

APPENDIX B

TRANSPORTATION AND TRAFFIC MODEL OUTPUTS

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APPENDIX B - 1

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**OAKLAND ARMY BASE
GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011**

GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011

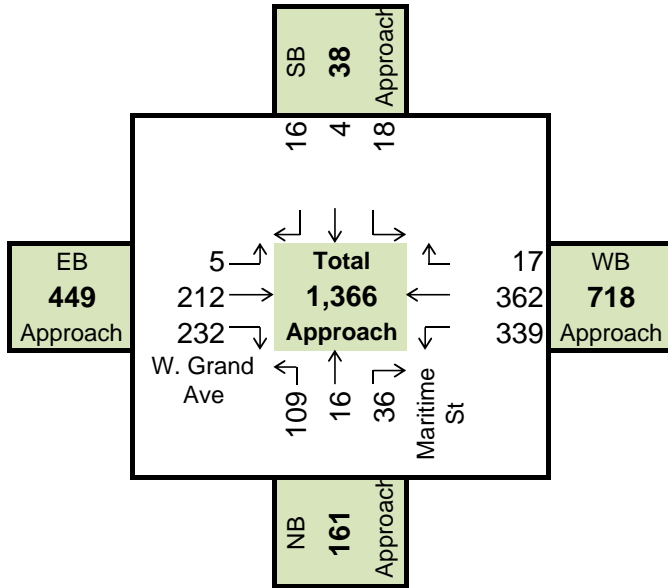
Intersection	Entering Traffic Volumes							
	AM Peak Hour				PM Peak Hour			
	2002 DEIR	2011	Growth	% Growth	2002 DEIR	2011	Growth	% Growth
W. Grand Ave. & Maritime St.								
Intersection Total	1,366	1,266	-100	-7%	1,750	1,497	-253	-14%
Northbound	161	113	-48	-30%	525	523	-2	0%
Southbound	38	50	12	32%	24	72	48	200%
Eastbound	449	348	-101	-22%	584	297	-287	-49%
Westbound	718	755	37	5%	617	605	-12	-2%
I-880 Frontage Rd. & W. Grand Ave.								
Intersection Total	1,935	1,853	-82	-4%	2,266	1,931	-335	-15%
Northbound	316	403	87	28%	357	427	70	20%
Southbound	327	334	7	2%	151	172	21	14%
Eastbound	412	251	-161	-39%	751	451	-300	-40%
Westbound	880	865	-15	-2%	1,007	881	-126	-13%
Middle Harbor Rd. & 7th St.								
Intersection Total	1,092	922	-170	-16%	1,070	1,074	4	0%
Northbound	185	195	10	5%	282	342	60	21%
Southbound	180	155	-25	-14%	256	262	6	2%
Eastbound	141	232	91	65%	373	325	-48	-13%
Westbound	586	340	-246	-42%	159	145	-14	-9%
I-880 NB Off-Ramp & 7th St.								
Intersection Total	1,347	1,171	-176	-13%	1,461	1,054	-407	-28%
Northbound	549	563	14	3%	519	405	-114	-22%
Southbound	272	273	1	0%	277	248	-29	-10%
Eastbound	71	64	-7	-10%	201	185	-16	-8%
Westbound	455	271	-184	-40%	464	216	-248	-53%
Adeline St. & 3rd St.								
Intersection Total	828	790	-38	-5%	923	979	56	6%
Northbound	170	211	41	24%	398	430	32	8%
Southbound	400	251	-149	-37%	219	124	-95	-43%
Eastbound	38	109	71	187%	62	141	79	127%
Westbound	220	219	-1	0%	244	284	40	16%
Market St. & 3rd St.								
Intersection Total	714	570	-144	-20%	674	755	81	12%
Northbound	25	37	12	48%	92	90	-2	-2%
Southbound	175	151	-24	-14%	108	101	-7	-6%
Eastbound	227	146	-81	-36%	283	392	109	39%
Westbound	287	236	-51	-18%	191	172	-19	-10%
Brush St. & 12th St.								
Intersection Total	2,875	2,636	-239	-8%	1,718	1,614	-104	-6%
Northbound	469	668	199	42%	366	328	-38	-10%
Southbound	2,187	1,804	-383	-18%	1,029	1,075	46	4%
Eastbound	2	0	-2	-100%	0	0	0	#DIV/0!
Westbound	217	164	-53	-24%	323	211	-112	-35%

GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011

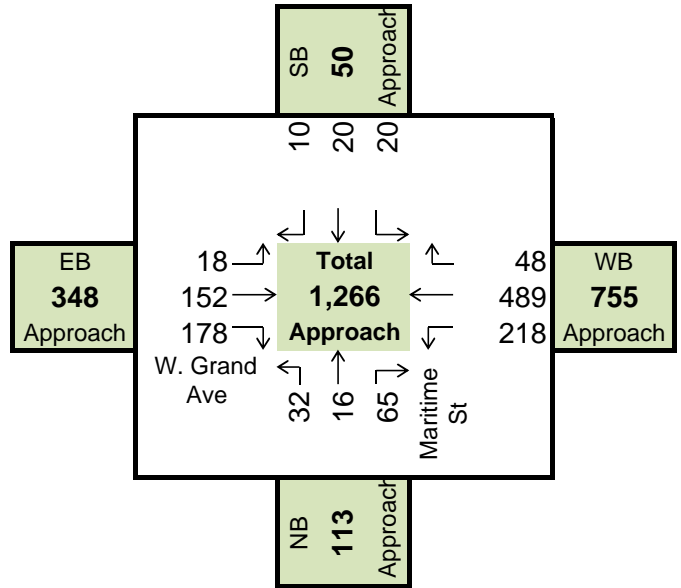
I-80 NB Ramps & Powell St.								
Intersection Total	3,443	2,885	-558	-16%	4,557	3,753	-804	-18%
Northbound	1,478	1,313	-165	-11%	1,530	1,145	-385	-25%
Southbound	0	0	0	0%	0	0	0	0%
Eastbound	865	673	-192	-22%	948	841	-107	-11%
Westbound	1,100	899	-201	-18%	2,079	1,767	-312	-15%
Webster St. & Atlantic Ave.								
Intersection Total	3,015	2,837	-178	-6%	2,810	2,772	-38	-1%
Northbound	1,198	1,061	-137	-11%	672	680	8	1%
Southbound	1,031	854	-177	-17%	1,396	1,226	-170	-12%
Eastbound	577	637	60	10%	523	485	-38	-7%
Westbound	209	285	76	36%	219	381	162	74%

GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
W. Grand Ave. & Maritime St.
AM Peak Hour

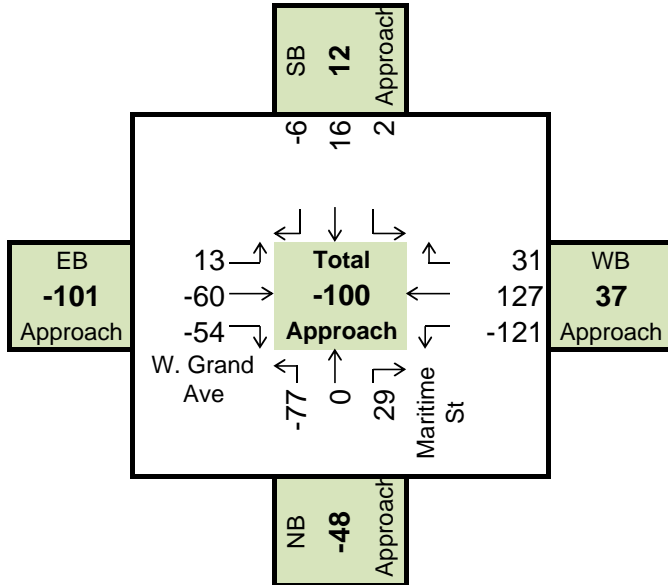
2002 DEIR



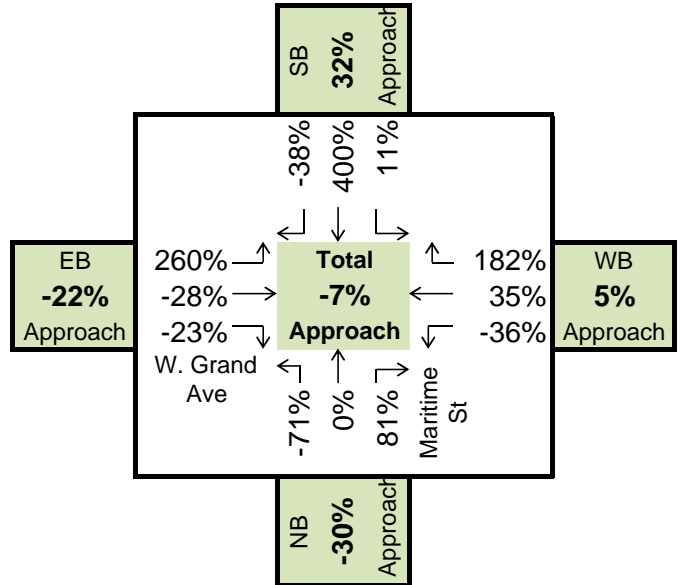
2011



Growth

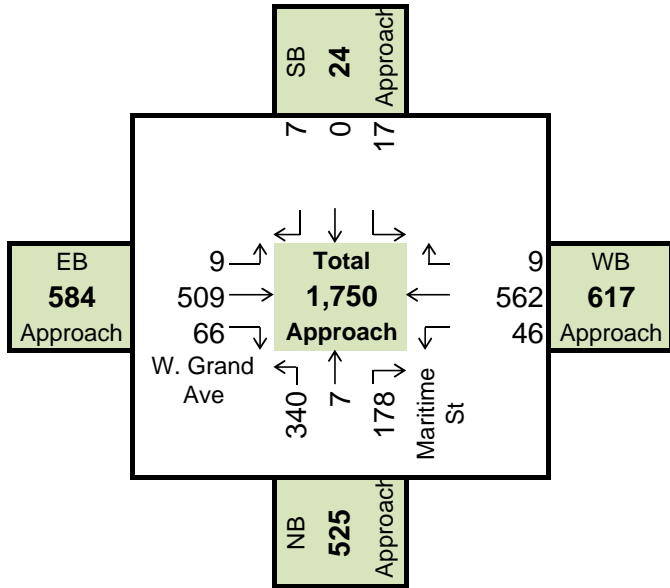


Percent Growth

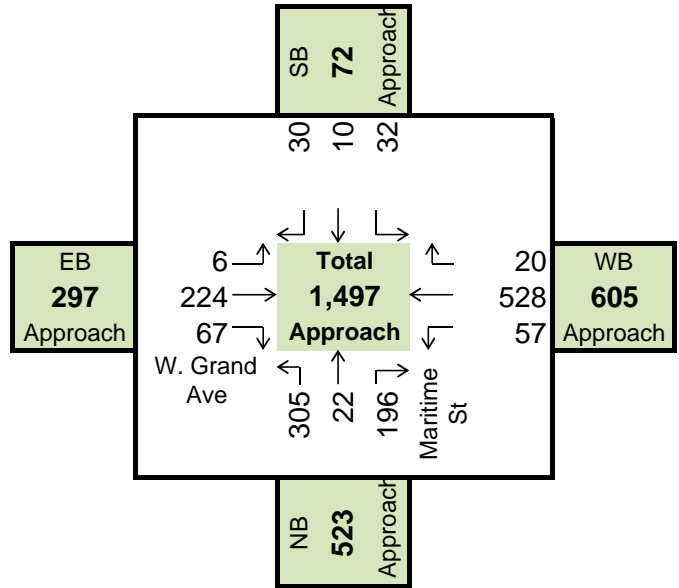


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
W. Grand Ave. & Maritime St.
PM Peak Hour

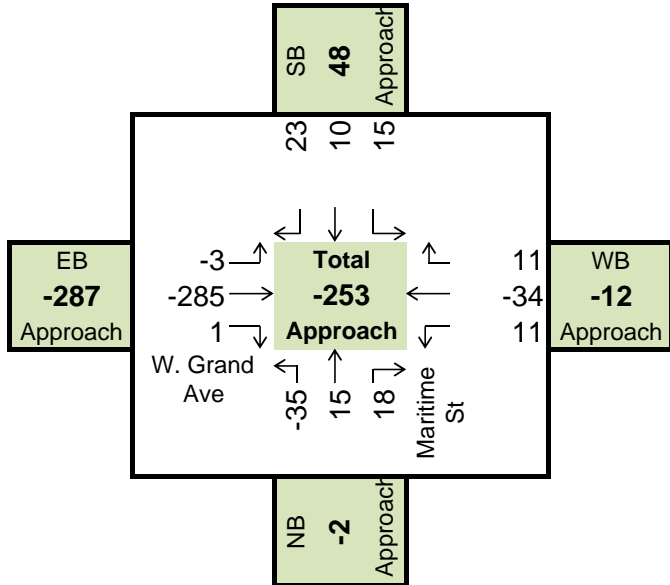
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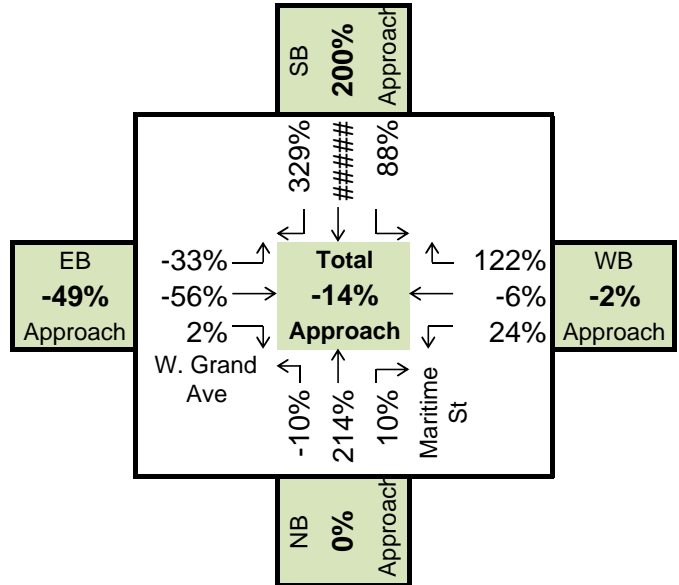
2011



Growth



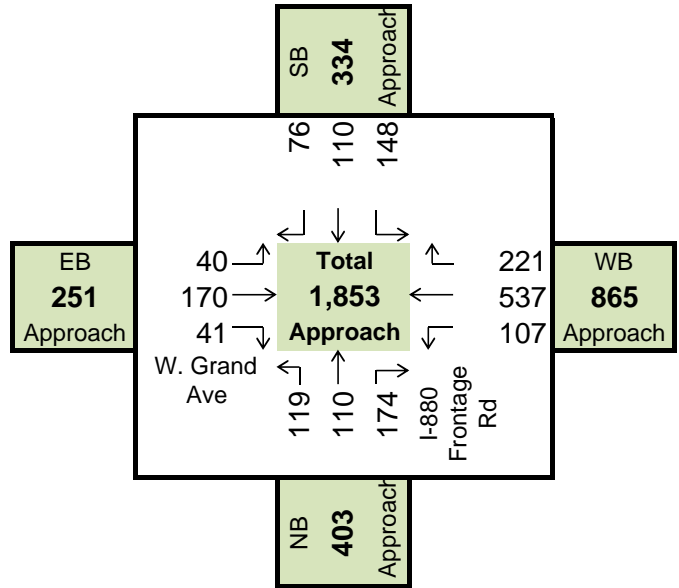
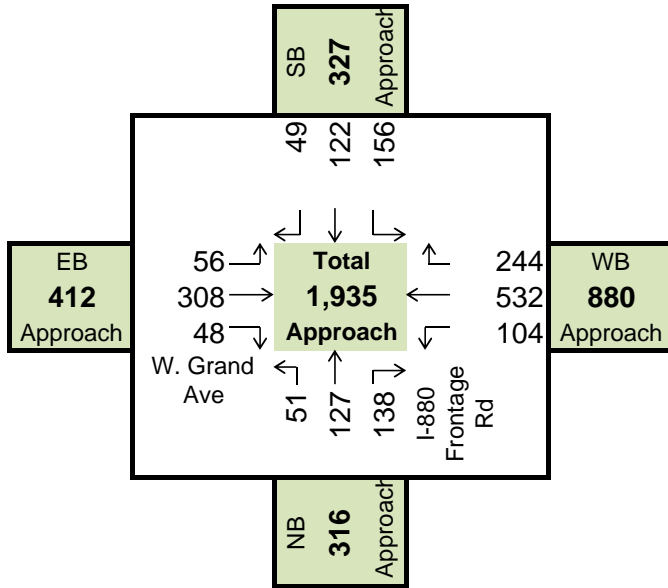
Percent Growth



GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
I-880 Frontage Rd. & W. Grand Ave.
AM Peak Hour

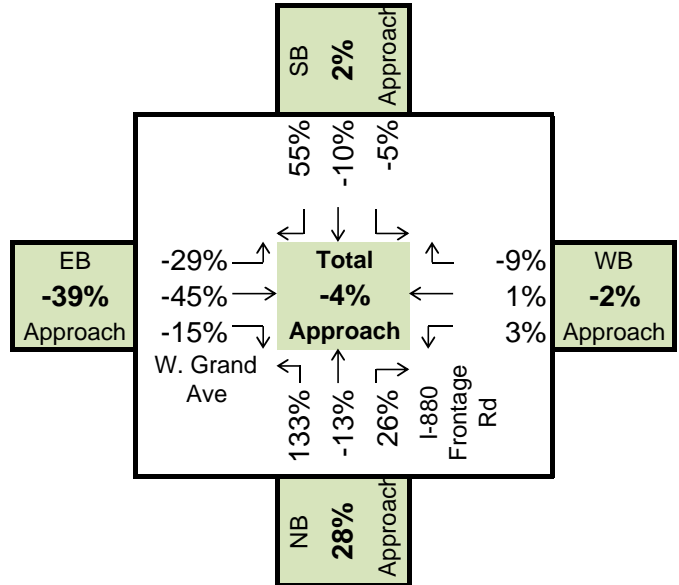
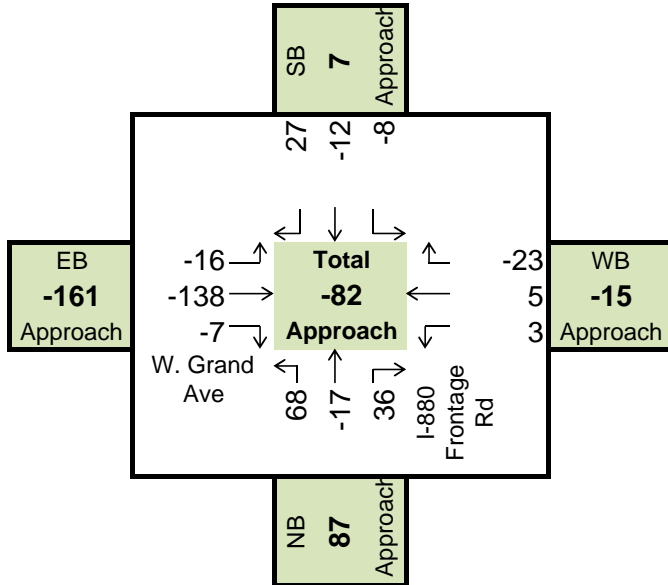
2002 DEIR

2011



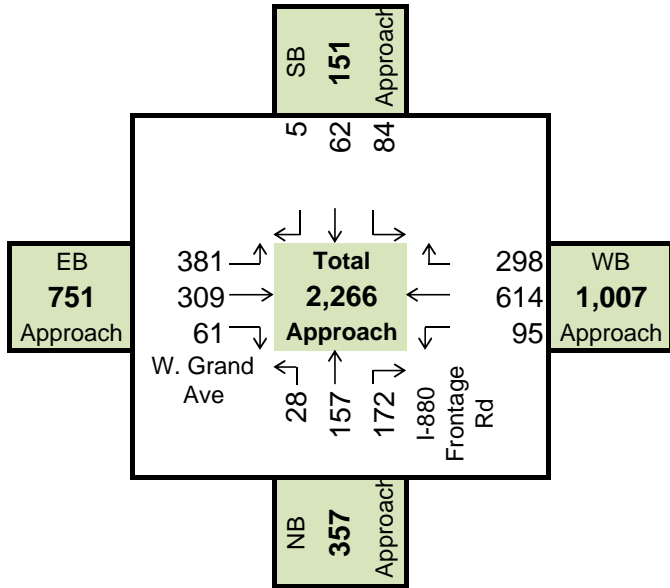
Growth

Percent Growth

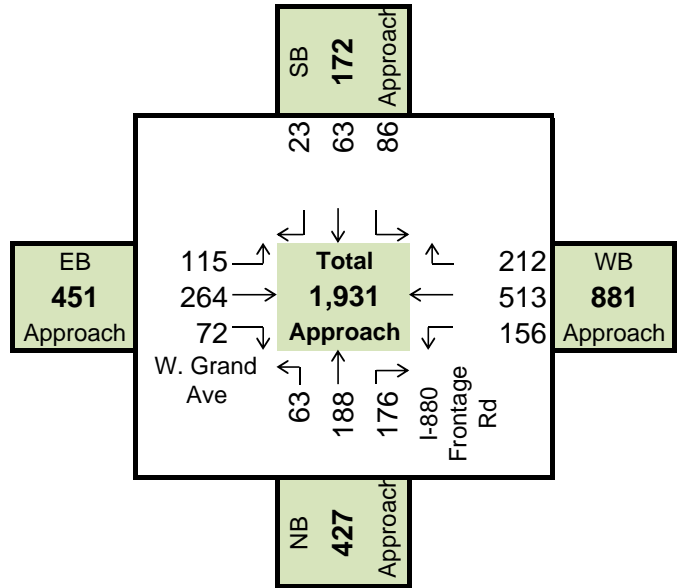


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
I-880 Frontage Rd. & W. Grand Ave.
PM Peak Hour

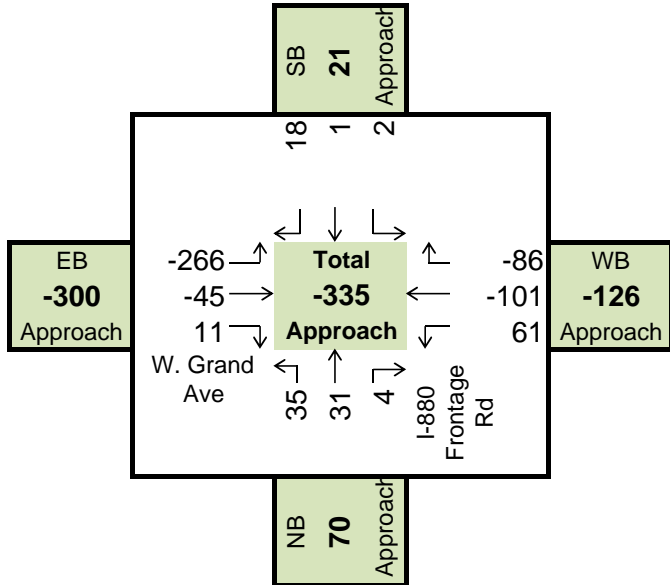
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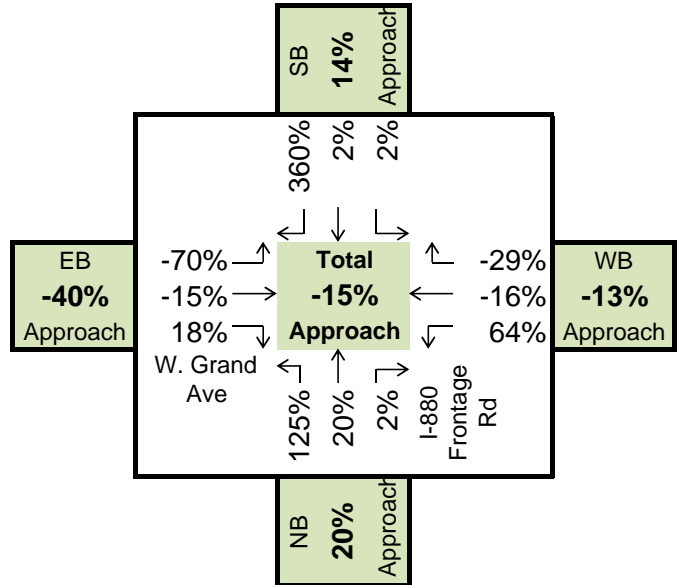
2011



