI}$ = 0.554	0.293	0.85	1.00	0.248

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.200	1.000	0.248	0.449
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.549	0.110	0.546	0.136	0.246
Head-on collision	0.038	0.008	0.020	0.005	0.013
Angle collision	0.280	0.056	0.204	0.051	0.107
Sideswipe	0.076	0.015	0.032	0.008	0.023
Other multiple-vehicle collision	0.057	0.011	0.198	0.049	0.061

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-9.02	0.42	0.40	0.36	0.061	1.000	0.061	0.85	1.00	0.052
Fatal and Injury (FI)	-9.75	0.27	0.51	0.24	0.015	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.240	0.015	0.85	1.00	0.012
Property Damage Only (PDO)	-9.08	0.45	0.33	0.53	0.049	$(5)_{TOTAL}-(5)_{FI}$ = 0.760	0.046	0.85	1.00	0.039

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.012	1.000	0.039	0.052
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.003	0.000	0.000
Collision with fixed object	0.653	0.008	0.895	0.035	0.043
Collision with other object	0.091	0.001	0.069	0.003	0.004
Other single-vehicle collision	0.045	0.001	0.018	0.001	0.001
Single-vehicle noncollision	0.209	0.003	0.014	0.001	0.003

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.12	3.11

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-6.60	0.05	0.24	0.41	0.09	0.52	0.039	3.11	1.00	0.122
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.122

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.449	0.052	0.500	0.011	1.00	0.006
Fatal and injury (FI)	--	--	--	--	1.00	0.006

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.110	0.136	0.246
Head-on collisions (from Worksheet 2D)	0.008	0.005	0.013
Angle collisions (from Worksheet 2D)	0.056	0.051	0.107
Sideswipe (from Worksheet 2D)	0.015	0.008	0.023
Other multiple-vehicle collision (from Worksheet 2D)	0.011	0.049	0.061
Subtotal	0.200	0.248	0.449
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.008	0.035	0.043
Collision with other object (from Worksheet 2F)	0.001	0.003	0.004
Other single-vehicle collision (from Worksheet 2F)	0.001	0.001	0.001
Single-vehicle noncollision (from Worksheet 2F)	0.003	0.001	0.003
Collision with pedestrian (from Worksheet 2G or 2I)	0.122	0.000	0.122
Collision with bicycle (from Worksheet 2J)	0.006	0.000	0.006
Subtotal	0.140	0.039	0.179
Total	0.340	0.288	0.627

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	0.6
Fatal and injury (FI)	0.3
Property damage only (PDO)	0.3

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	
Agency or Company	Fehr & Peers	Intersection	7th Street and Mandela Parkway
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	8,780
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	7,530
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	
Number of major-road approaches with right-turn lanes (0,1,2)		0	
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	3
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2		--	Protected
Type of left-turn signal phasing for Leg #3		--	Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Permissive
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			1,660
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	3
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	2

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.73	0.88	1.00	1.00	0.91	1.00	0.59

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	2.179	1.000	2.179	0.59	1.00	1.280
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	0.630	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.300	0.655	0.59	1.00	0.384
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	1.468	$(5)_{TOTAL}-(5)_{FI}$ 0.700	1.525	0.59	1.00	0.896

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.384	1.000	0.896	1.280
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.173	0.483	0.433	0.606
Head-on collision	0.049	0.019	0.030	0.027	0.046
Angle collision	0.347	0.133	0.244	0.219	0.352
Sideswipe	0.099	0.038	0.032	0.029	0.067
Other multiple-vehicle collision	0.055	0.021	0.211	0.189	0.210

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.197	1.000	0.197	0.59	1.00	0.116
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.063	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ 0.325	0.064	0.59	1.00	0.038
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.132	$(5)_{TOTAL}-(5)_{FI}$ 0.675	0.133	0.59	1.00	0.078

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.038	1.000	0.078	0.116
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.028	0.870	0.068	0.096
Collision with other object	0.072	0.003	0.070	0.005	0.008
Other single-vehicle collision	0.040	0.002	0.023	0.002	0.003
Single-vehicle noncollision	0.141	0.005	0.034	0.003	0.008