Growth

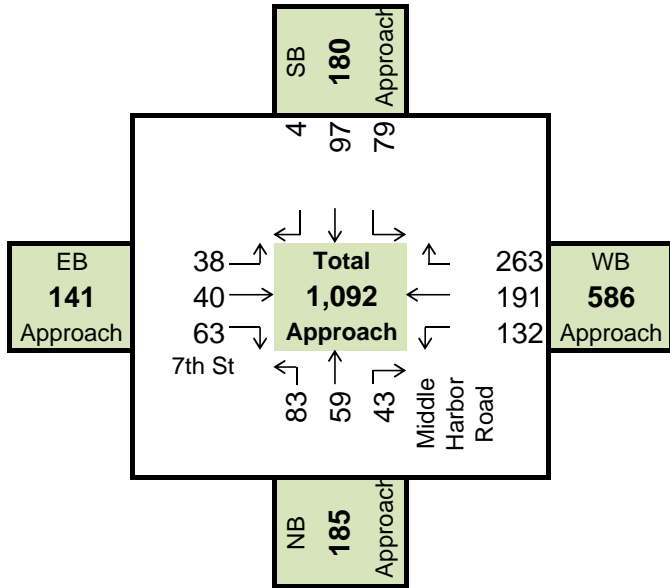


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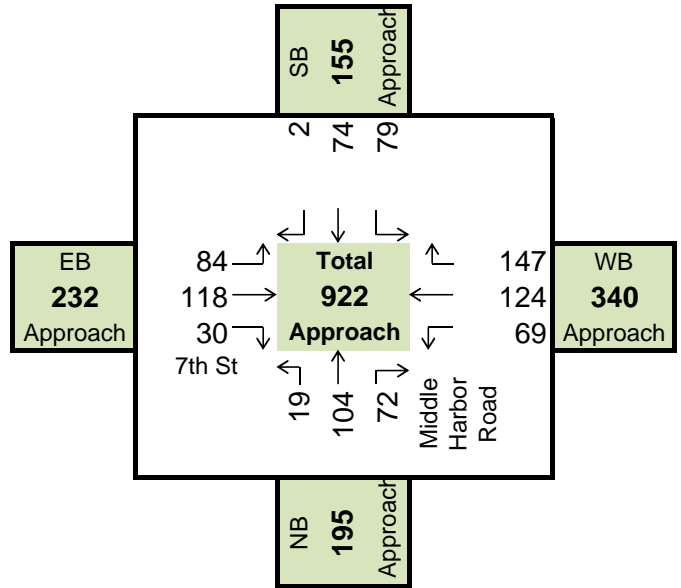


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Middle Harbor Rd. & 7th St.
AM Peak Hour

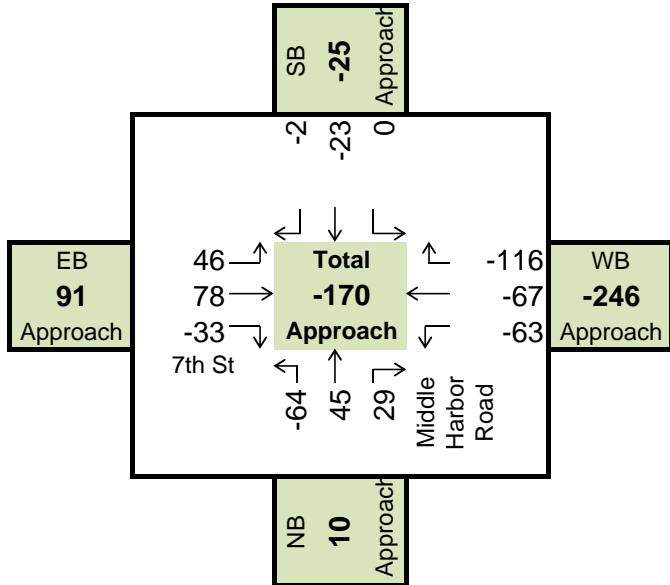
2002 DEIR



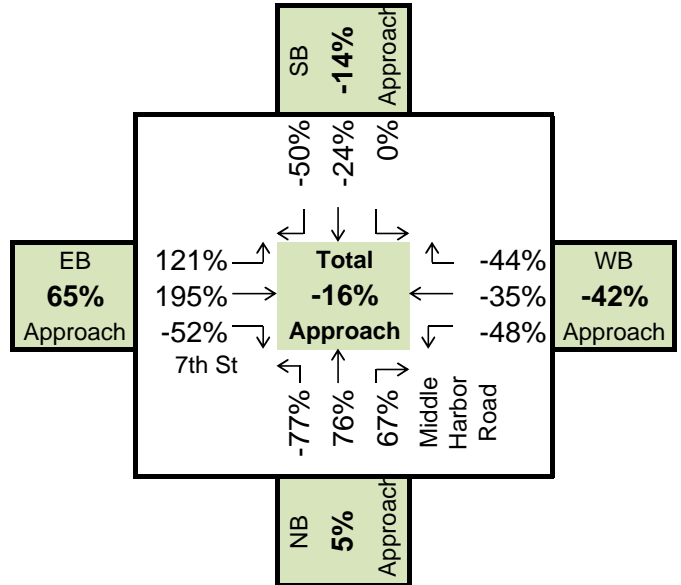
2011



Growth

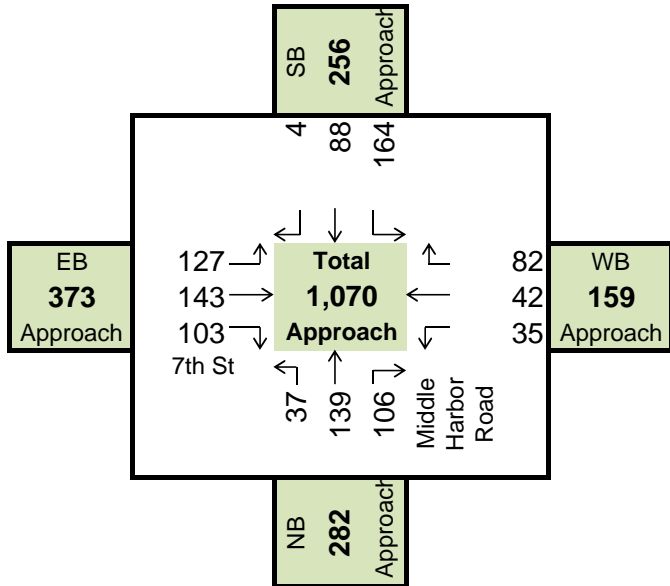


Percent Growth

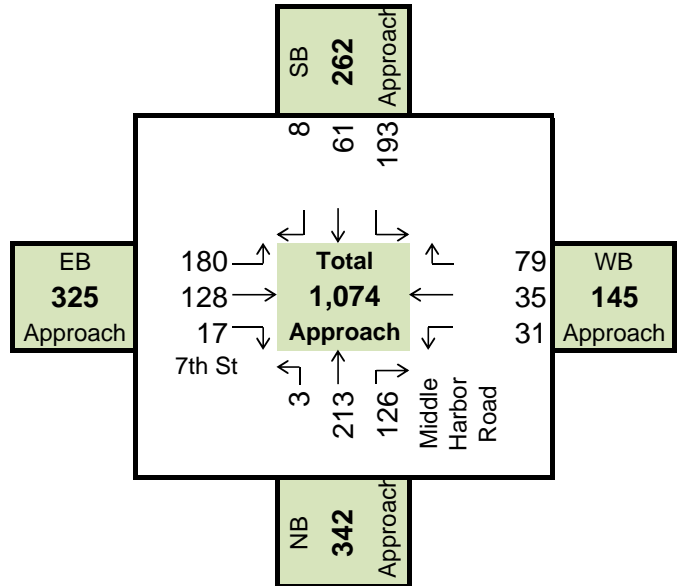


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Middle Harbor Rd. & 7th St.
PM Peak Hour

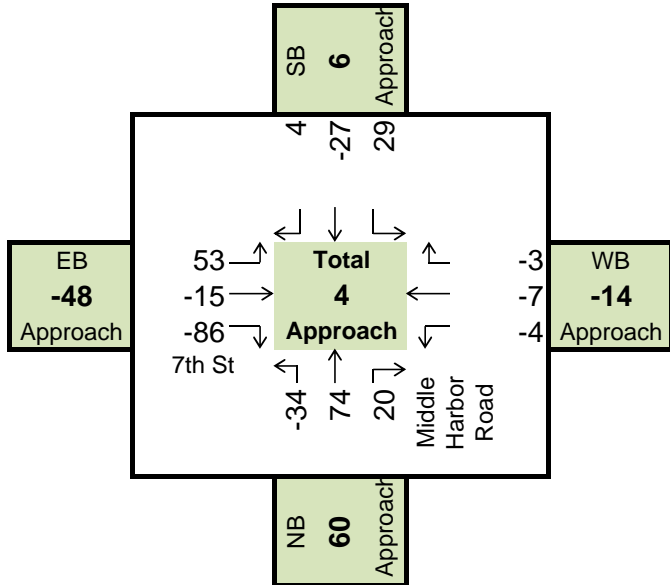
2002 DEIR



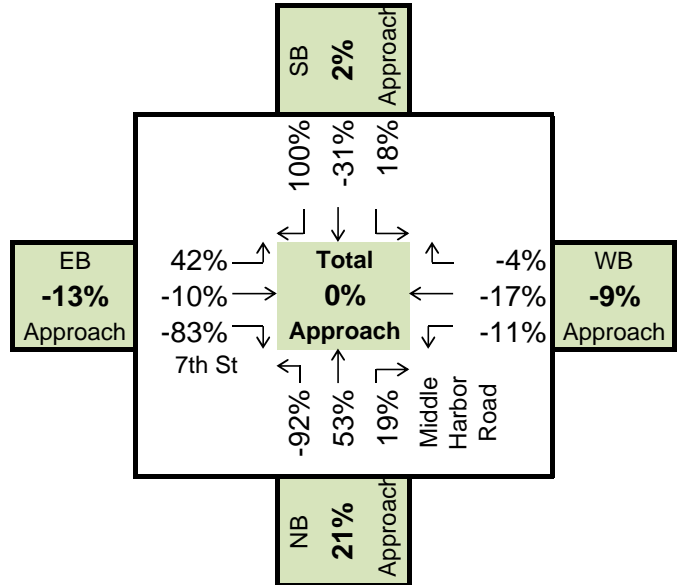
2011



Growth

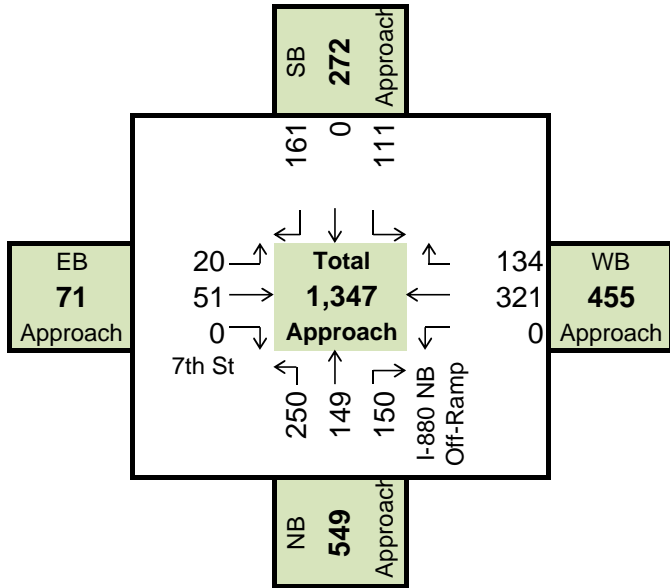


Percent Growth

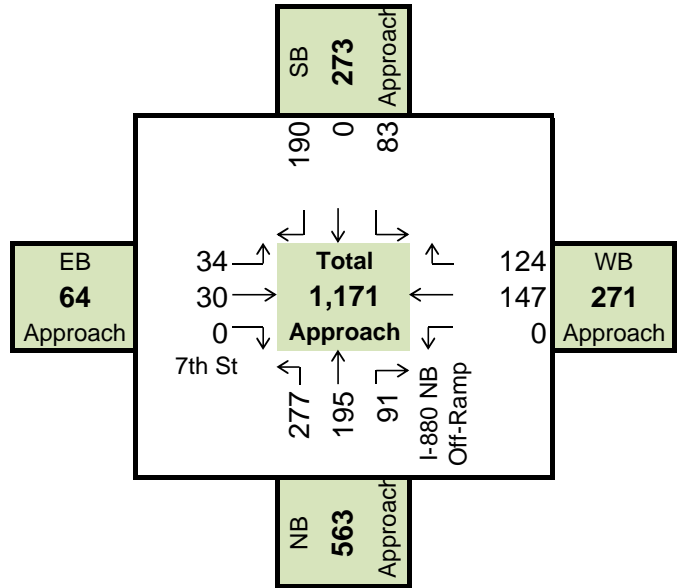


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
I-880 NB Off-Ramp & 7th St.
AM Peak Hour

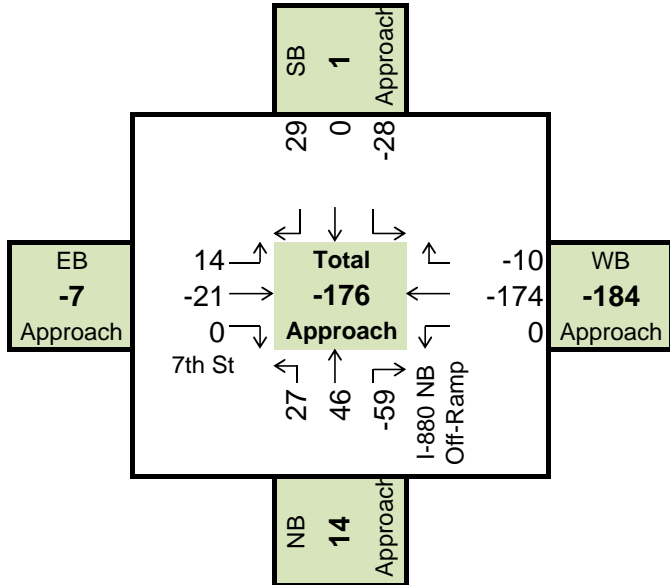
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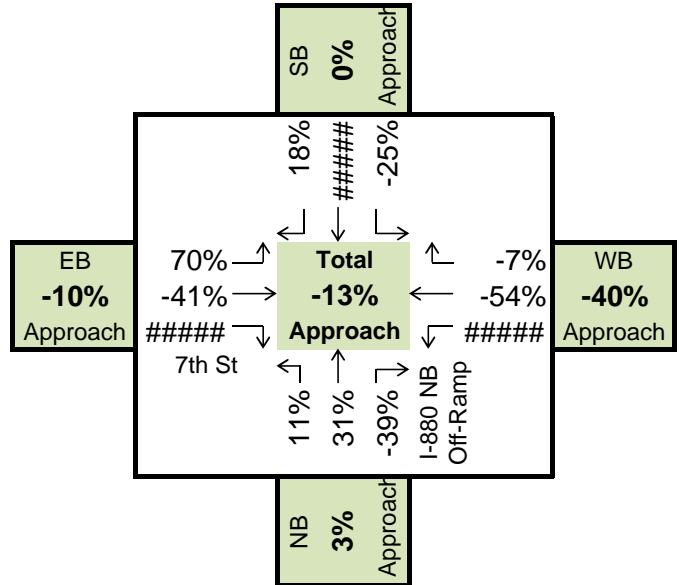
2011



Growth

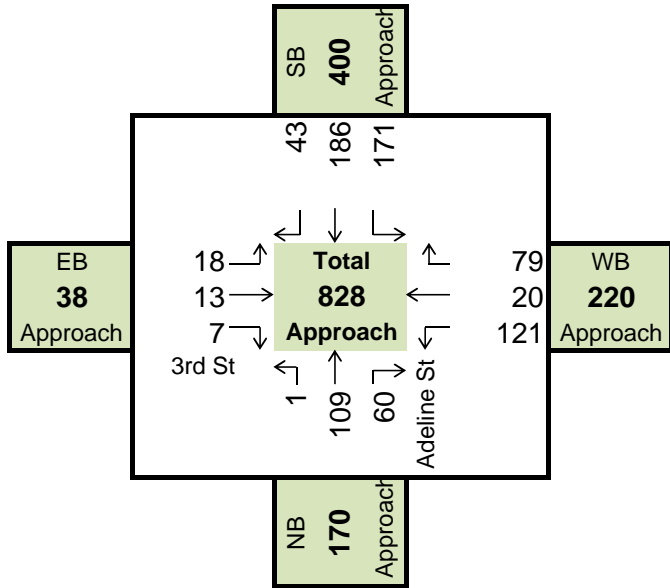


Percent Growth

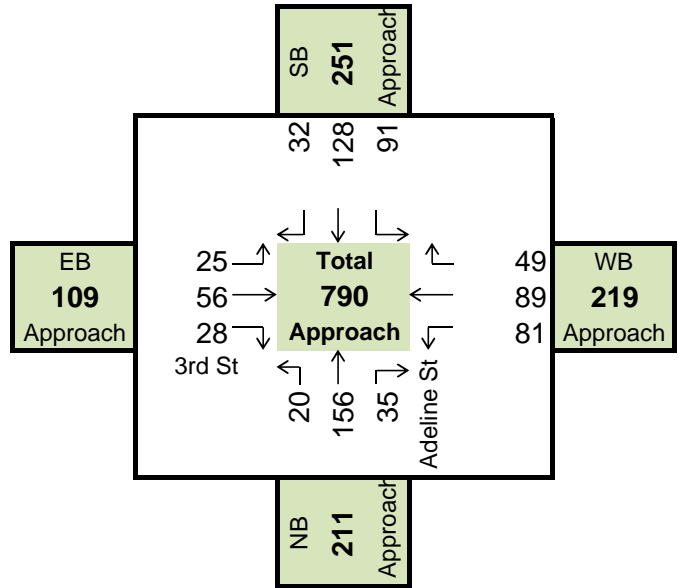


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Adeline St. & 3rd St.
AM Peak Hour

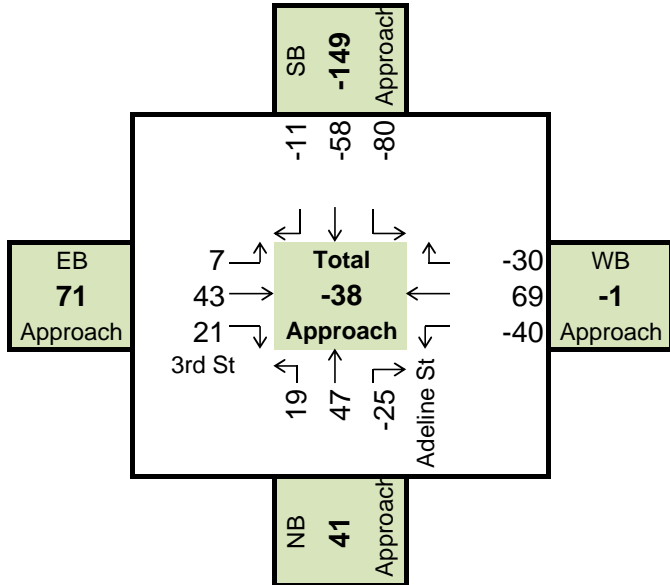
2002 DEIR



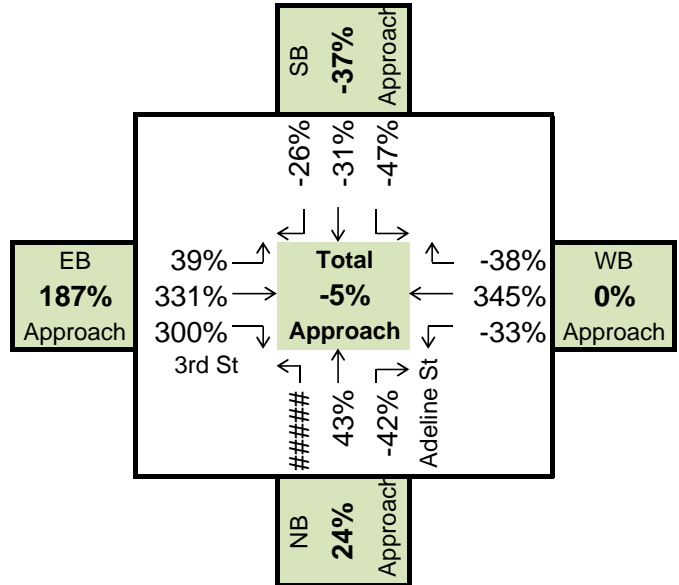
2011



Growth

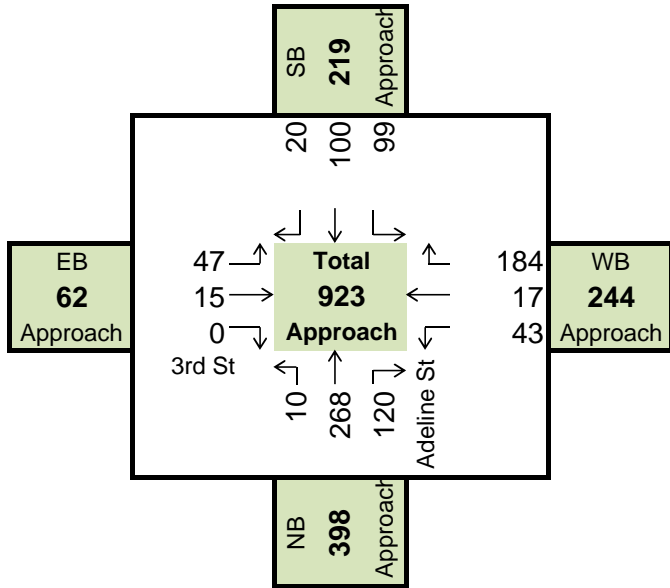


Percent Growth

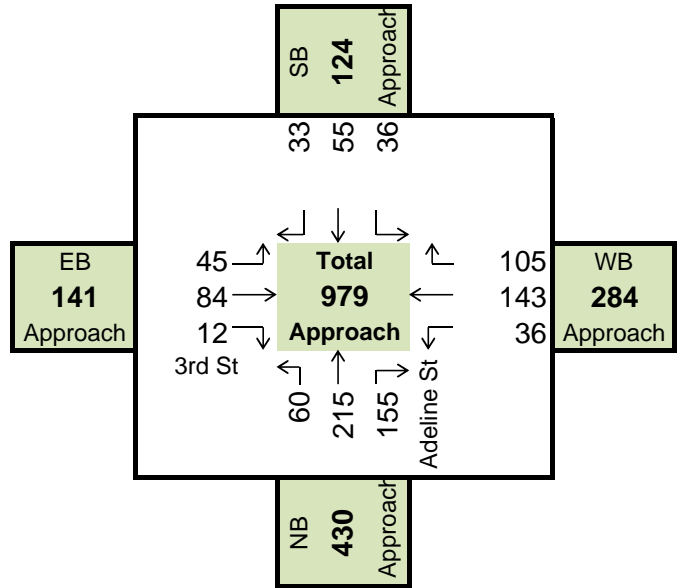


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Adeline St. & 3rd St.
PM Peak Hour

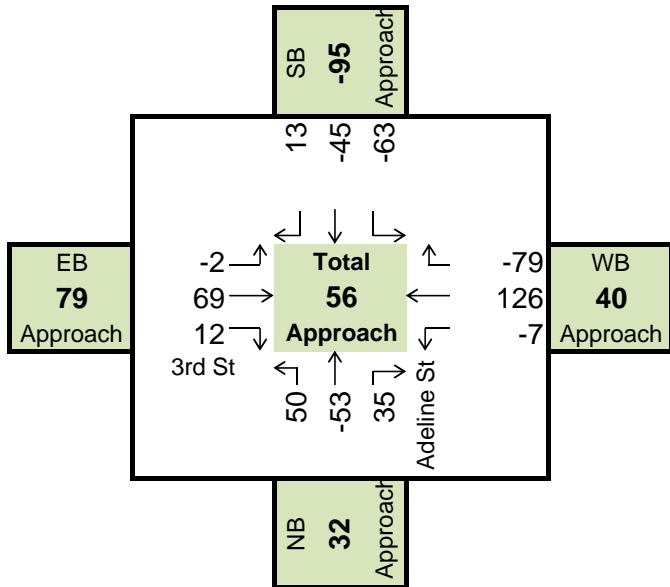
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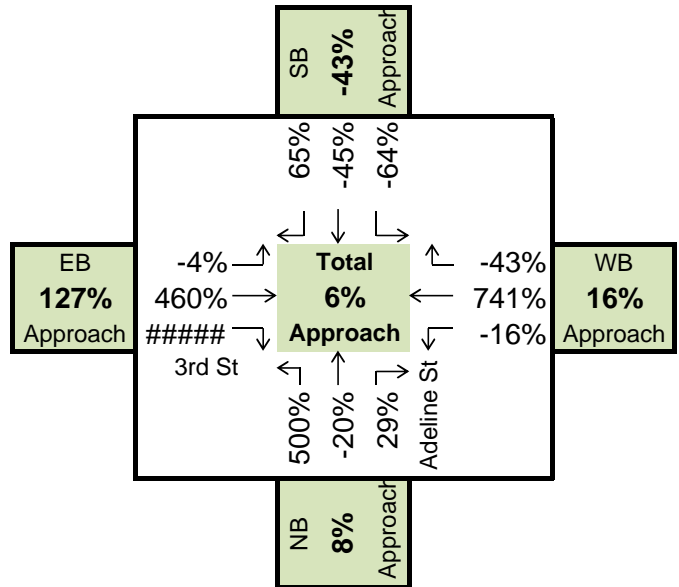
2011



Growth

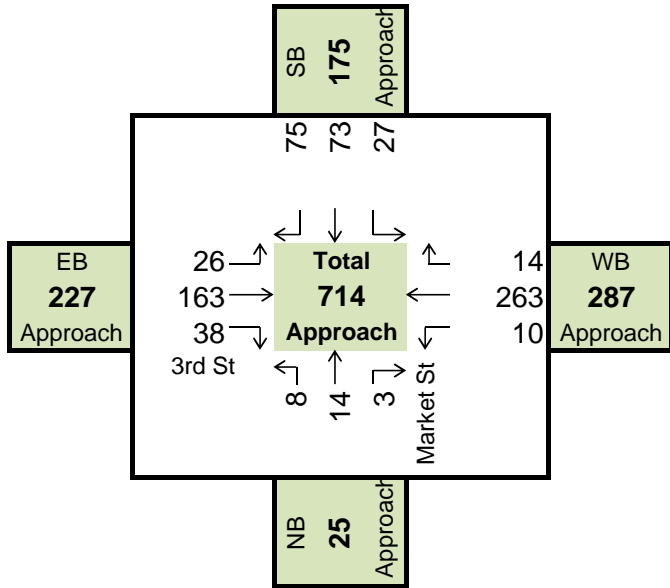


Percent Growth

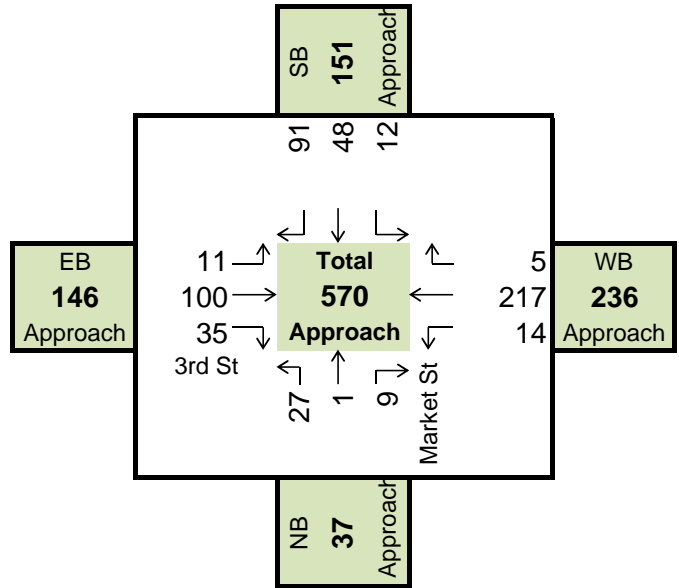


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Market St. & 3rd St.
AM Peak Hour

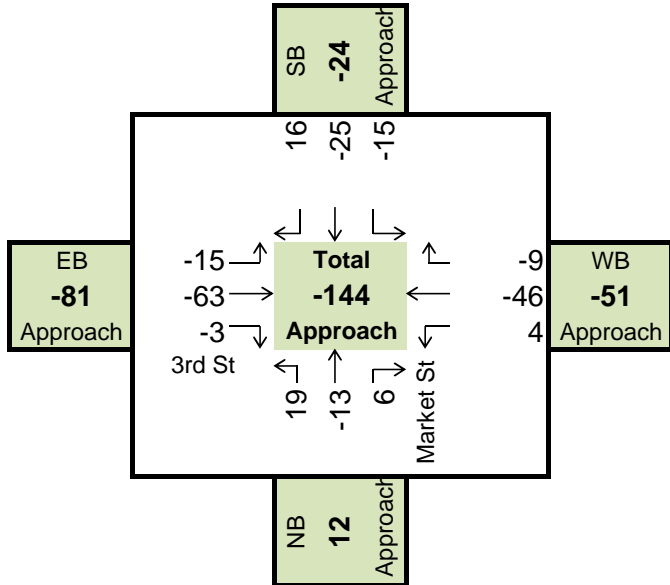
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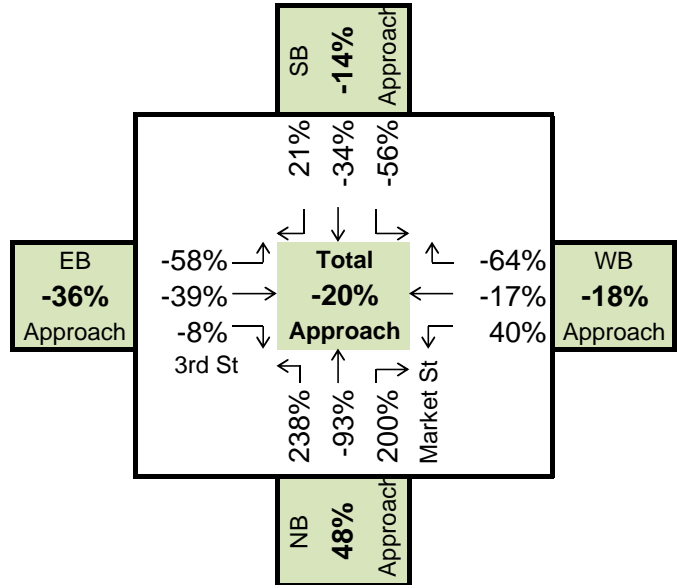
2011



Growth



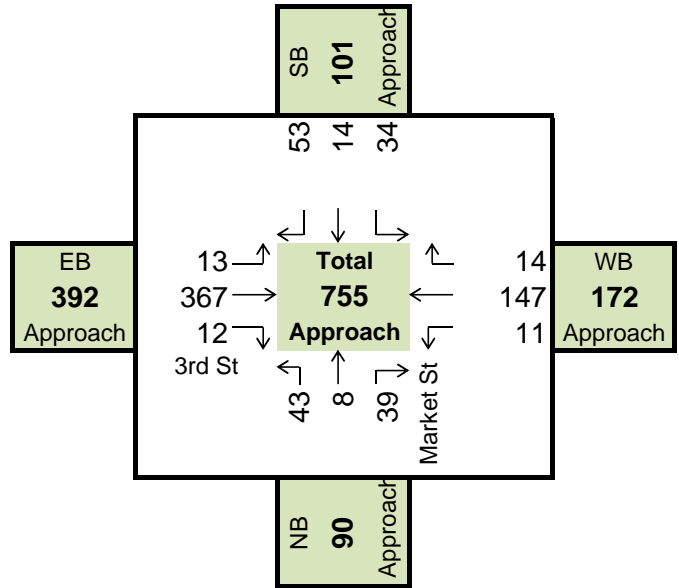
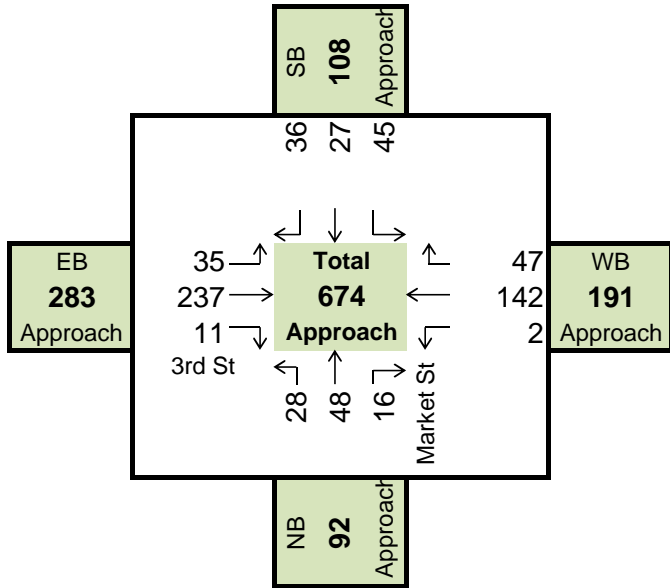
Percent Growth



GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Market St. & 3rd St.
PM Peak Hour

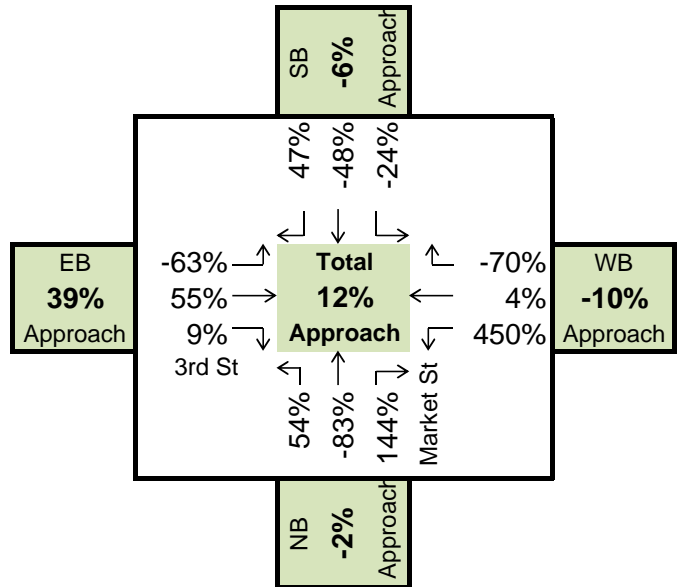
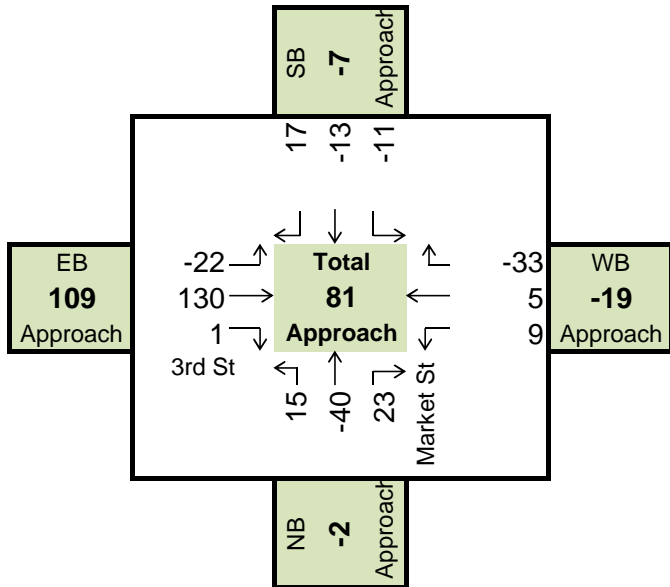
2002 DEIR

2011



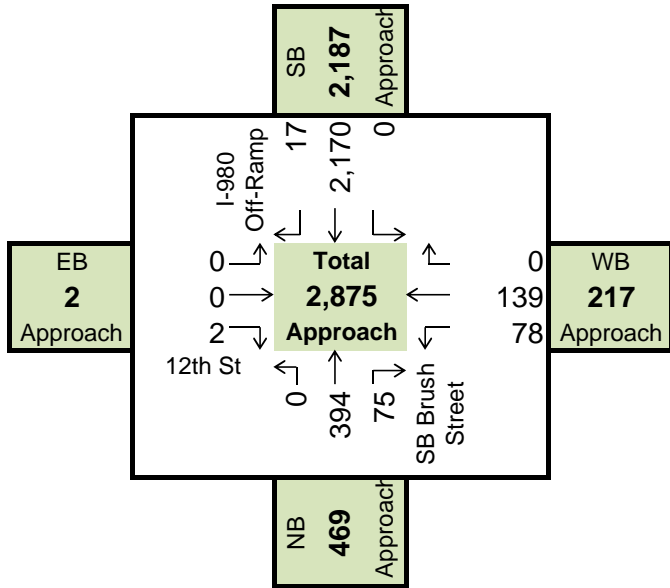
Growth

Percent Growth

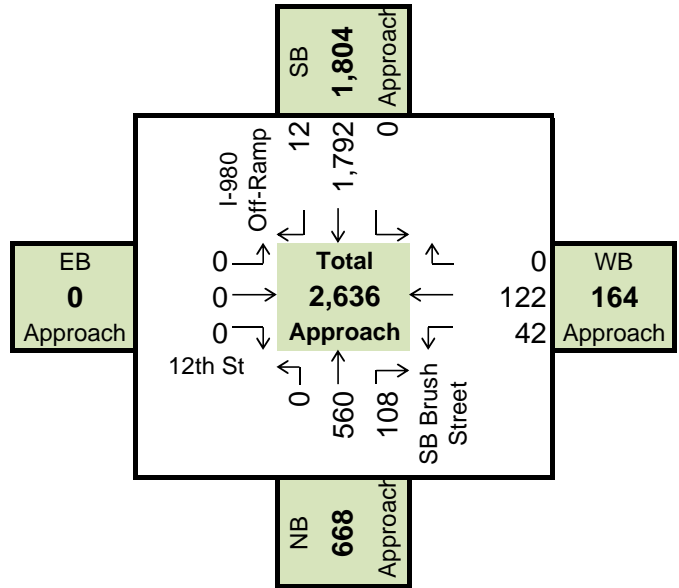


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Brush St. & 12th St.
AM Peak Hour

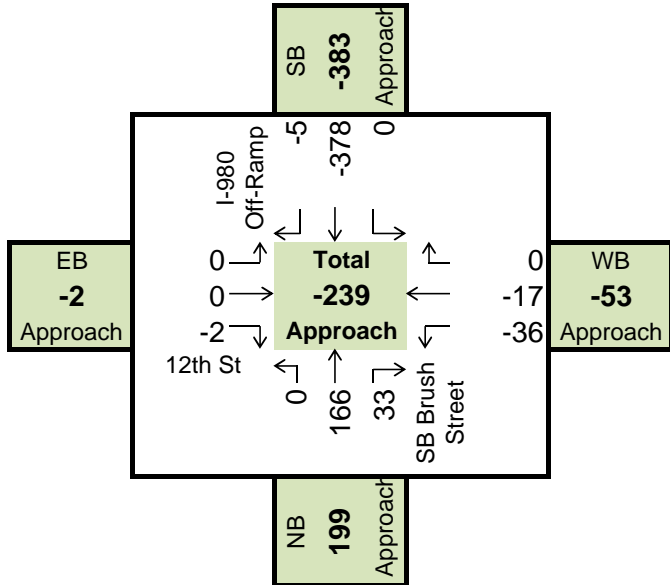
2002 DEIR



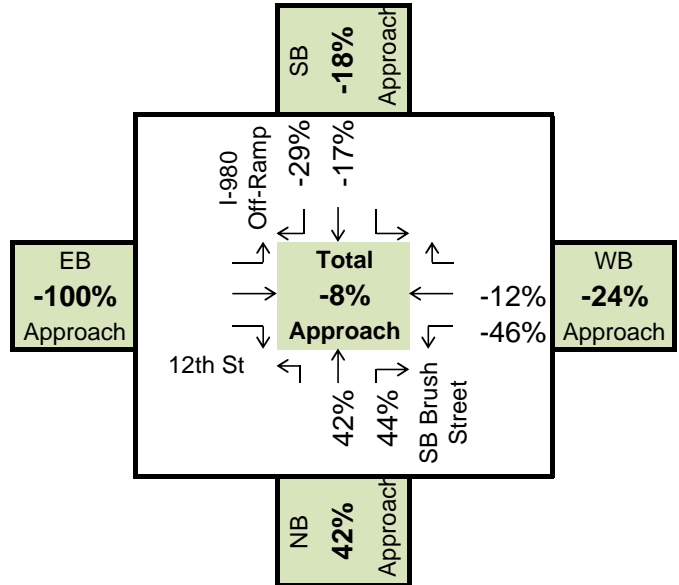
2011



Growth



Percent Growth

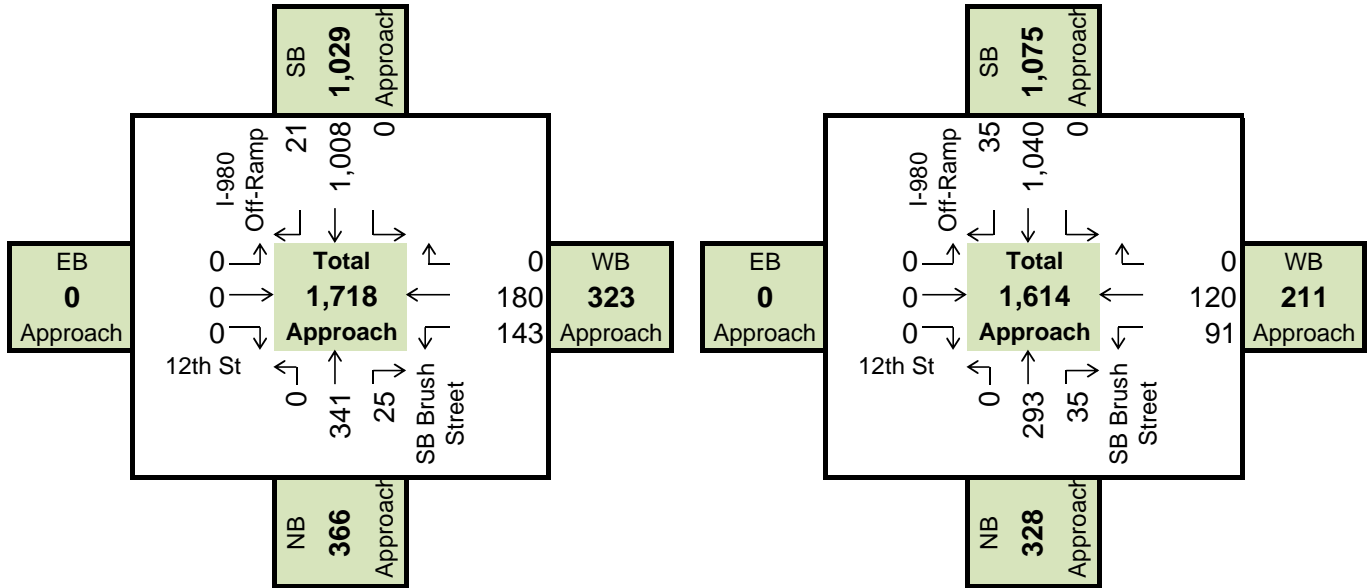


Note: Southbound Brush Street traffic volumes are shown graphically in the northbound direction.

GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Brush St. & 12th St.
PM Peak Hour

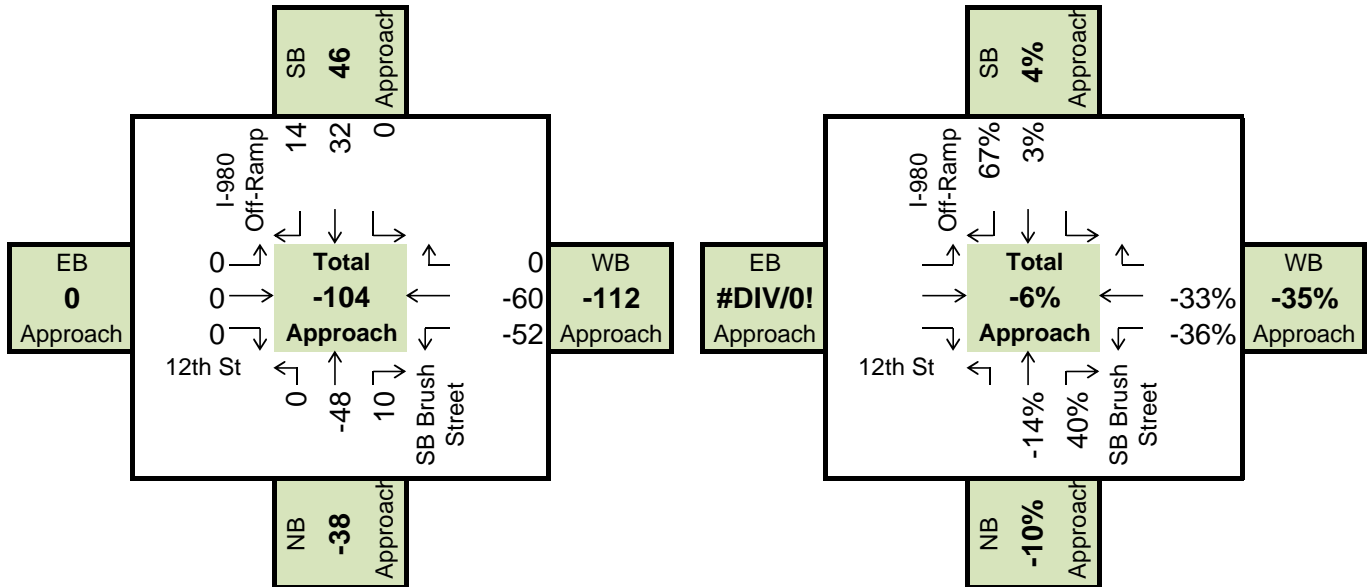
2002 DEIR

2011



Growth

Percent Growth

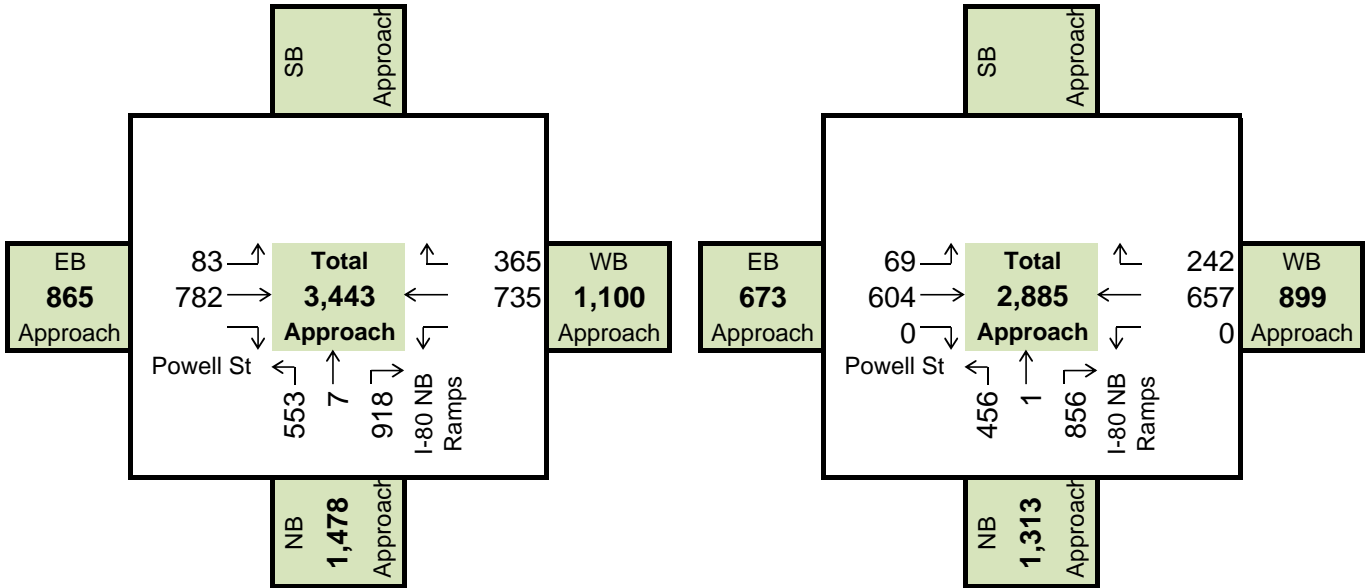


Note: Southbound Brush Street traffic volumes are shown graphically in the northbound direction.

GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
I-80 NB Ramps & Powell St.
AM Peak Hour

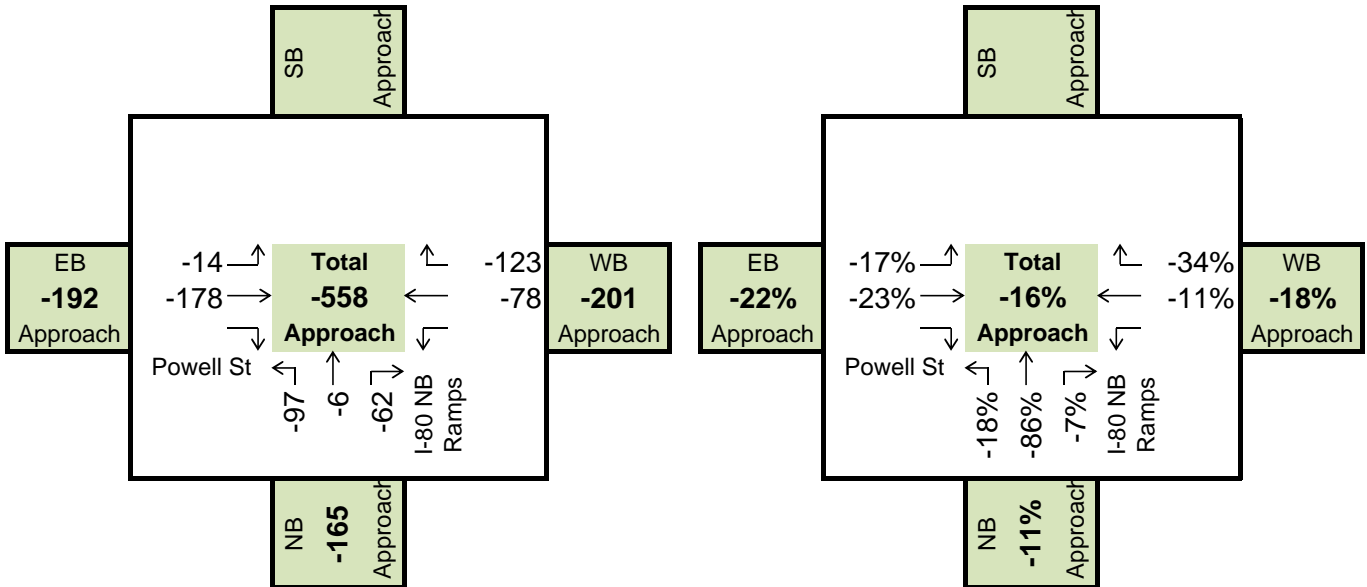
2002 DEIR

2011



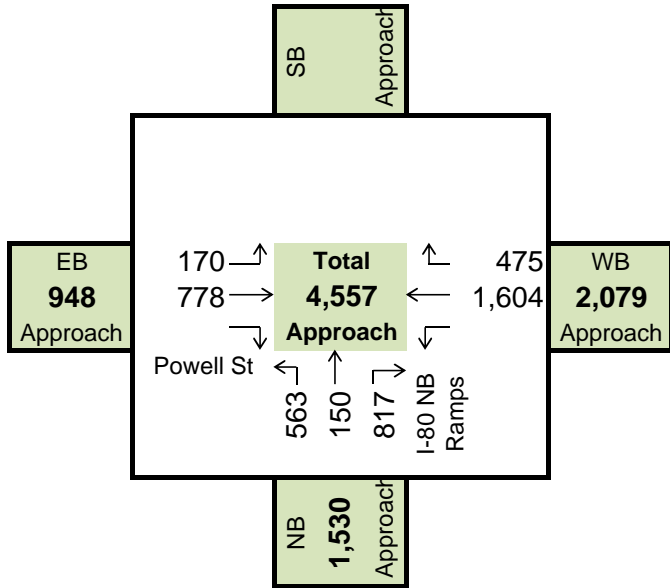
Growth

Percent Growth

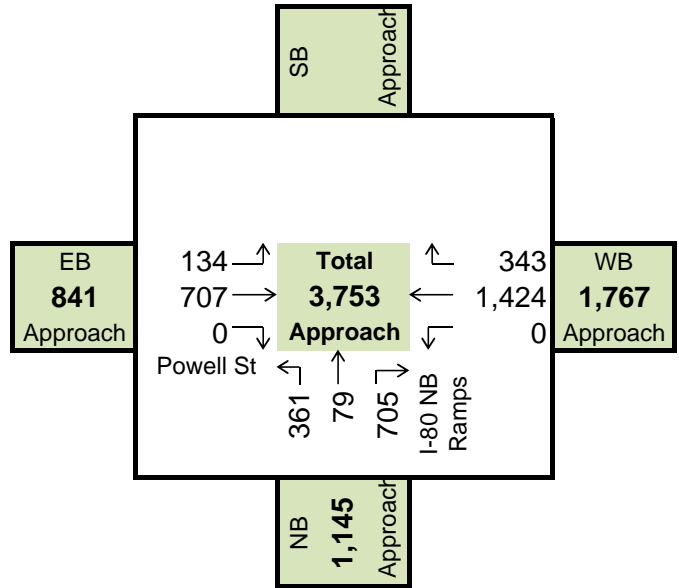


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
I-80 NB Ramps & Powell St.
PM Peak Hour

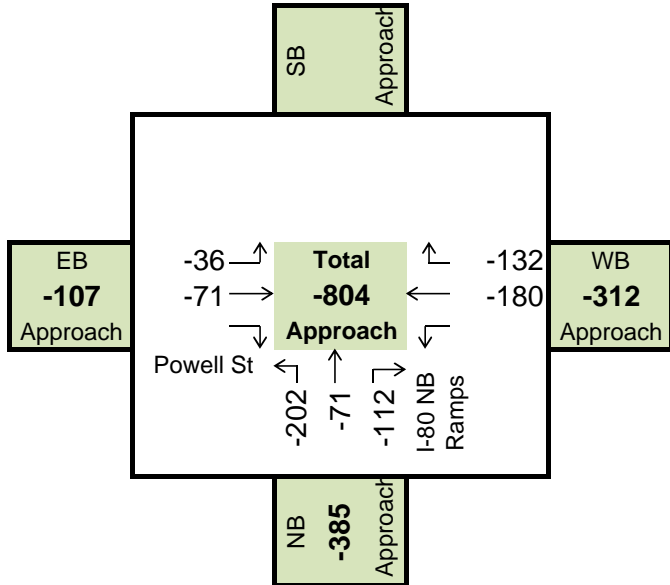
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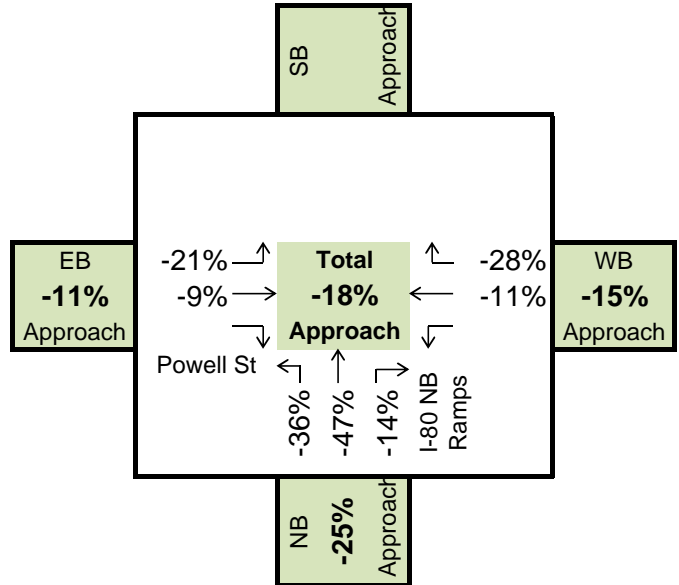
2011



Growth

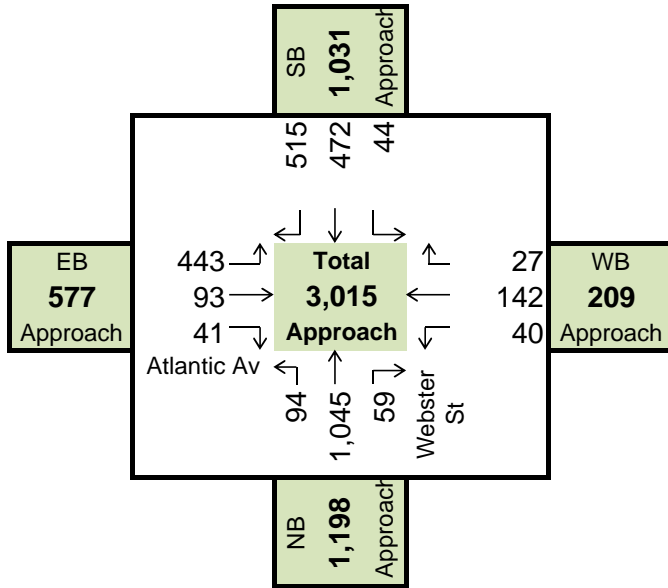


Percent Growth

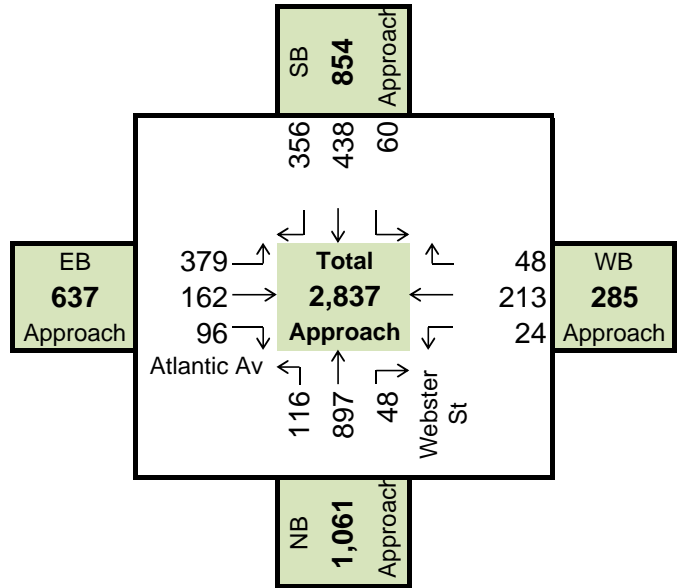


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Webster St. & Atlantic Ave.
AM Peak Hour

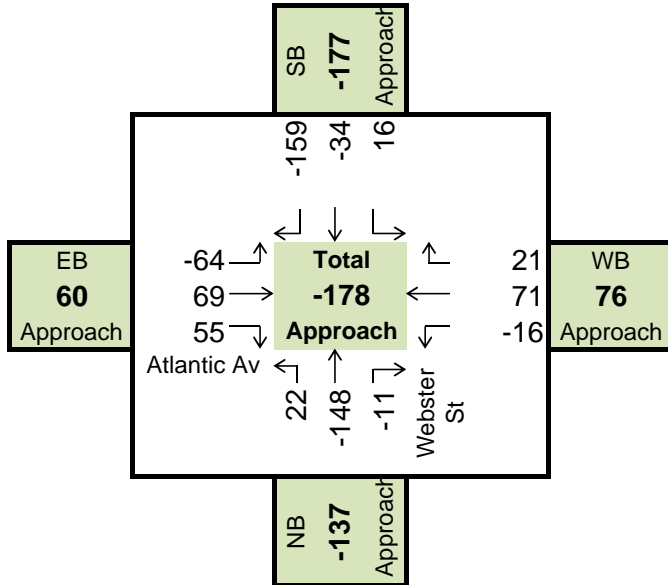
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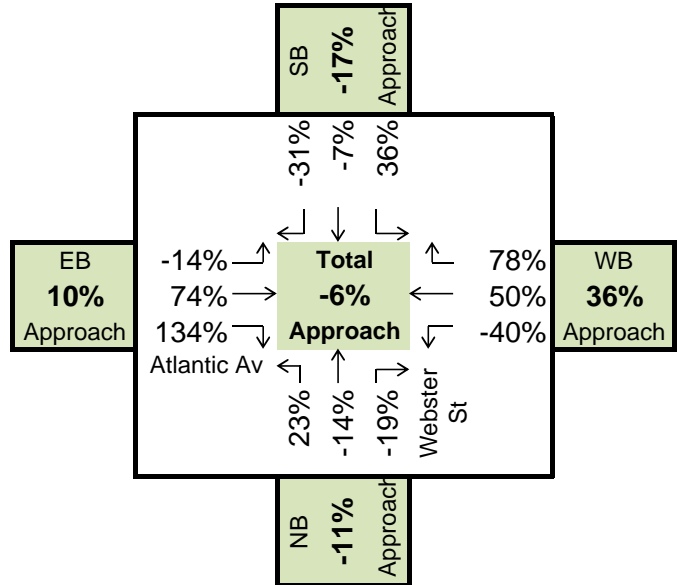
2011



Growth

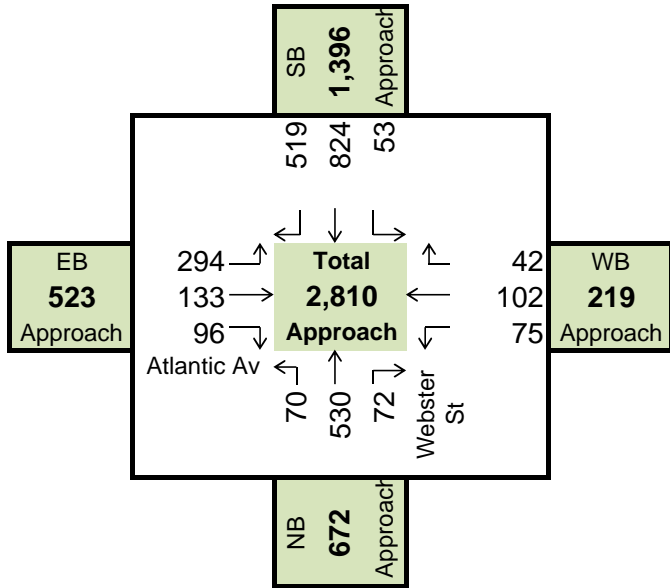


Percent Growth

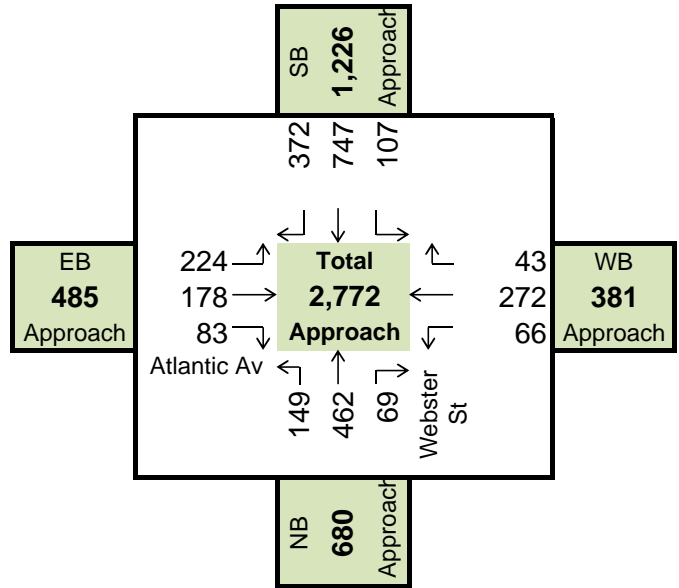


GROWTH IN TRAFFIC VOLUMES FROM 2002 DEIR TO 2011
Webster St. & Atlantic Ave.
PM Peak Hour

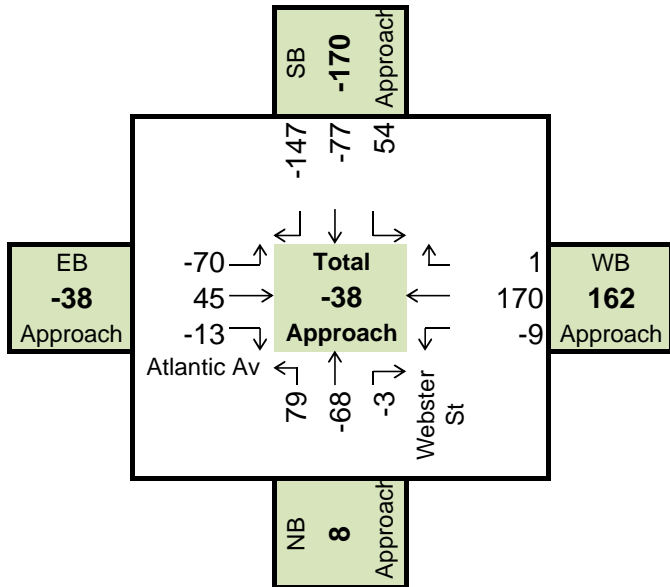
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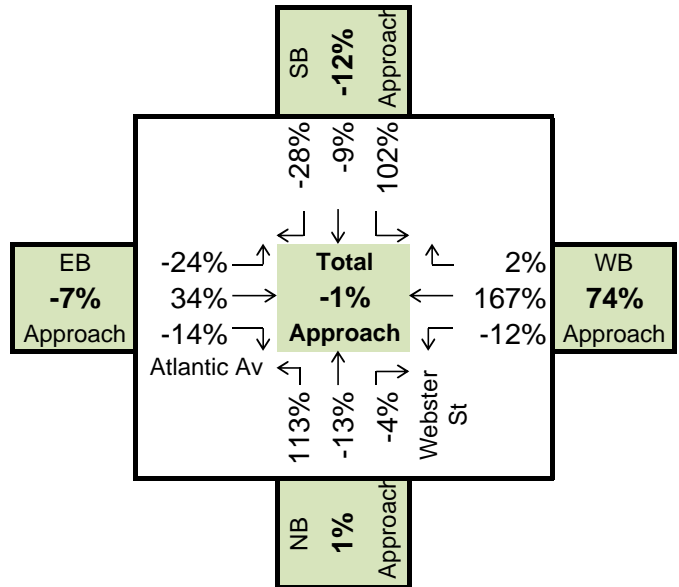
2011



Growth



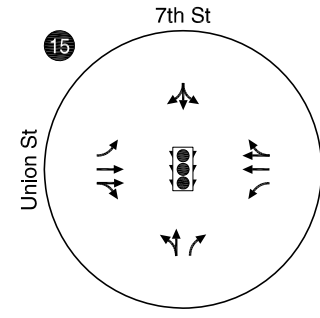
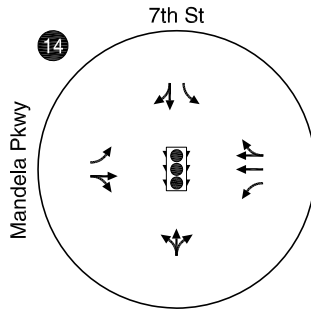
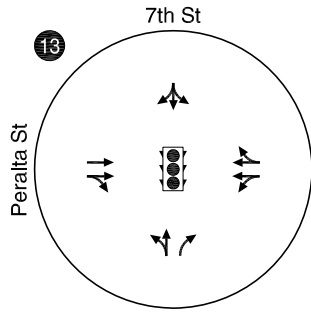
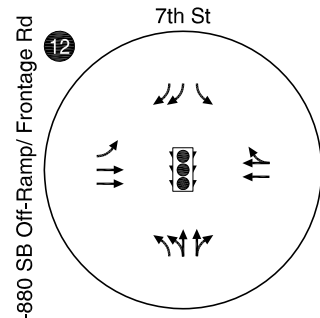
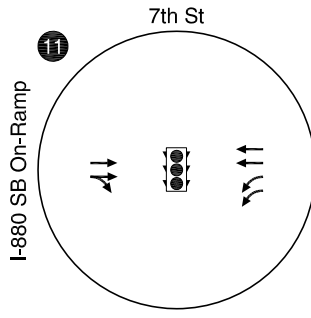
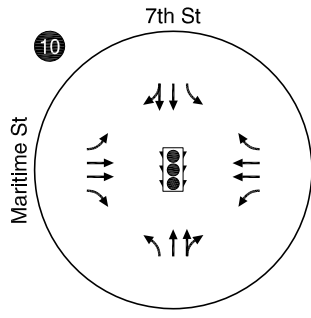
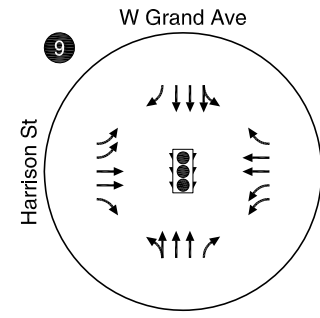
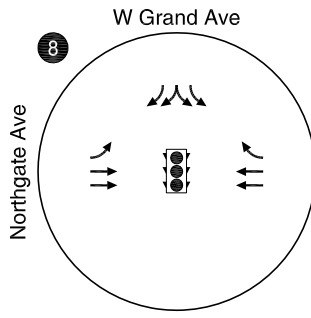
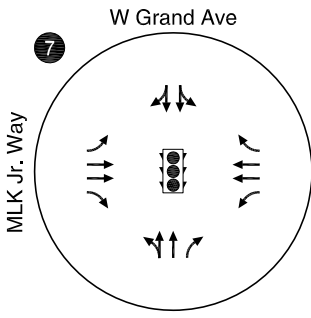
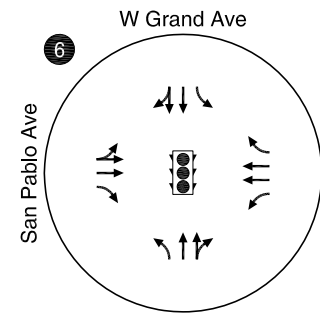
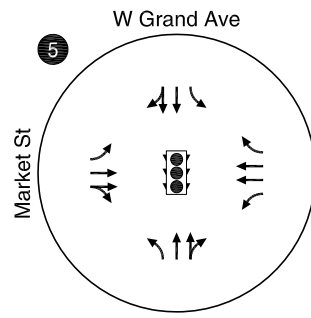
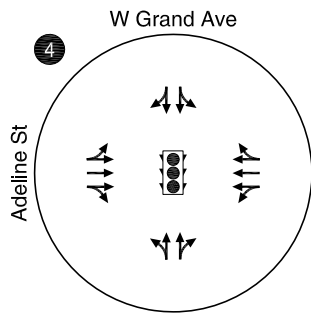
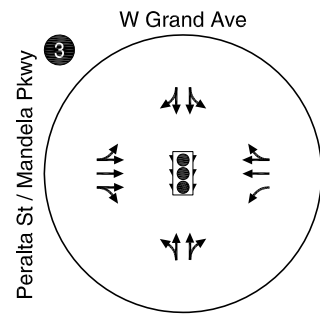
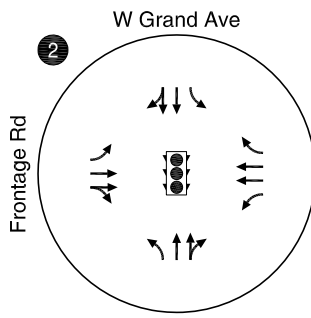
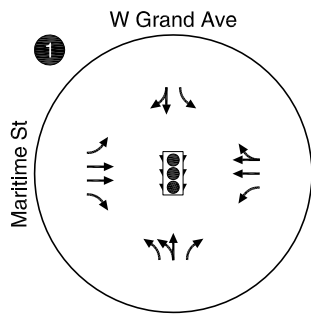
Percent Growth



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APPENDIX B - 2

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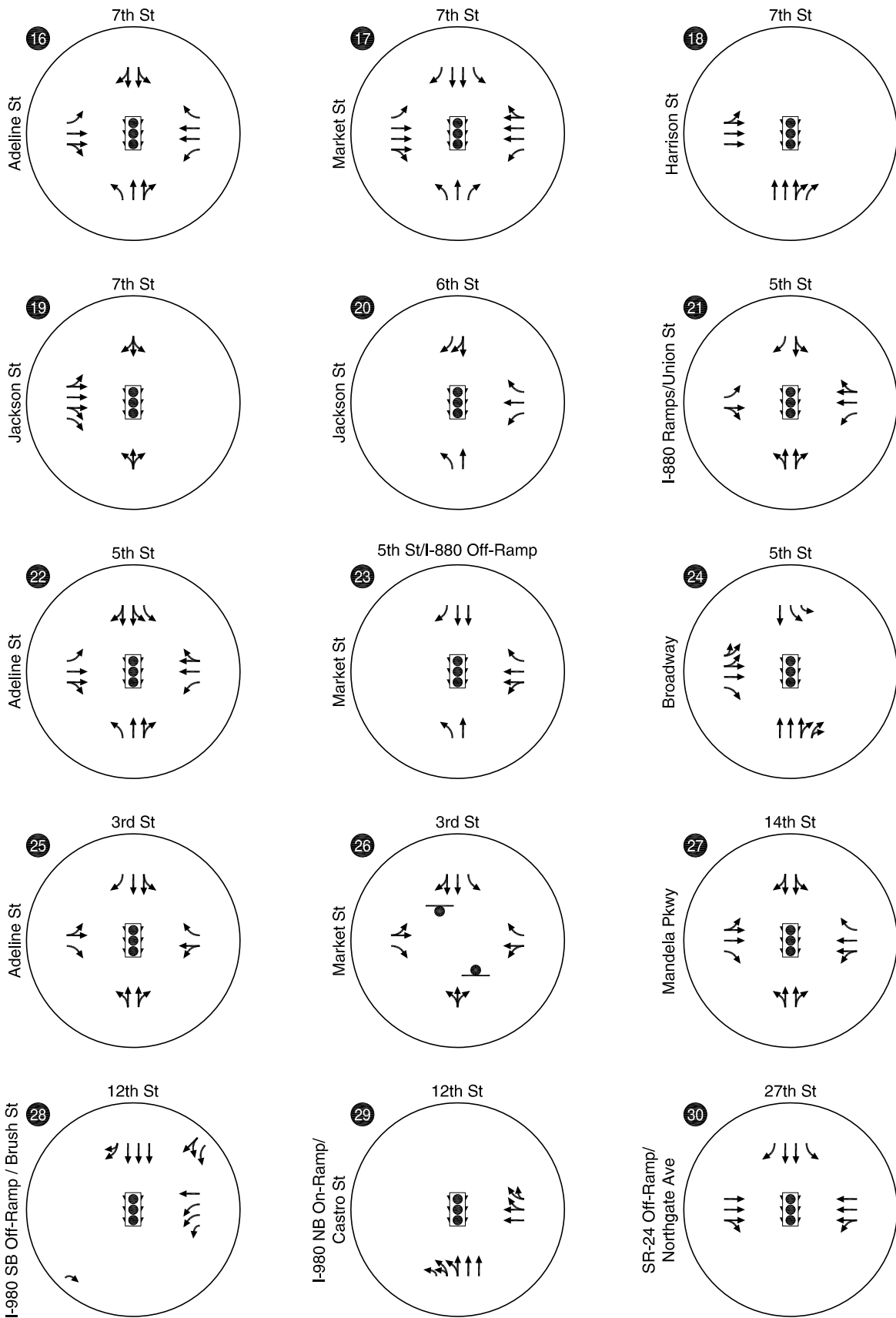