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
4.15	1.00	1.12	4.65

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.116	4.65	1.00	0.539
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.539

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	1.280	0.116	1.396	0.015	1.00	0.021
Fatal and injury (FI)	--	--	--	--	1.00	0.021

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.173	0.433	0.606
Head-on collisions (from Worksheet 2D)	0.019	0.027	0.046
Angle collisions (from Worksheet 2D)	0.133	0.219	0.352
Sideswipe (from Worksheet 2D)	0.038	0.029	0.067
Other multiple-vehicle collision (from Worksheet 2D)	0.021	0.189	0.210
Subtotal	0.384	0.896	1.280
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.028	0.068	0.096
Collision with other object (from Worksheet 2F)	0.003	0.005	0.008
Other single-vehicle collision (from Worksheet 2F)	0.002	0.002	0.003
Single-vehicle noncollision (from Worksheet 2F)	0.005	0.003	0.008
Collision with pedestrian (from Worksheet 2G or 2I)	0.539	0.000	0.539
Collision with bicycle (from Worksheet 2J)	0.021	0.000	0.021
Subtotal	0.598	0.078	0.676
Total	0.982	0.974	1.956

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	2.0
Fatal and injury (FI)	1.0
Property damage only (PDO)	1.0

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	
Agency or Company	Fehr & Peers	Intersection	5th Street and Chester Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4ST
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 46,800 (veh/day)	--	1,740
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 5,900 (veh/day)	--	700
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	
Type of left-turn signal phasing for Leg #1		Permissive	
Type of left-turn signal phasing for Leg #2		--	
Type of left-turn signal phasing for Leg #3		--	
Type of left-turn signal phasing for Leg #4 (if applicable)		--	
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	
Intersection red light cameras (present/not present)		Not Present	
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	
Number of bus stops within 300 m (1,000 ft) of the intersection		0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.00	1.00	1.00	1.00	0.91	0.98	0.89

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-8.90	0.82	0.25	0.40	0.319	1.000	0.319	0.89	1.00	0.285
Fatal and Injury (FI)	-11.13	0.93	0.28	0.48	0.095	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.296	0.094	0.89	1.00	0.084
Property Damage Only (PDO)	-8.74	0.77	0.23	0.40	0.226	$(5)_{TOTAL}-(5)_{FI}$ = 0.704	0.224	0.89	1.00	0.201

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.084	1.000	0.201	0.285
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.338	0.028	0.374	0.075	0.103
Head-on collision	0.041	0.003	0.030	0.006	0.009
Angle collision	0.440	0.037	0.335	0.067	0.104
Sideswipe	0.121	0.010	0.044	0.009	0.019
Other multiple-vehicle collision	0.060	0.005	0.217	0.044	0.049

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-5.33	0.33	0.12	0.65	0.125	1.000	0.125	0.89	1.00	0.111
Fatal and Injury (FI)	--	--	--	--	0.035	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.346	0.043	0.89	1.00	0.039
Property Damage Only (PDO)	-7.04	0.36	0.25	0.54	0.066	$(5)_{TOTAL}-(5)_{FI}$ = 0.654	0.082	0.89	1.00	0.073

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.039	1.000	0.073	0.111
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.001	0.000	0.026	0.002	0.002
Collision with fixed object	0.679	0.026	0.847	0.062	0.088
Collision with other object	0.089	0.003	0.070	0.005	0.009
Other single-vehicle collision	0.051	0.002	0.007	0.001	0.002
Single-vehicle noncollision	0.179	0.007	0.049	0.004	0.010

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	0.285	0.111	0.396	0.022	1.00	0.009
Fatal and injury (FI)	--	--	--	--	1.00	0.009

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
--	--	--	--

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.285	0.111	0.396	0.018	1.00	0.007
Fatal and injury (FI)	--	--	--	--	1.00	0.007