EXISTING LANE CONFIGURATIONS OAKLAND, CALIFORNIA

FIGURE

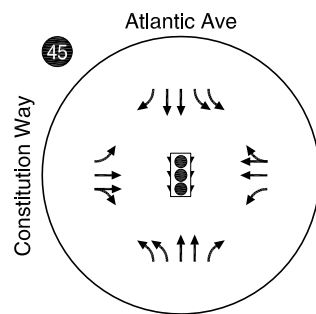
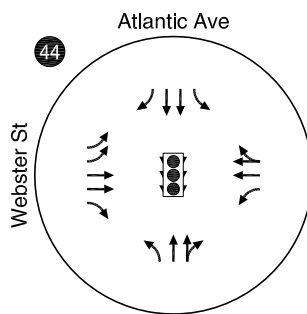
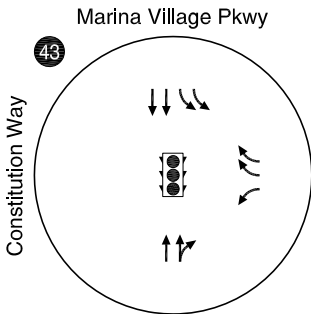
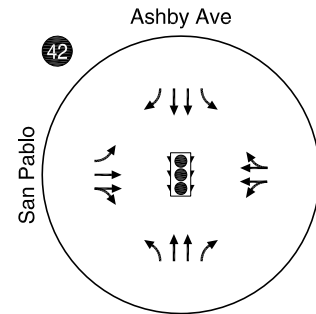
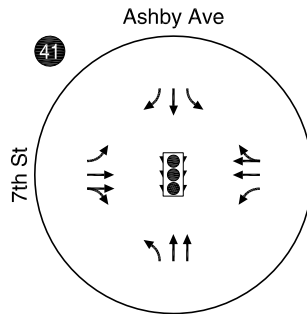
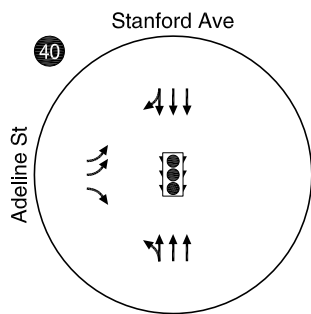
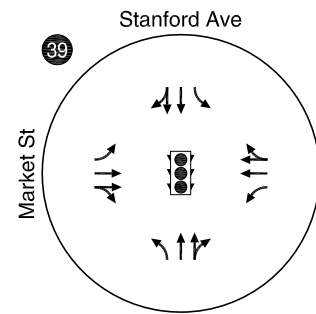
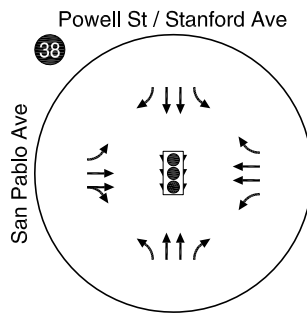
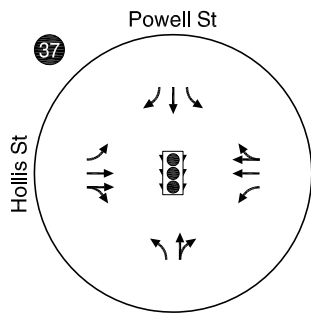
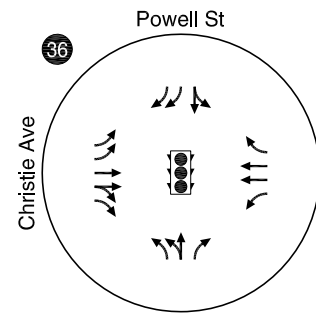
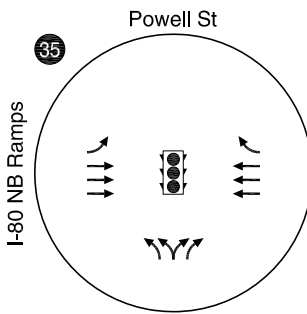
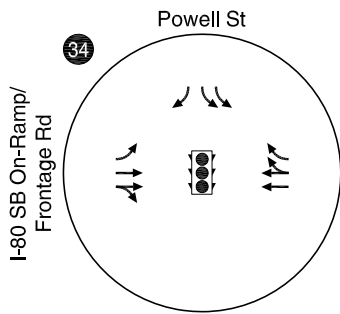
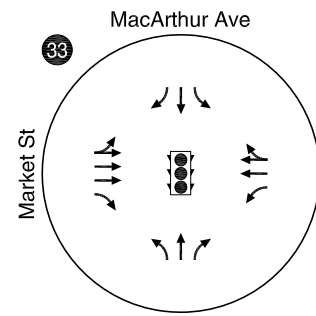
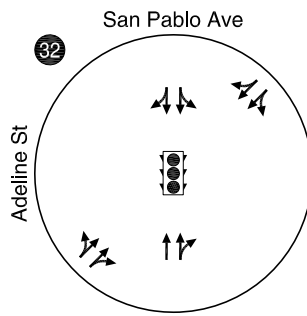
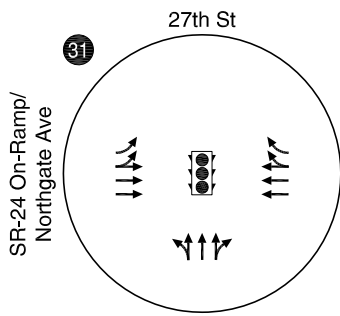
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EXISTING LANE CONFIGURATIONS OAKLAND, CALIFORNIA

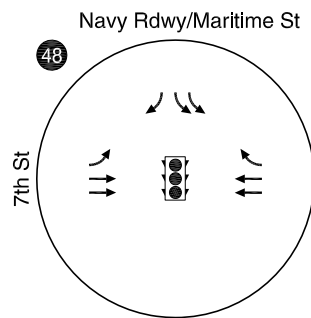
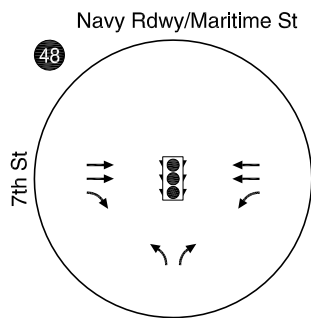
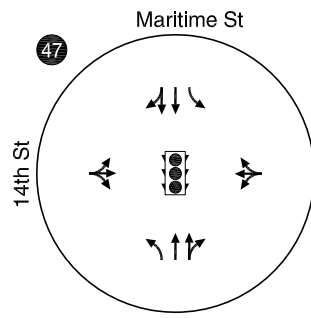
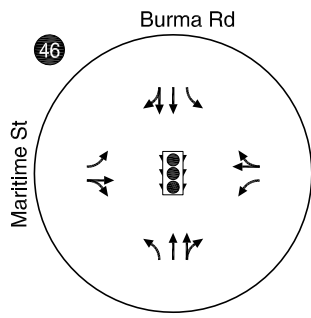
FIGURE



EXISTING LANE CONFIGURATIONS
OAKLAND, CALIFORNIA

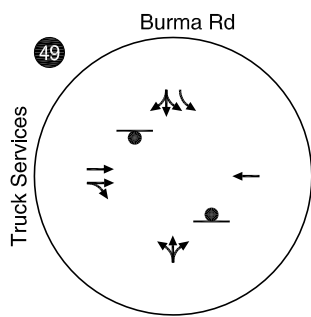
FIGURE

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Maritime Street Overpass Variant

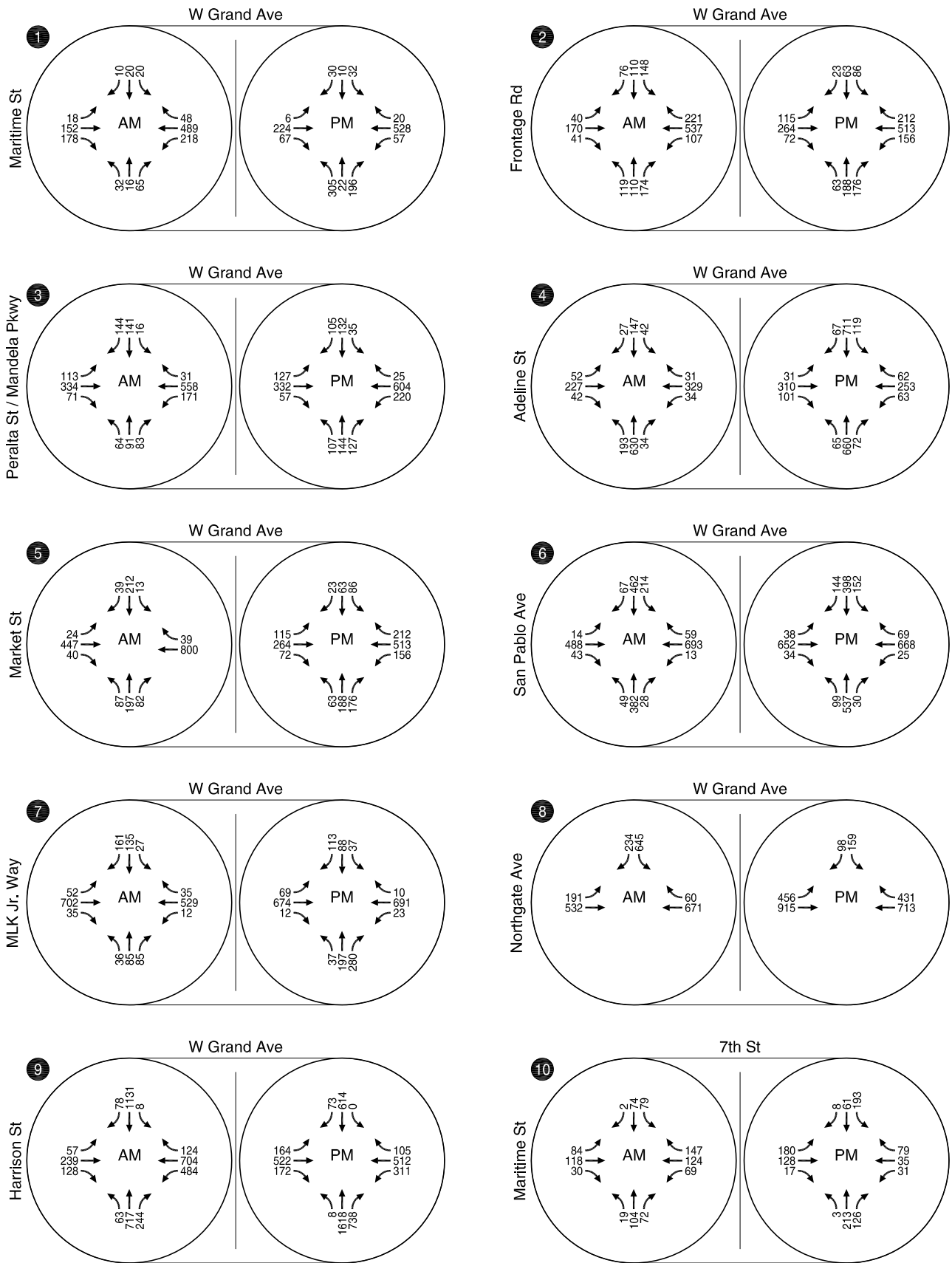
Alternative 2
At-Grade 7th Street Variant



EXISTING LANE PLUS PROJECT CONFIGURATIONS
OAKLAND, CALIFORNIA

FIGURE

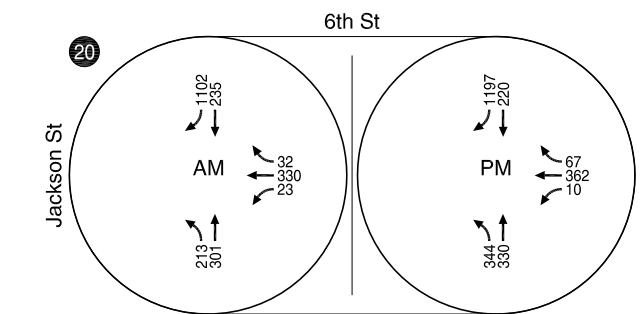
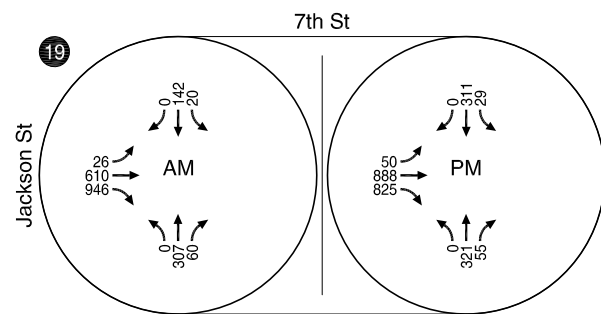
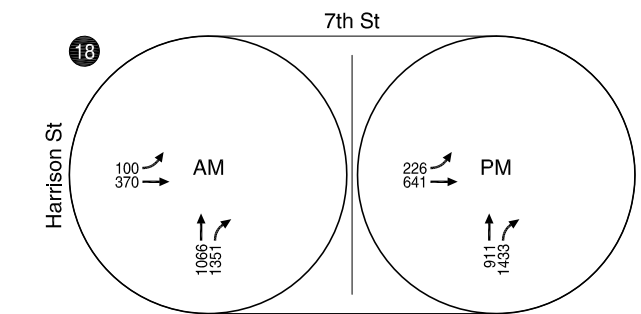
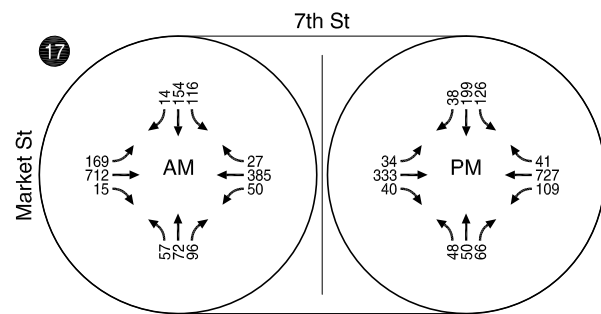
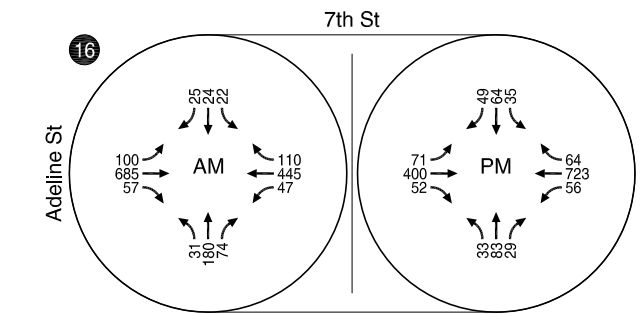
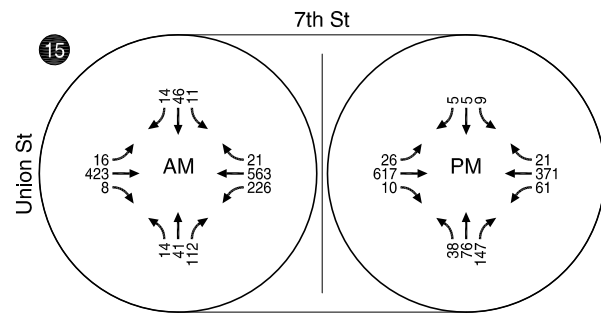
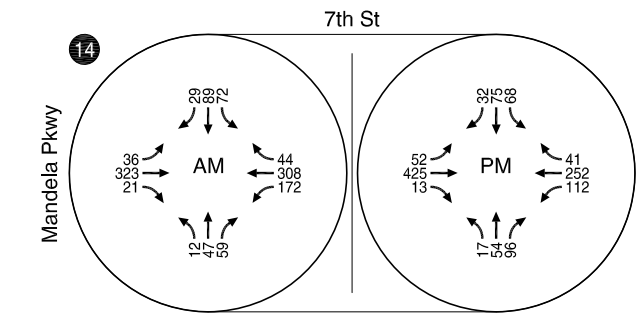
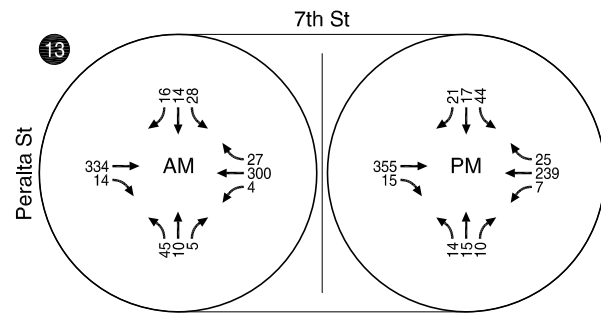
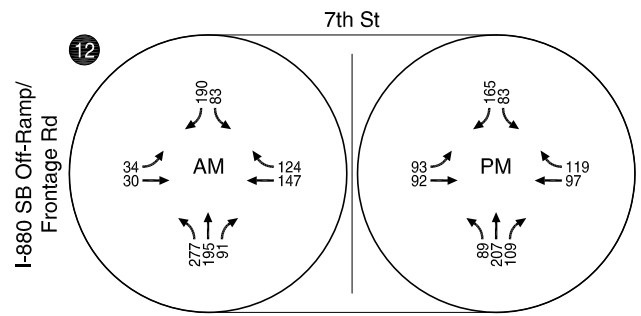
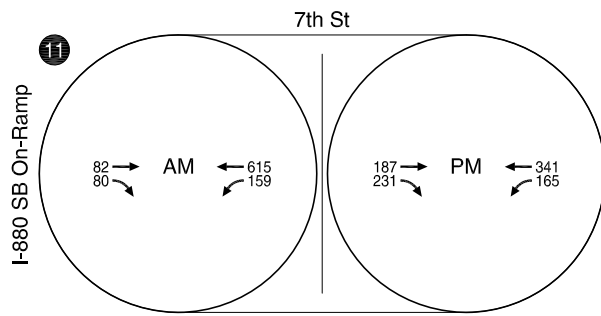
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**EXISTING AM & PM VOLUMES
OAKLAND, CALIFORNIA**

FIGURE

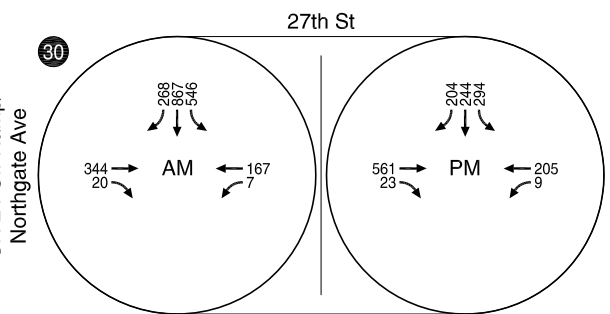
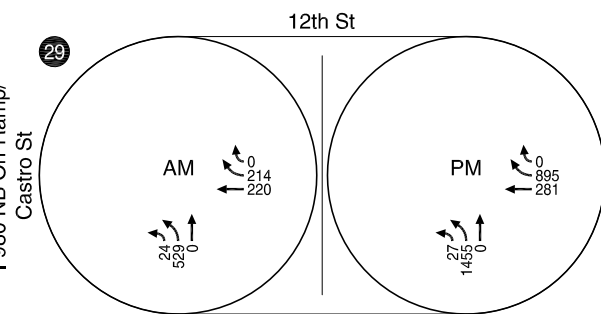
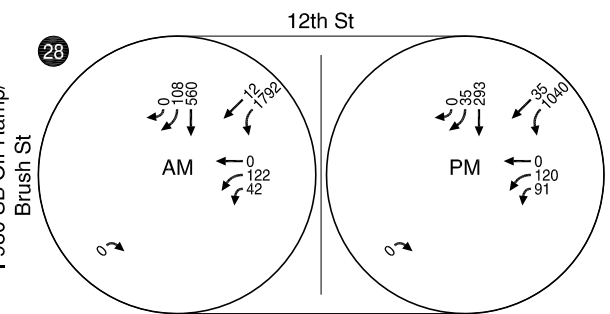
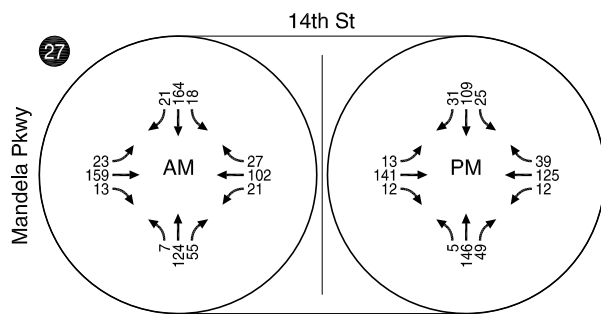
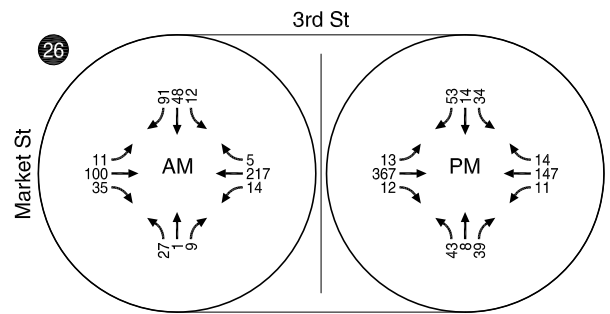
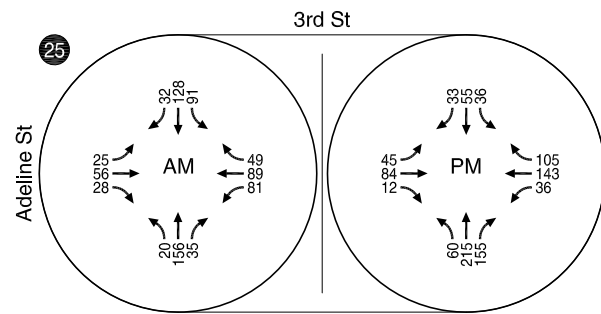
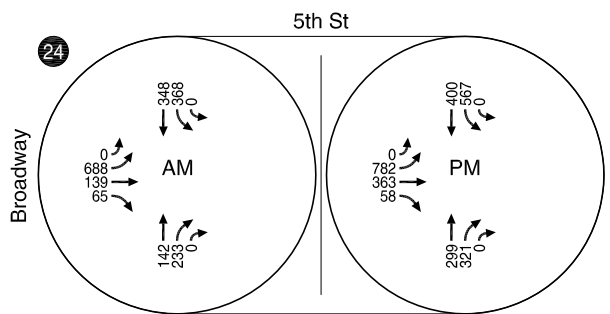
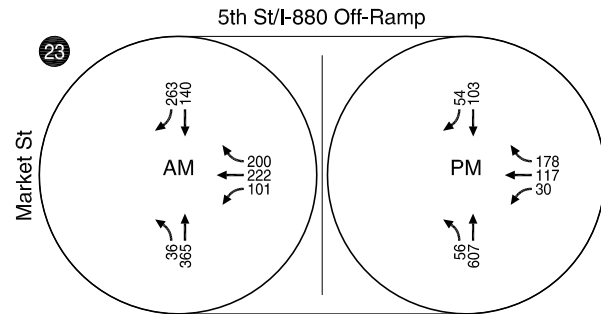
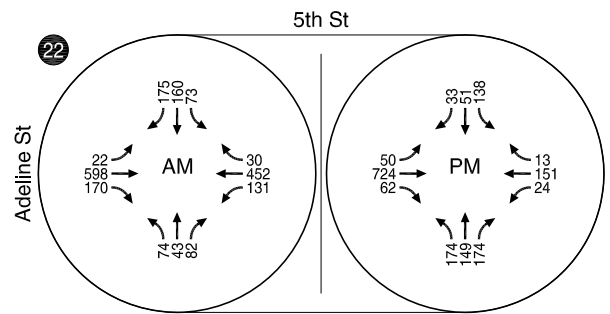
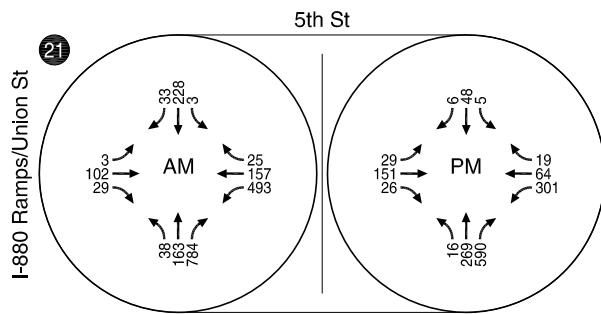
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EXISTING AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

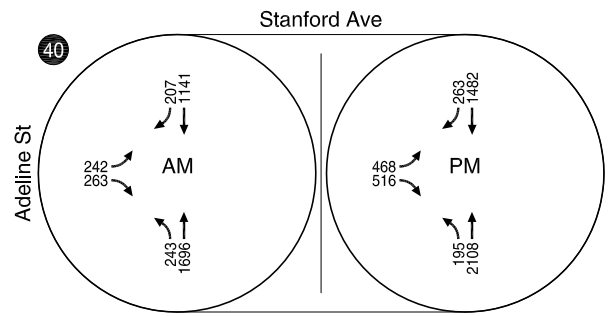
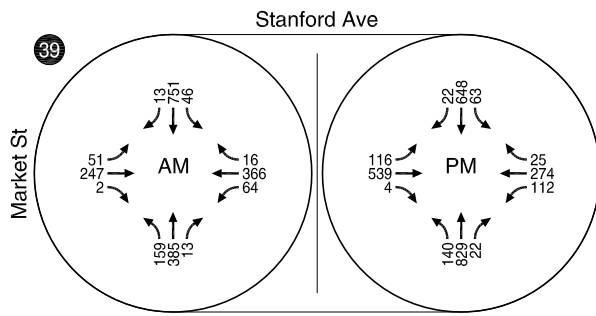
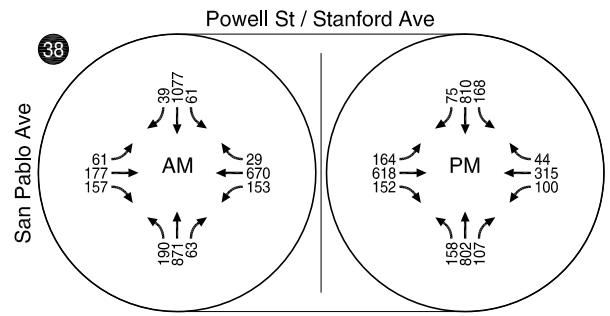
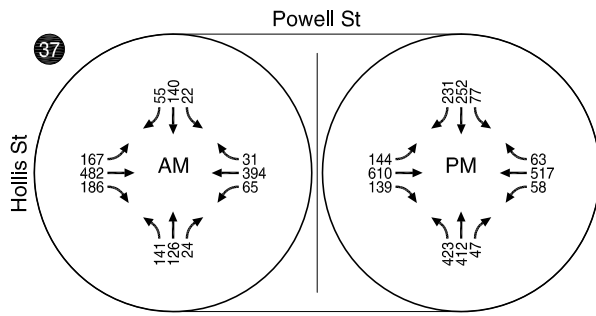
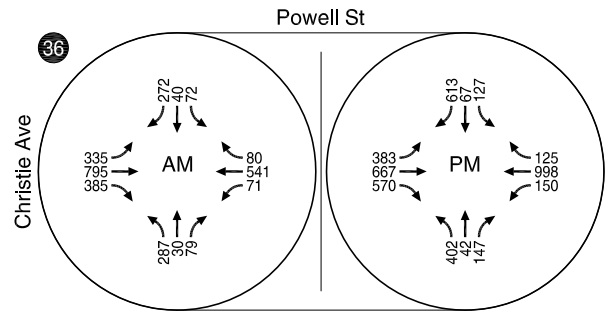
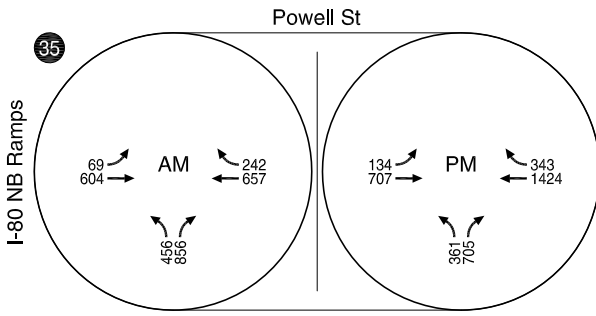
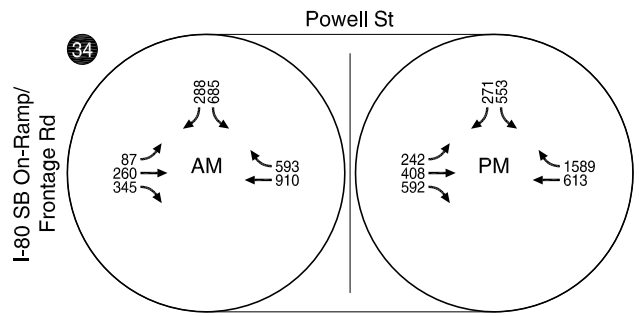
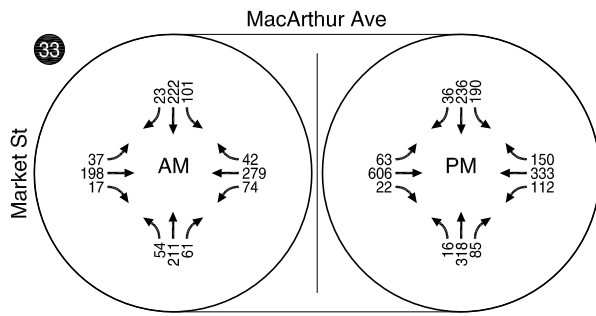
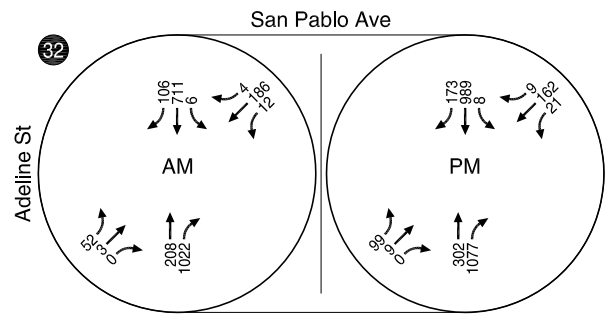
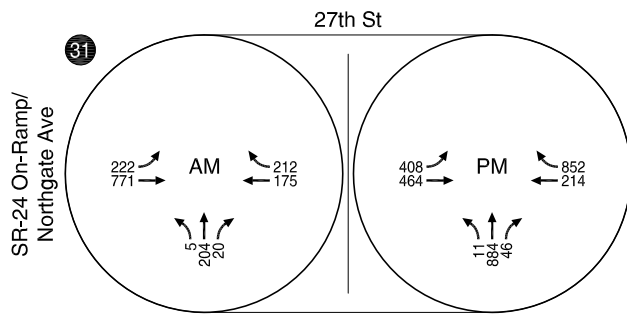
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EXISTING AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

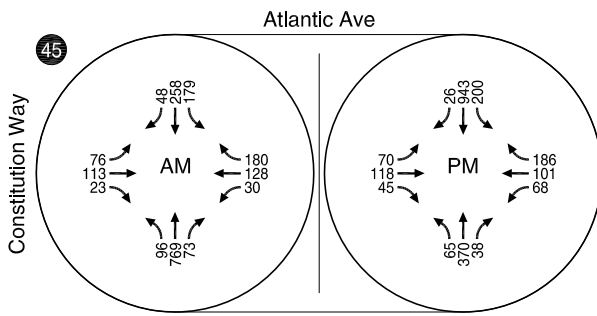
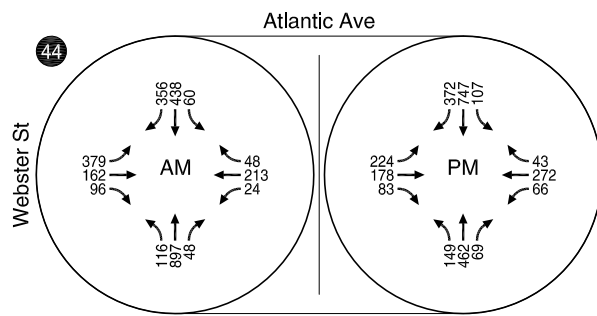
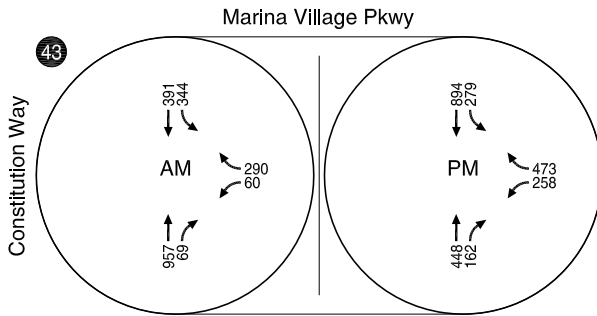
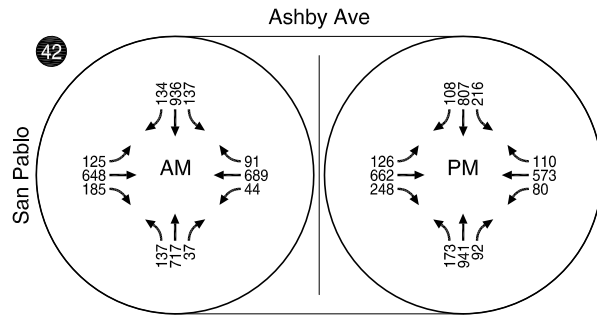
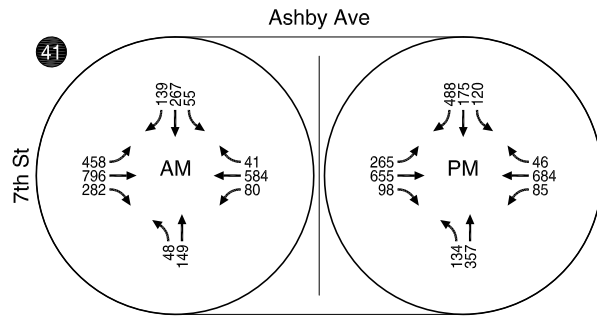
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**EXISTING AM AND PM VOLUMES
OAKLAND, CALIFORNIA**

FIGURE

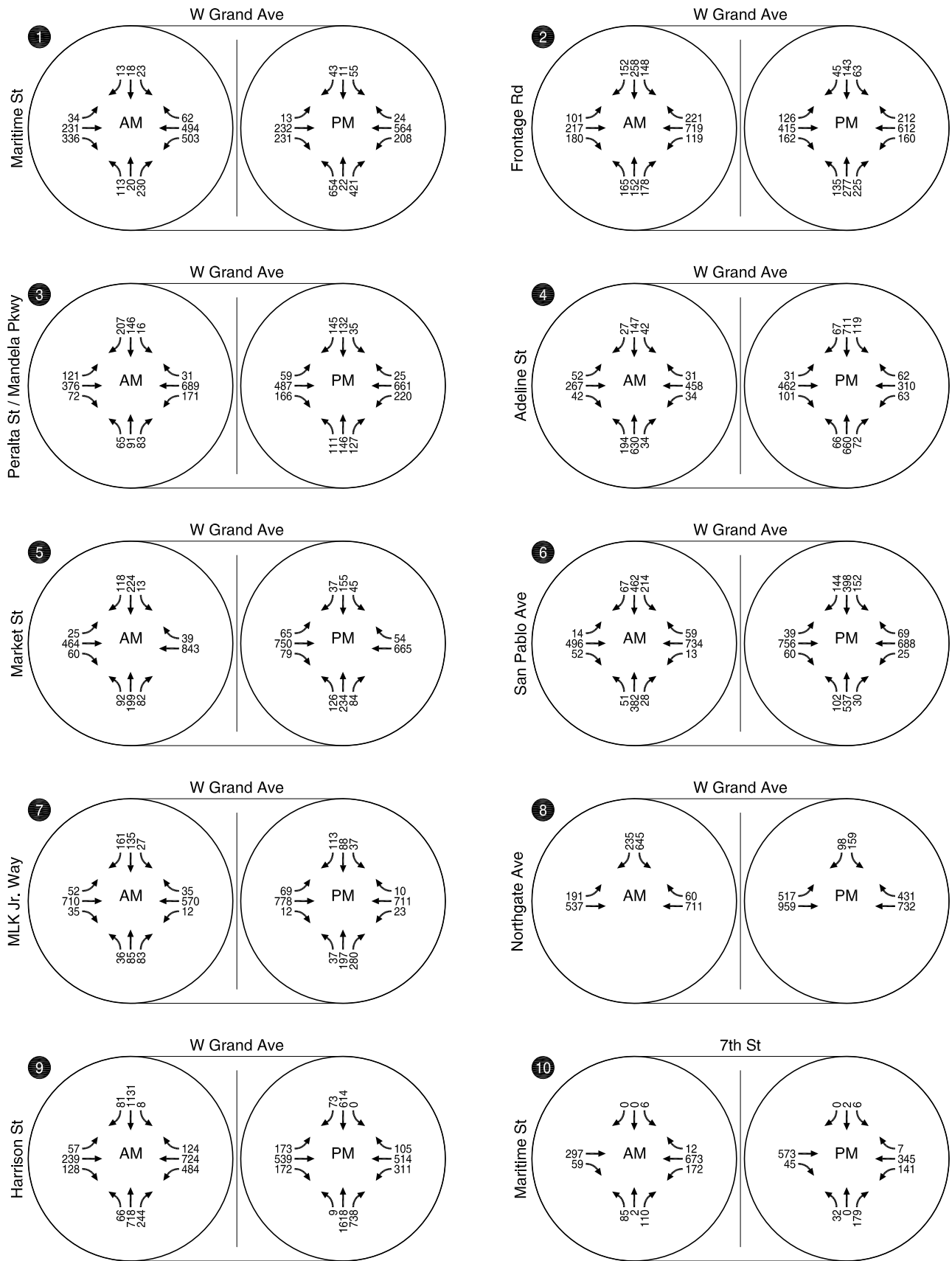
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**EXISTING AM AND PM VOLUMES
OAKLAND, CALIFORNIA**

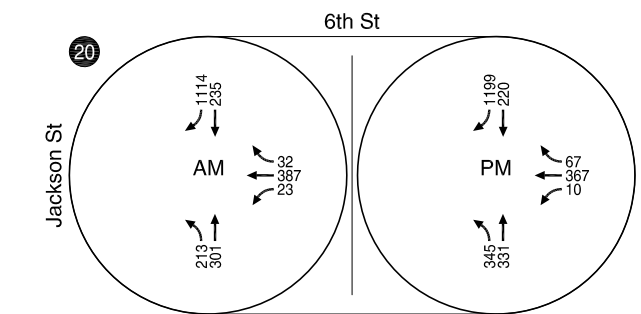
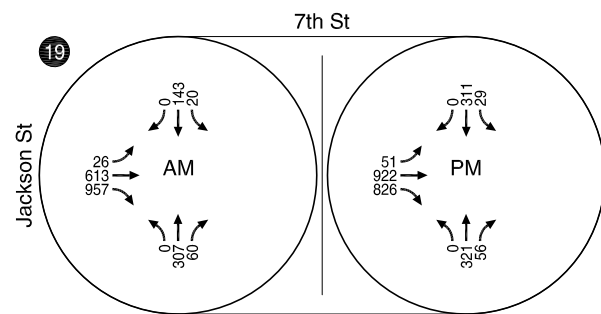
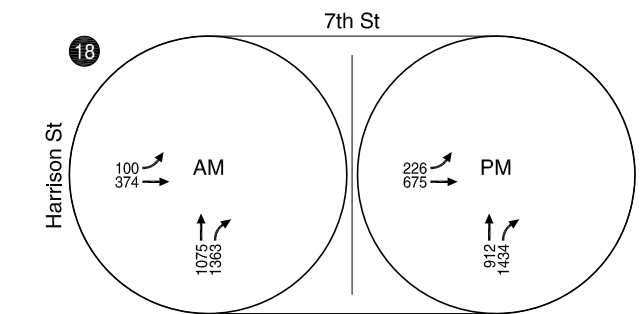
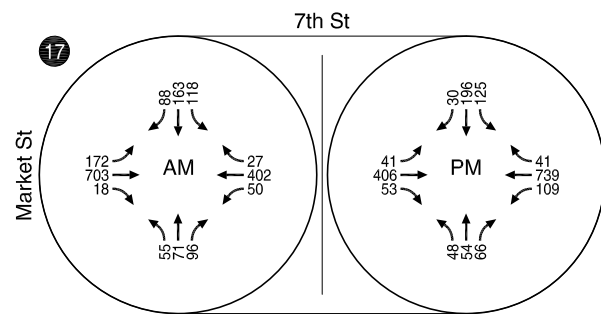
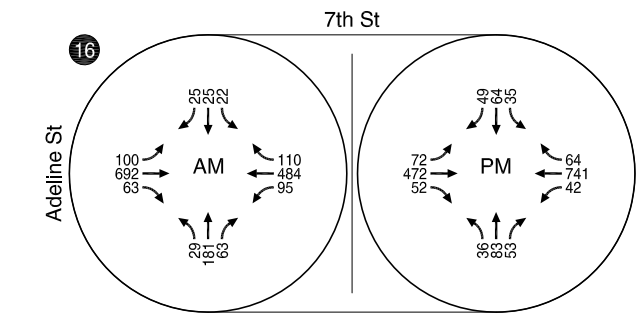
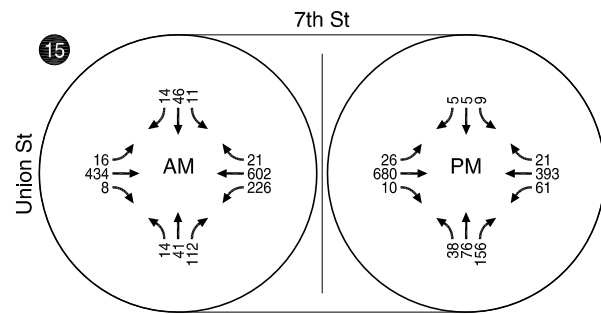
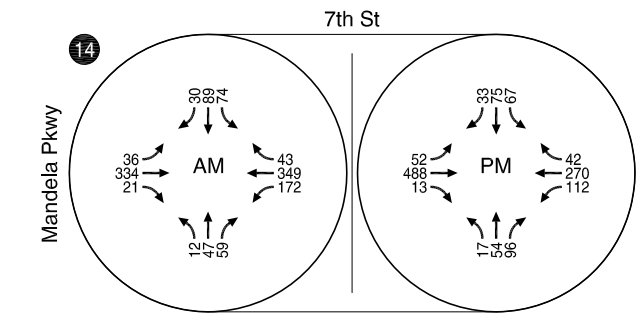
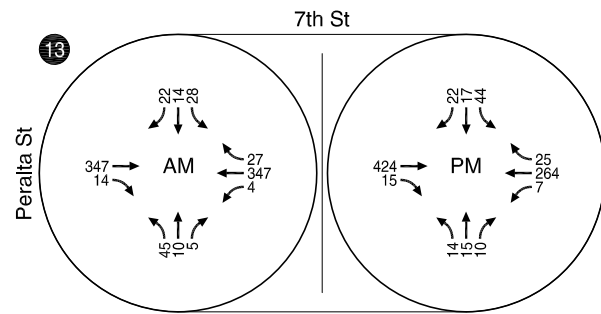
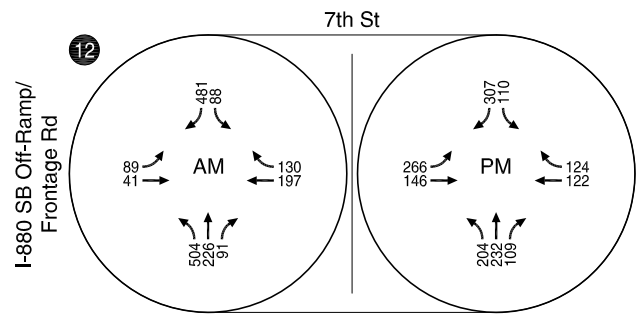
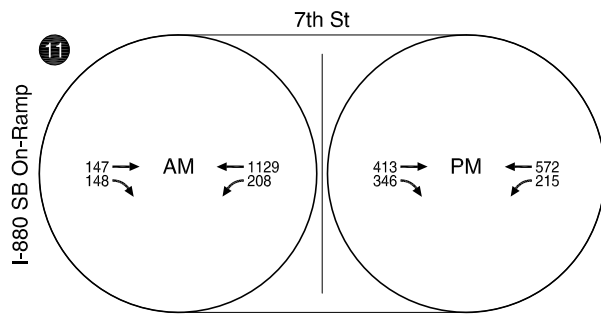
FIGURE



EXISTING PLUS PROJECT AM & PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

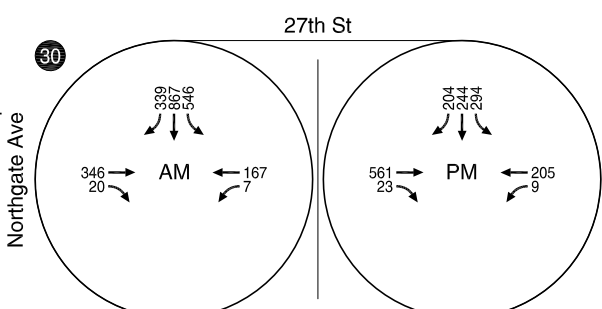
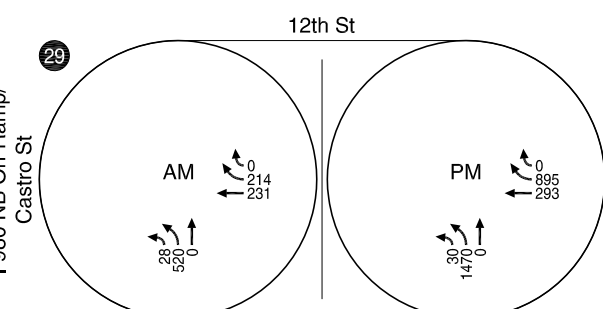
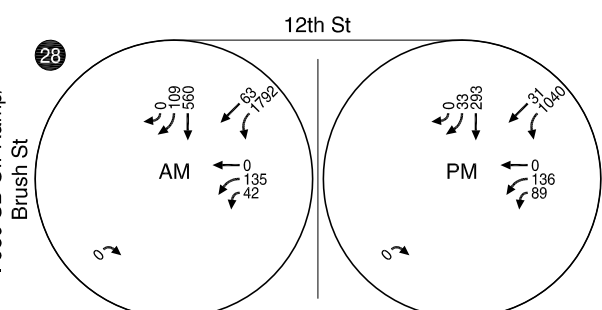
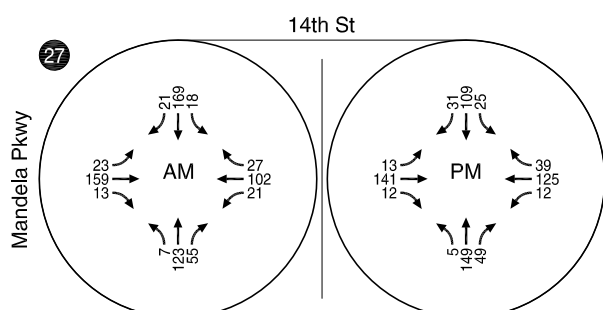
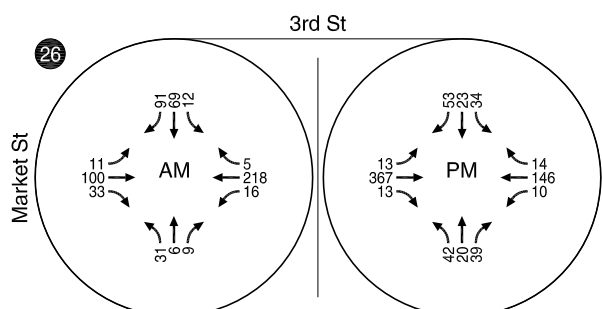
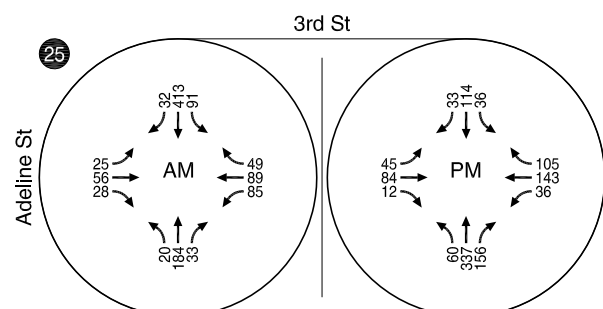
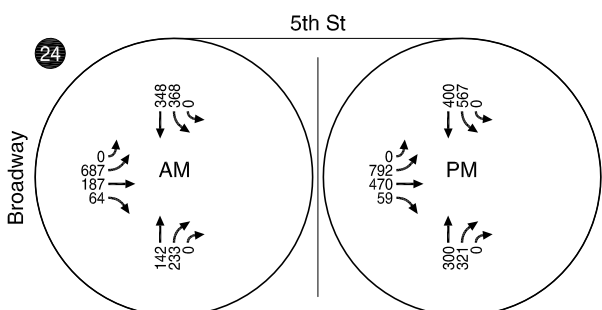
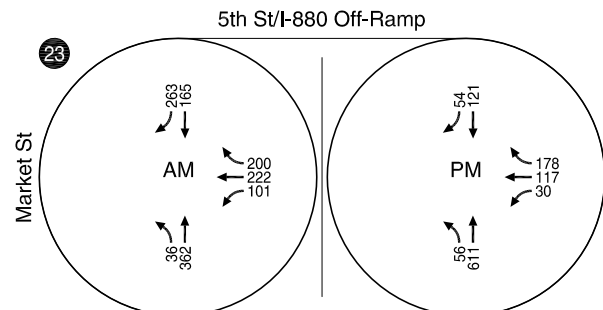
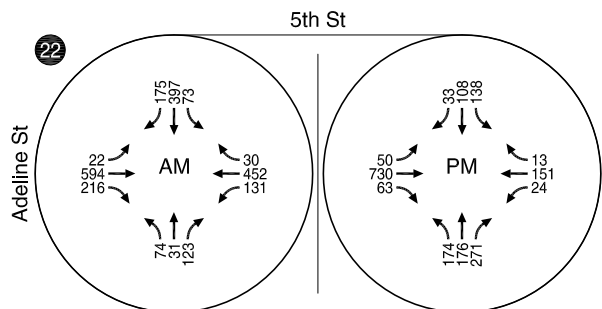
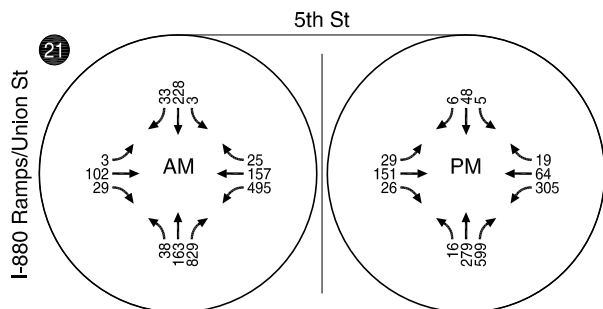
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EXISTING PLUS PROJECT AM & PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