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.028	0.075	0.103
Head-on collisions (from Worksheet 2D)	0.003	0.006	0.009
Angle collisions (from Worksheet 2D)	0.037	0.067	0.104
Sideswipe (from Worksheet 2D)	0.010	0.009	0.019
Other multiple-vehicle collision (from Worksheet 2D)	0.005	0.044	0.049
Subtotal	0.084	0.201	0.285
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.002	0.002
Collision with fixed object (from Worksheet 2F)	0.026	0.062	0.088
Collision with other object (from Worksheet 2F)	0.003	0.005	0.009
Other single-vehicle collision (from Worksheet 2F)	0.002	0.001	0.002
Single-vehicle noncollision (from Worksheet 2F)	0.007	0.004	0.010
Collision with pedestrian (from Worksheet 2G or 2I)	0.009	0.000	0.009
Collision with bicycle (from Worksheet 2J)	0.007	0.000	0.007
Subtotal	0.054	0.073	0.127
Total	0.139	0.273	0.412

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	0.4
Fatal and injury (FI)	0.1
Property damage only (PDO)	0.3

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	
Agency or Company	Fehr & Peers	Intersection	5th Street and Center Street
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	3ST
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 45,700 (veh/day)	--	3,150
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 9,300 (veh/day)	--	200
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	
Type of left-turn signal phasing for Leg #1		Permissive	
Type of left-turn signal phasing for Leg #2		--	
Type of left-turn signal phasing for Leg #3		--	
Type of left-turn signal phasing for Leg #4 (if applicable)		--	
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	
Intersection red light cameras (present/not present)		Not Present	
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	
Number of bus stops within 300 m (1,000 ft) of the intersection		0	
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.00	1.00	1.00	1.00	0.91	1.00	0.91

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-13.36	1.11	0.41	0.80	0.106	1.000	0.106	0.91	1.00	0.096
Fatal and Injury (FI)	-14.01	1.16	0.30	0.69	0.046	$\frac{(4)_{FI}/((4)_{FI}+(4)_{PDO})}{0.484}$	0.051	0.91	1.00	0.047
Property Damage Only (PDO)	-15.38	1.20	0.51	0.77	0.049	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.516}$	0.055	0.91	1.00	0.050

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.047	1.000	0.050	0.096
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.421	0.020	0.440	0.022	0.041
Head-on collision	0.045	0.002	0.023	0.001	0.003
Angle collision	0.343	0.016	0.262	0.013	0.029
Sideswipe	0.126	0.006	0.040	0.002	0.008
Other multiple-vehicle collision	0.065	0.003	0.235	0.012	0.015

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-6.81	0.16	0.51	1.14	0.060	1.000	0.060	0.91	1.00	0.054
Fatal and Injury (FI)	--	--	--	--	0.018	$\frac{(4)_{FI}/((4)_{FI}+(4)_{PDO})}{0.364}$	0.022	0.91	1.00	0.020
Property Damage Only (PDO)	-8.36	0.25	0.55	1.29	0.032	$\frac{(5)_{TOTAL}-(5)_{FI}}{0.636}$	0.038	0.91	1.00	0.034

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.020	1.000	0.034	0.054
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.003	0.000	0.000
Collision with animal	0.003	0.000	0.018	0.001	0.001
Collision with fixed object	0.762	0.015	0.834	0.029	0.044
Collision with other object	0.090	0.002	0.092	0.003	0.005
Other single-vehicle collision	0.039	0.001	0.023	0.001	0.002
Single-vehicle noncollision	0.105	0.002	0.030	0.001	0.003

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	0.096	0.054	0.150	0.021	1.00	0.003
Fatal and injury (FI)	--	--	--	--	1.00	0.003

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
--	--	--	--

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	--	--	--	--	--	--	--	--	1.00	--
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	--

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.096	0.054	0.150	0.016	1.00	0.002
Fatal and injury (FI)	--	--	--	--	1.00	0.002