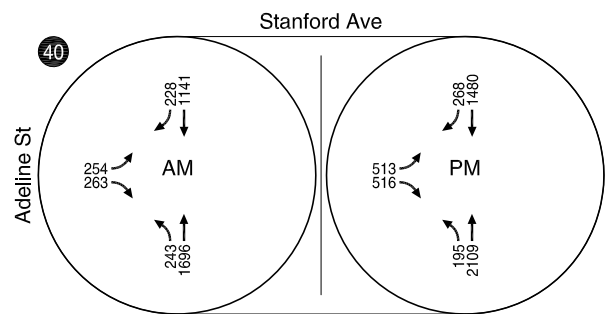
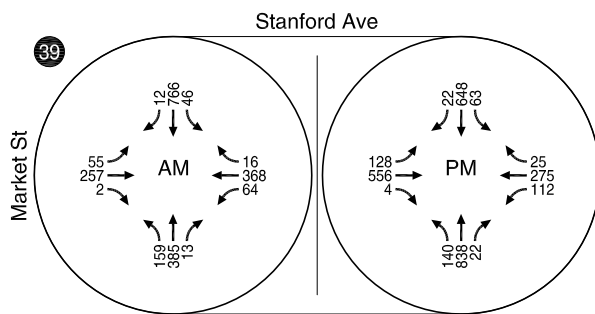
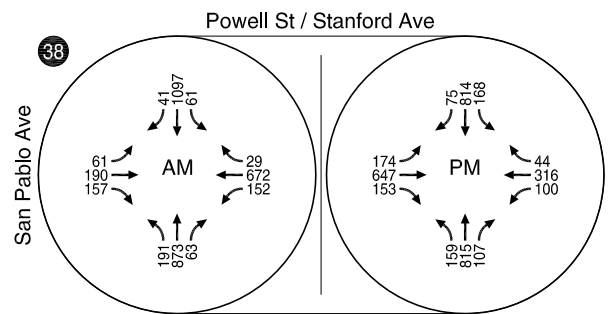
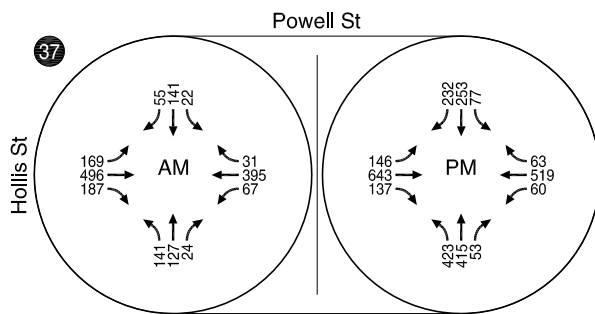
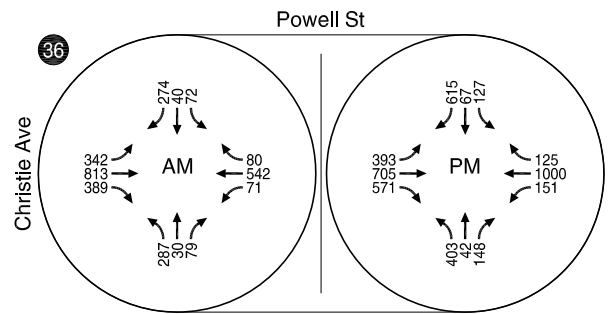
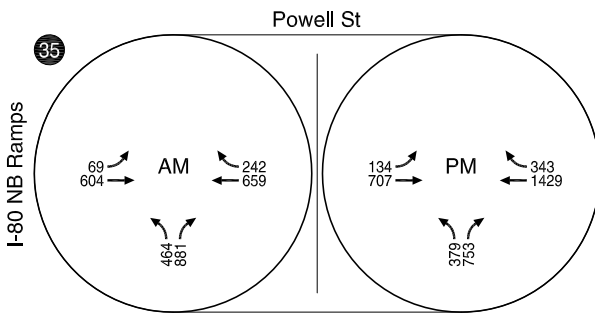
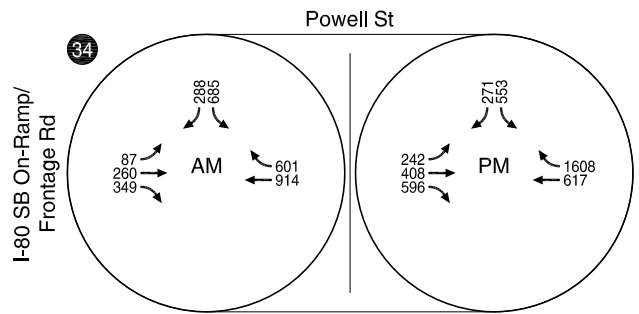
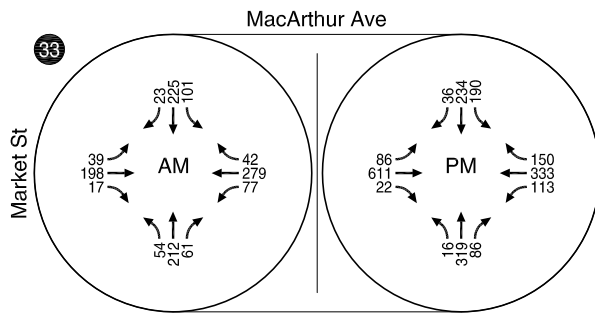
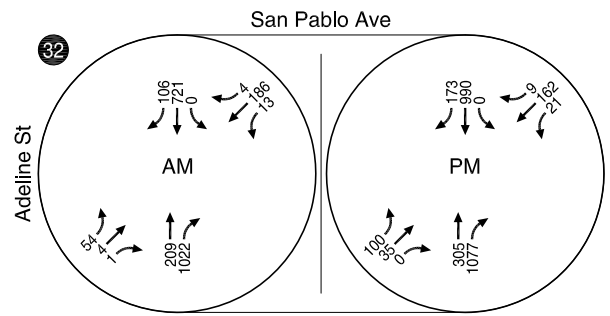
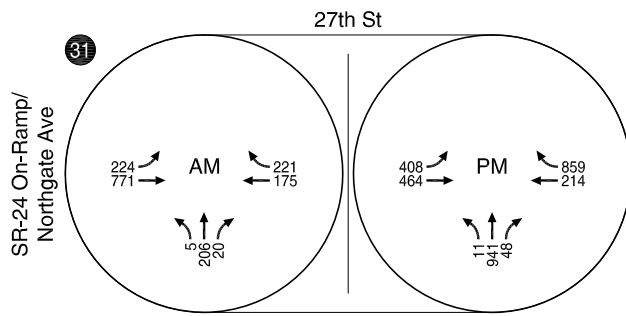
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**EXISTING PLUS PROJECT AM & PM VOLUMES
OAKLAND, CALIFORNIA**

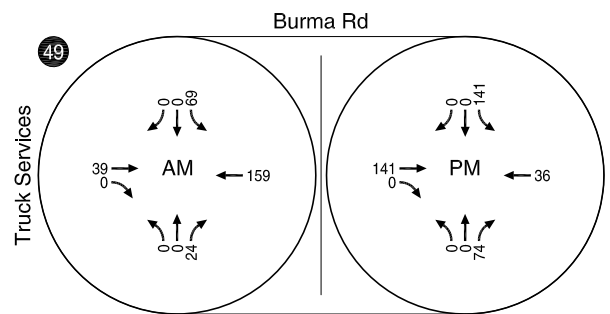
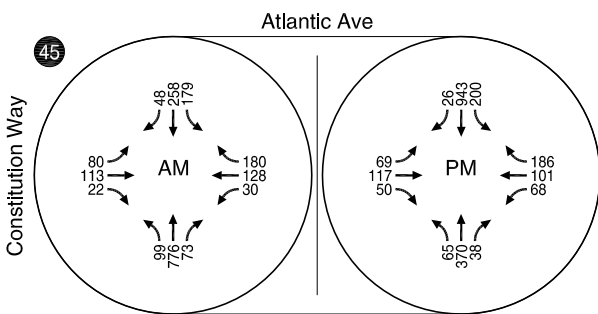
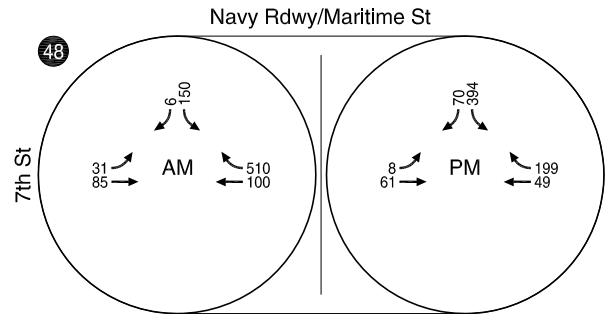
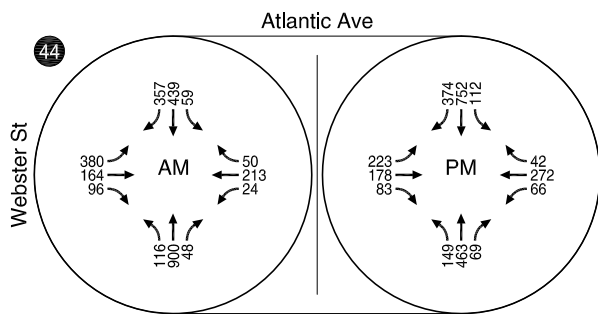
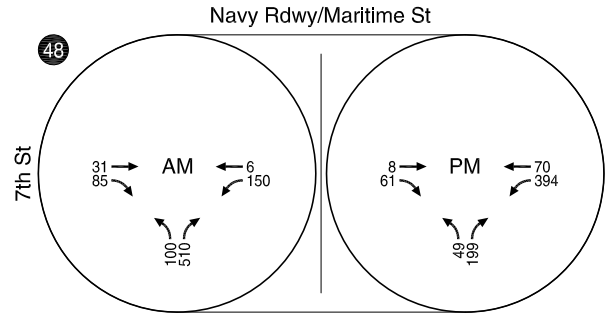
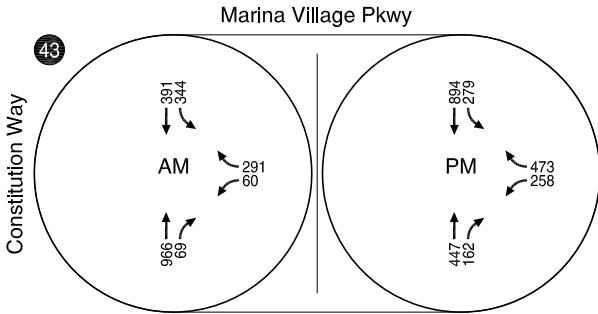
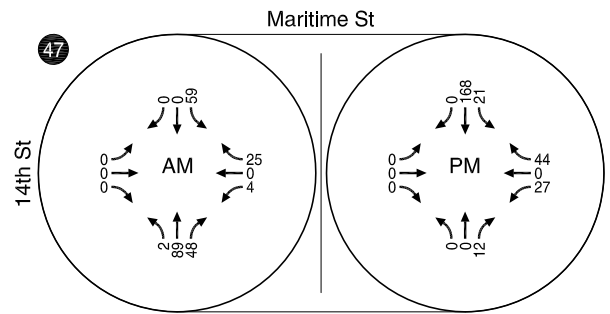
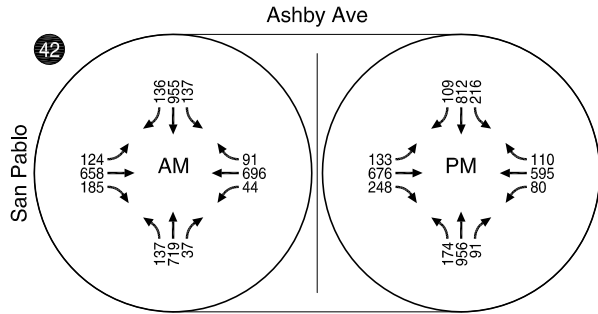
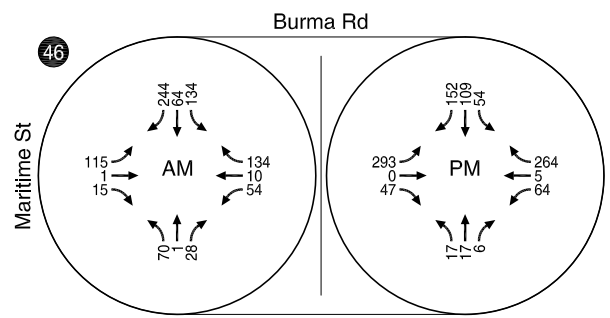
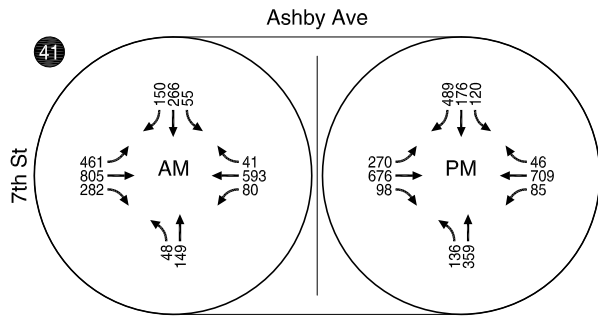
FIGURE



**EXISTING PLUS PROJECT AM & PM VOLUMES
OAKLAND, CALIFORNIA**

FIGURE

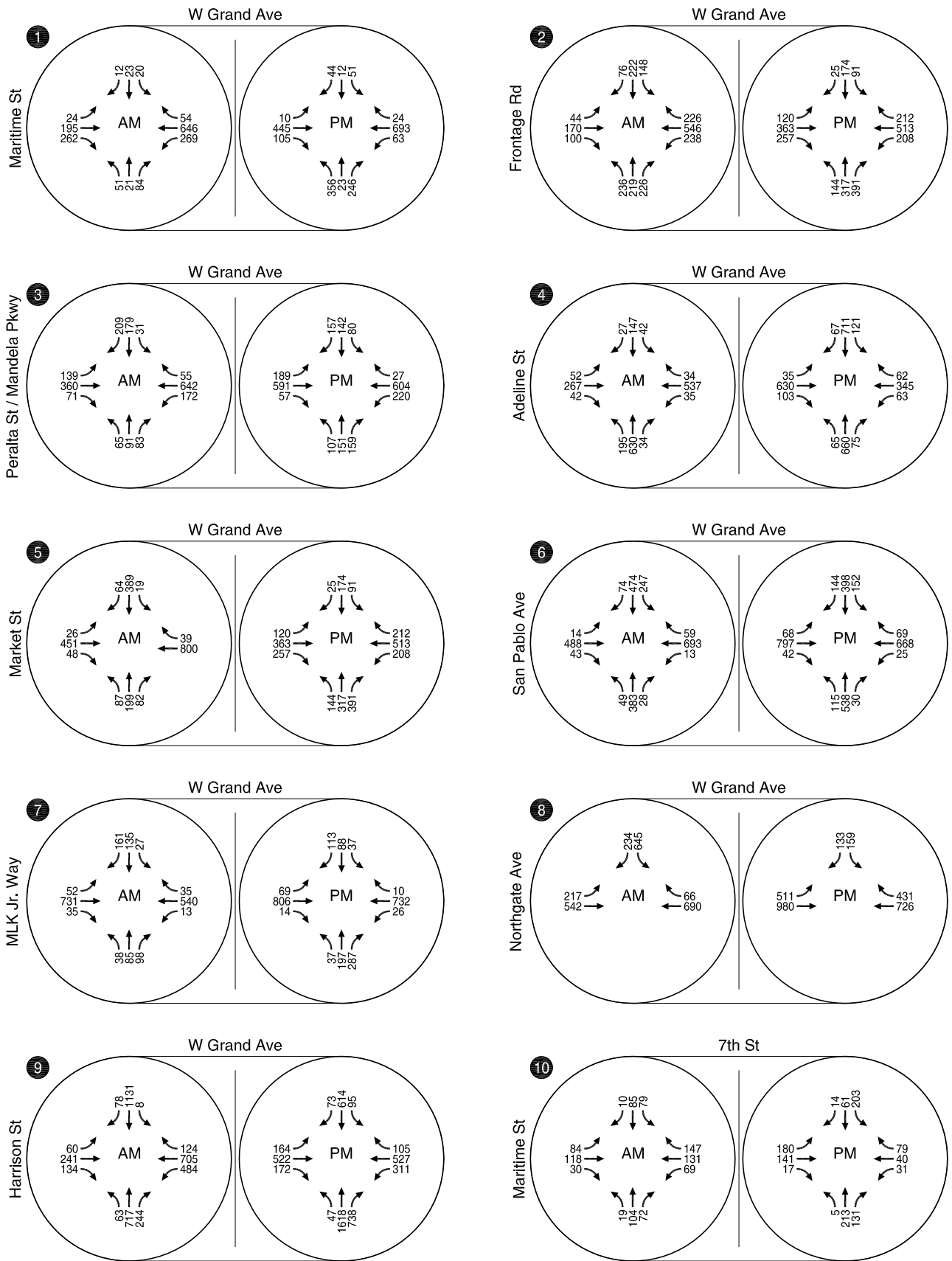
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EXISTING PLUS PROJECT AM & PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

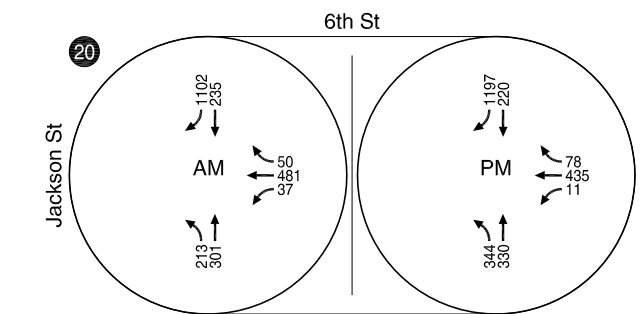
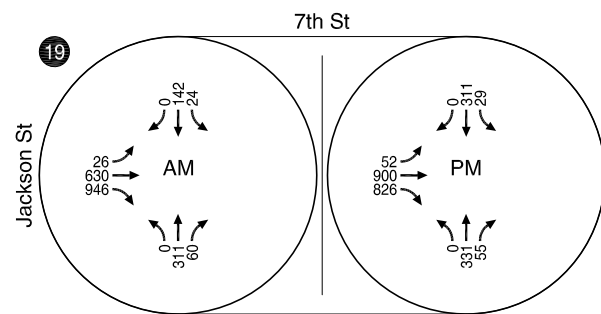
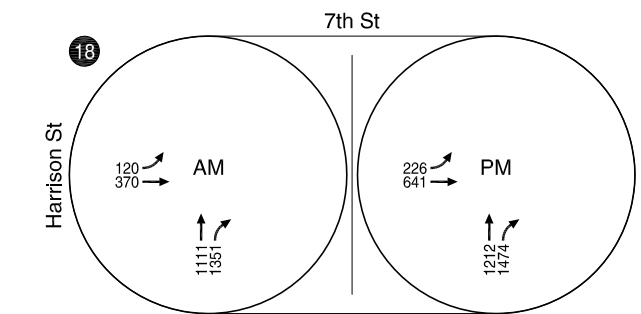
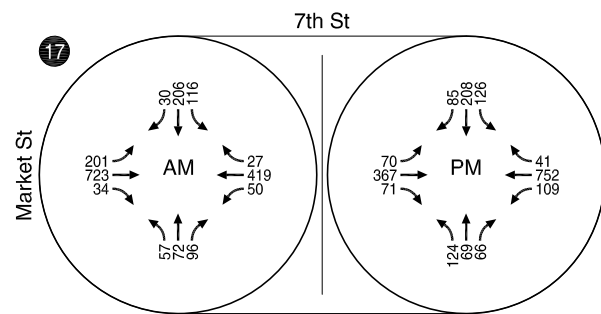
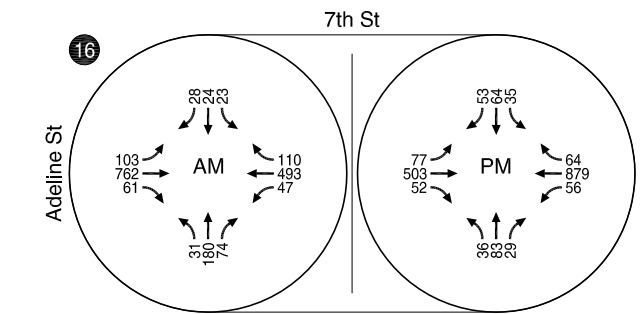
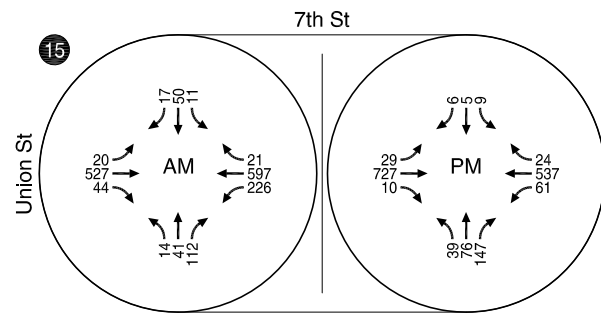
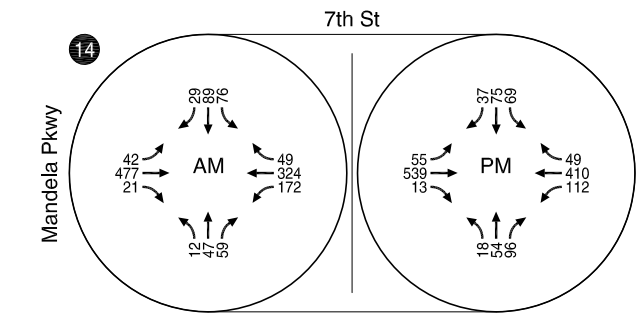
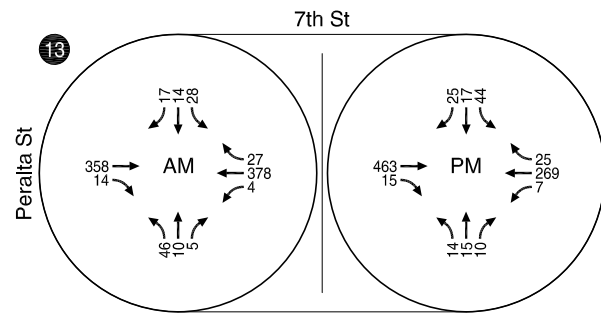
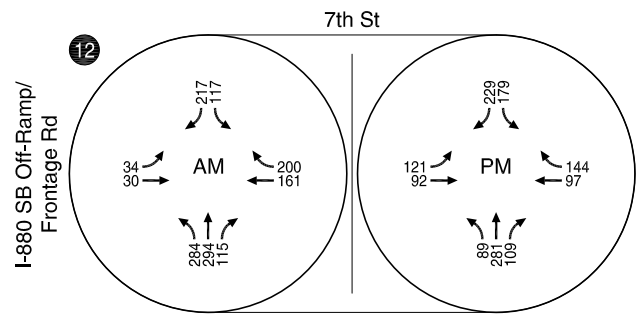
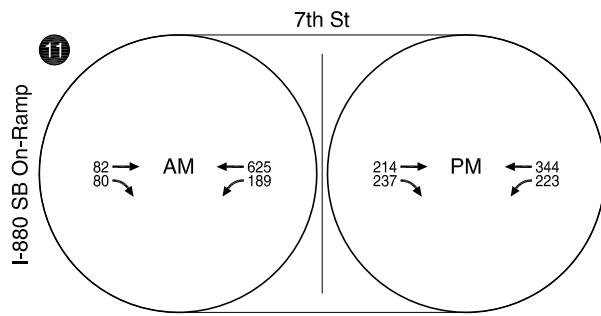
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**2020 AM & PM VOLUMES
OAKLAND, CALIFORNIA**