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.020	0.022	0.041
Head-on collisions (from Worksheet 2D)	0.002	0.001	0.003
Angle collisions (from Worksheet 2D)	0.016	0.013	0.029
Sideswipe (from Worksheet 2D)	0.006	0.002	0.008
Other multiple-vehicle collision (from Worksheet 2D)	0.003	0.012	0.015
Subtotal	0.047	0.050	0.096
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.001	0.001
Collision with fixed object (from Worksheet 2F)	0.015	0.029	0.044
Collision with other object (from Worksheet 2F)	0.002	0.003	0.005
Other single-vehicle collision (from Worksheet 2F)	0.001	0.001	0.002
Single-vehicle noncollision (from Worksheet 2F)	0.002	0.001	0.003
Collision with pedestrian (from Worksheet 2G or 2I)	0.003	0.000	0.003
Collision with bicycle (from Worksheet 2J)	0.002	0.000	0.002
Subtotal	0.025	0.035	0.060
Total	0.072	0.084	0.156

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	0.2
Fatal and injury (FI)	0.1
Property damage only (PDO)	0.1

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	Jordan Brooks	Roadway	
Agency or Company	Fehr & Peers	Intersection	5th Street and Mandela Parkway
Date Performed	01/02/19	Jurisdiction	Oakland, CA
		Analysis Year	2019

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	4,740
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	3,820
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	
Number of major-road approaches with right-turn lanes (0,1,2)		0	
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	0
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	0
Type of left-turn signal phasing for Leg #1		Permissive	Permissive
Type of left-turn signal phasing for Leg #2		--	Permissive
Type of left-turn signal phasing for Leg #3		--	Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Permissive
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			2,850
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	2
Number of bus stops within 300 m (1,000 ft) of the intersection		0	2
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	2

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF* $_{COMB}$
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
1.00	1.00	1.00	1.00	0.91	1.00	0.91

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	0.964	1.000	0.964	0.91	1.00	0.878
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	0.262	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.283	0.273	0.91	1.00	0.248
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	0.665	$(5)_{TOTAL}-(5)_{FI}$ = 0.717	0.691	0.91	1.00	0.630

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.248	1.000	0.630	0.878
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.112	0.483	0.304	0.416
Head-on collision	0.049	0.012	0.030	0.019	0.031
Angle collision	0.347	0.086	0.244	0.154	0.240
Sideswipe	0.099	0.025	0.032	0.020	0.045
Other multiple-vehicle collision	0.055	0.014	0.211	0.133	0.147

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.108	1.000	0.108	0.91	1.00	0.098
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.040	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.368	0.040	0.91	1.00	0.036
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.069	$(5)_{TOTAL}-(5)_{FI}$ = 0.632	0.068	0.91	1.00	0.062

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.036	1.000	0.062	0.098
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.027	0.870	0.054	0.081
Collision with other object	0.072	0.003	0.070	0.004	0.007
Other single-vehicle collision	0.040	0.001	0.023	0.001	0.003
Single-vehicle noncollision	0.141	0.005	0.034	0.002	0.007

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16		(4)*(5)*(6)
Total	--	--	--	--	1.00	--
Fatal and injury (FI)	--	--	--	--	1.00	--

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.12	3.11

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.100	3.11	1.00	0.311
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.311

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Calibration factor, C_i**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17		(4)*(5)*(6)
Total	0.878	0.098	0.976	0.015	1.00	0.015
Fatal and injury (FI)	--	--	--	--	1.00	0.015

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.112	0.304	0.416
Head-on collisions (from Worksheet 2D)	0.012	0.019	0.031
Angle collisions (from Worksheet 2D)	0.086	0.154	0.240
Sideswipe (from Worksheet 2D)	0.025	0.020	0.045
Other multiple-vehicle collision (from Worksheet 2D)	0.014	0.133	0.147
Subtotal	0.248	0.630	0.878
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.027	0.054	0.081
Collision with other object (from Worksheet 2F)	0.003	0.004	0.007
Other single-vehicle collision (from Worksheet 2F)	0.001	0.001	0.003
Single-vehicle noncollision (from Worksheet 2F)	0.005	0.002	0.007
Collision with pedestrian (from Worksheet 2G or 2I)	0.311	0.000	0.311
Collision with bicycle (from Worksheet 2J)	0.015	0.000	0.015
Subtotal	0.362	0.062	0.424
Total	0.610	0.692	1.301

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	1.3
Fatal and injury (FI)	0.6
Property damage only (PDO)	0.7