FIGURE

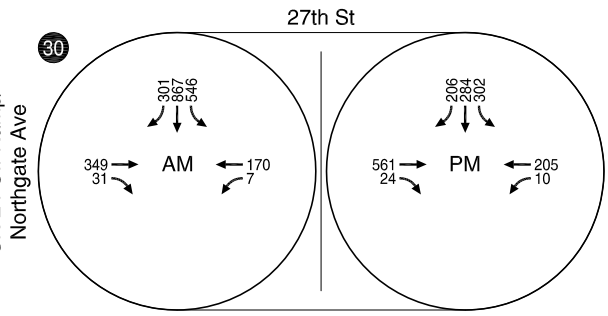
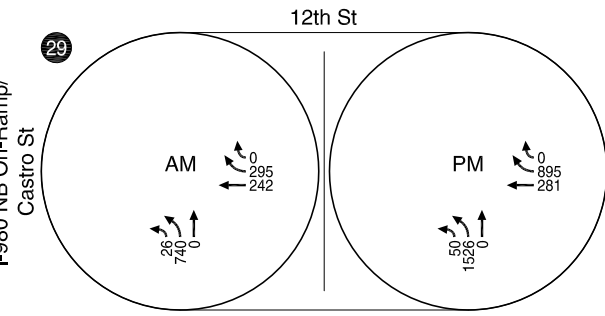
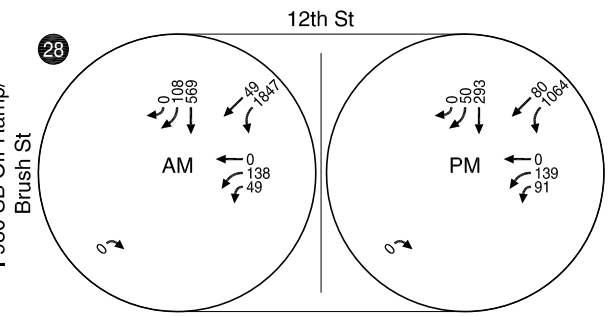
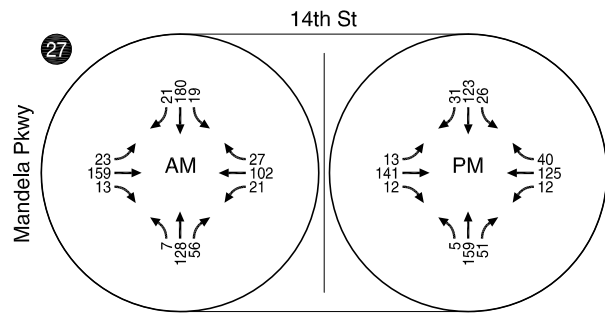
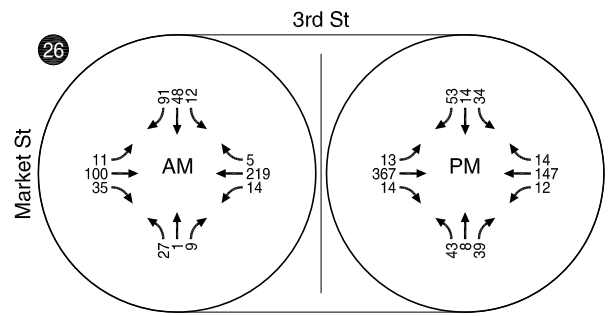
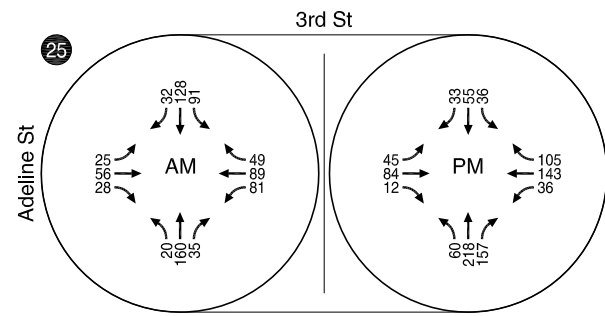
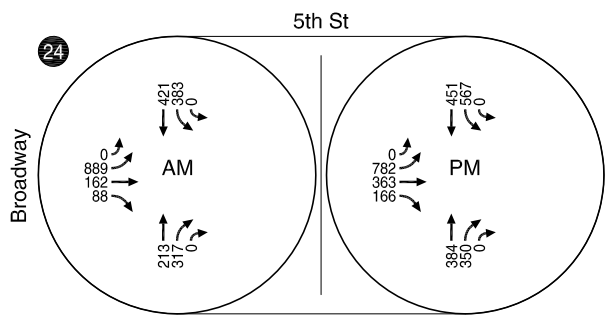
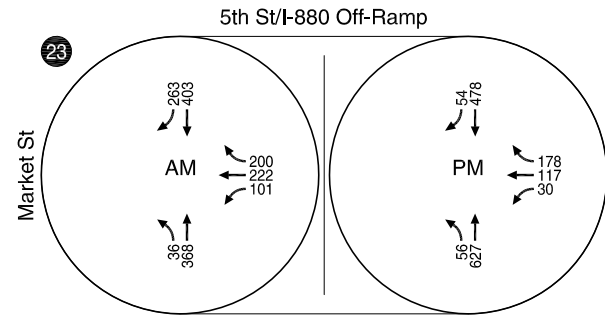
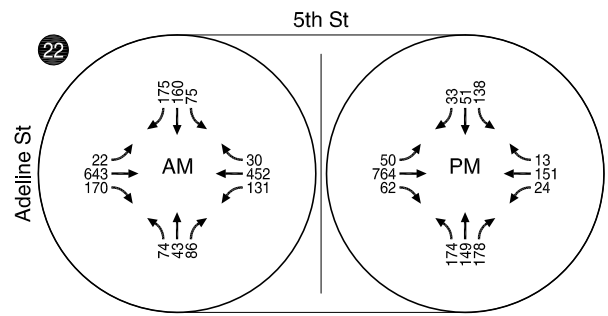
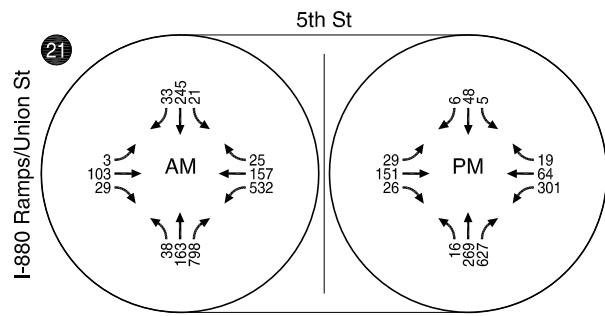
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2020 AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

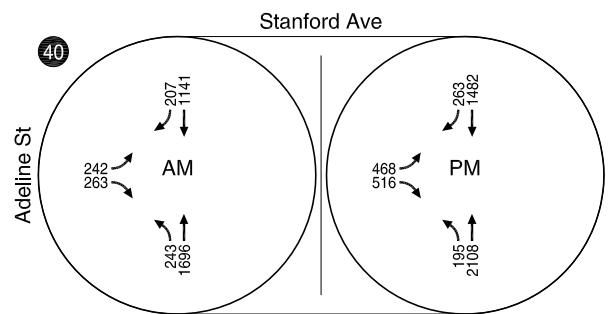
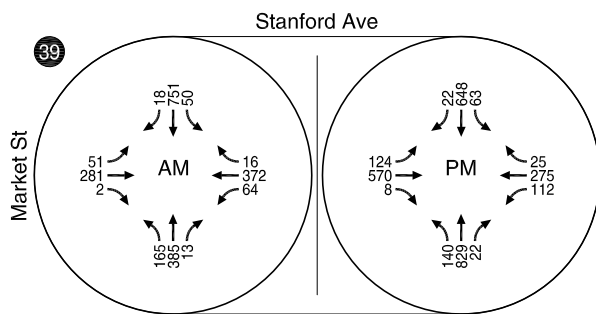
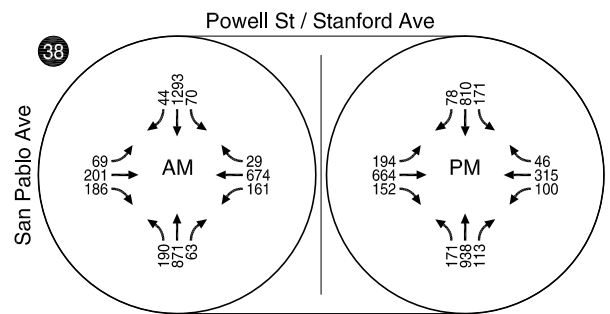
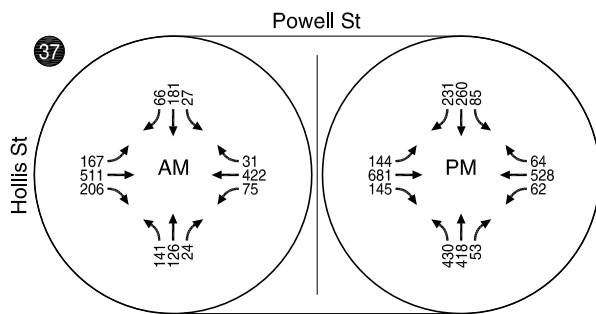
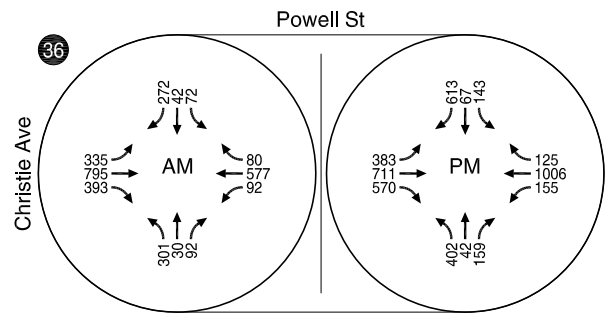
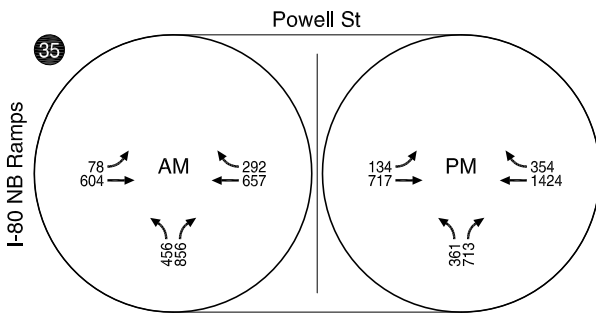
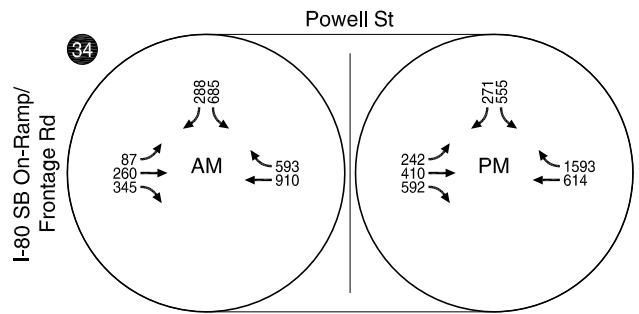
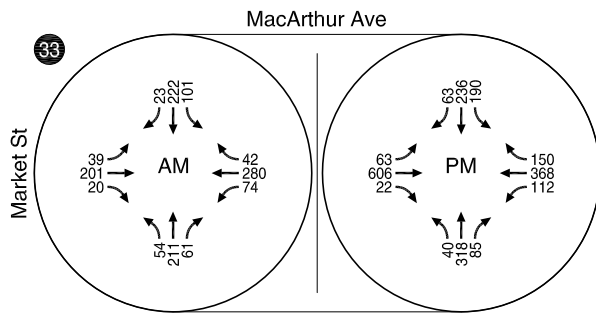
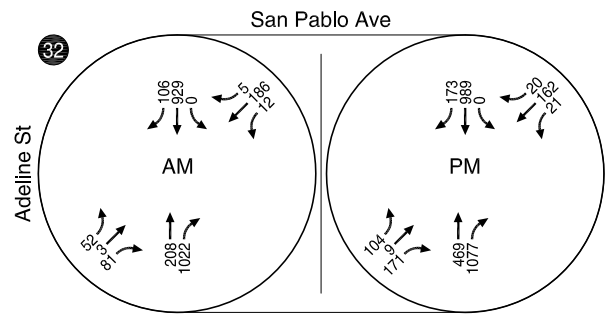
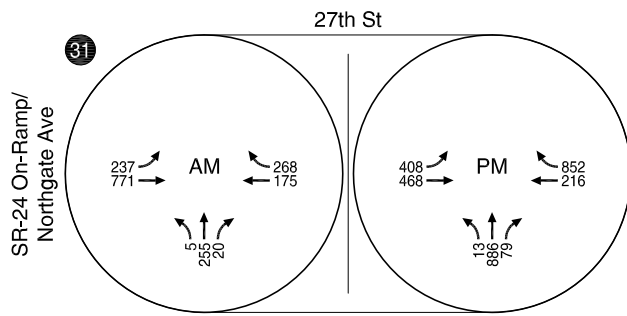
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2020 AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

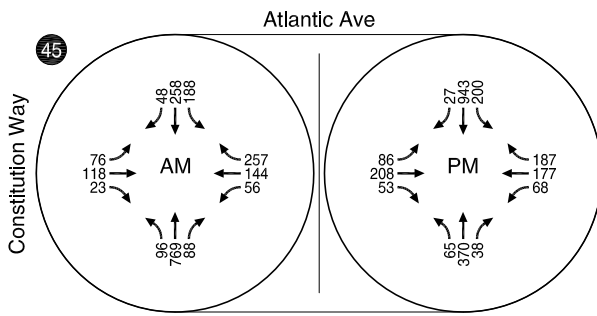
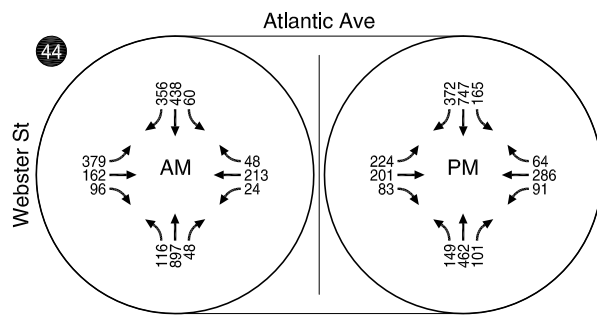
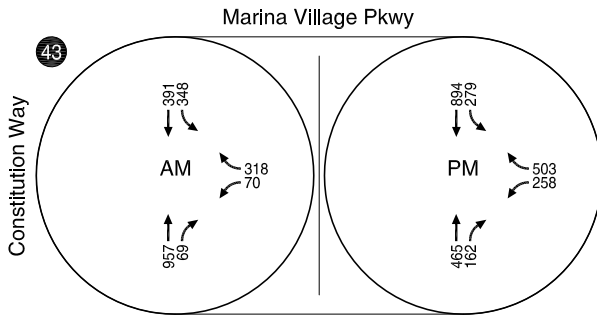
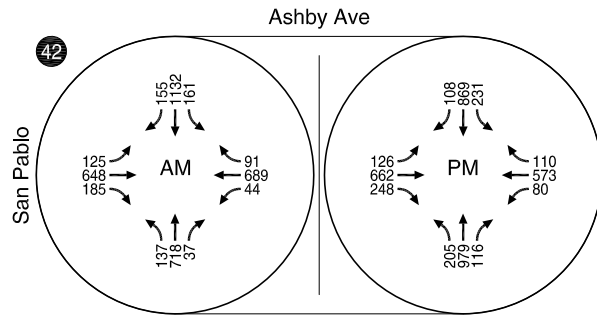
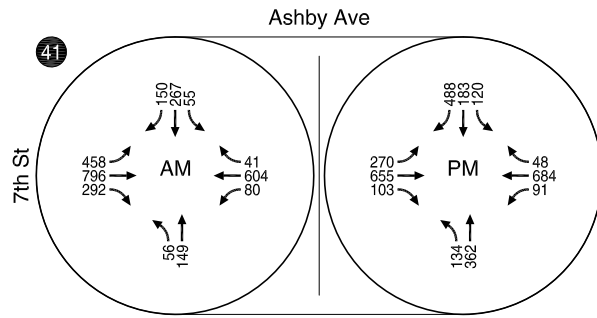
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2020 AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

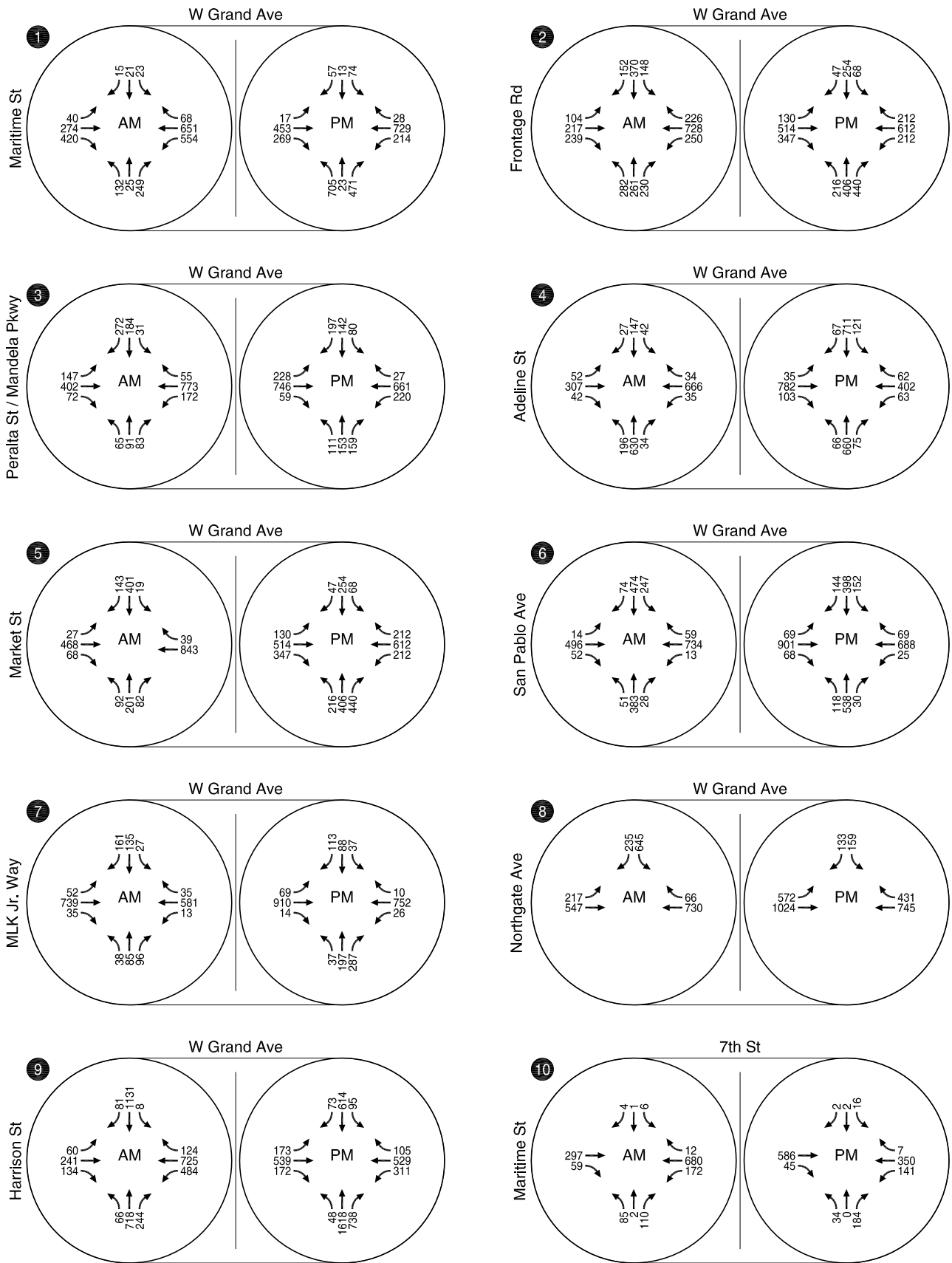
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**2020 AM AND PM VOLUMES
OAKLAND, CALIFORNIA**

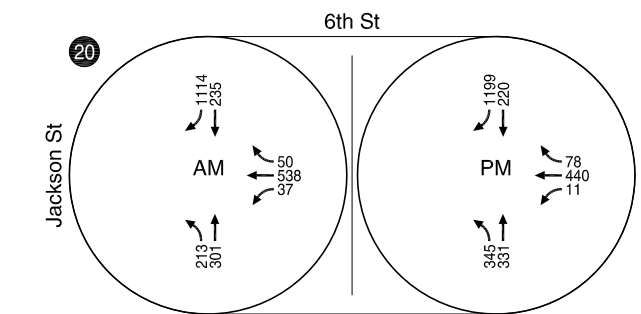
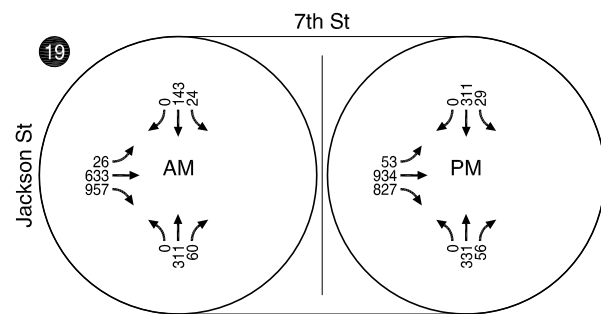
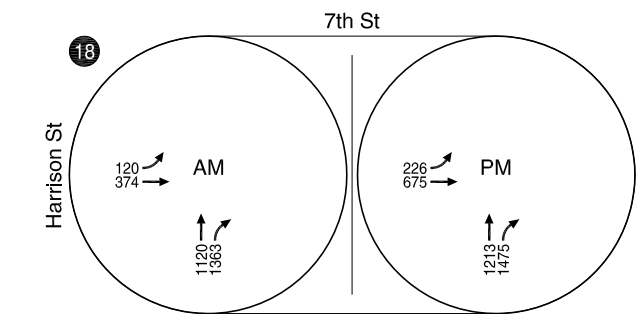
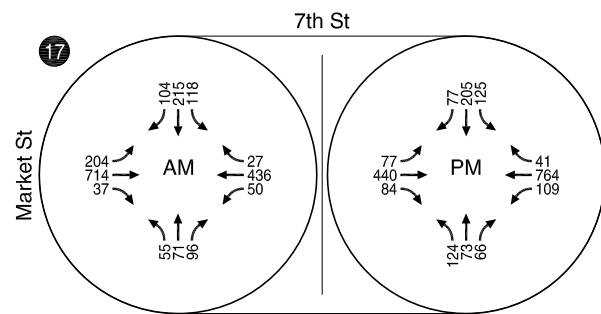
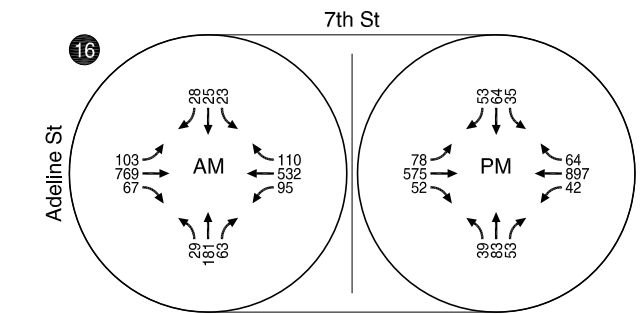
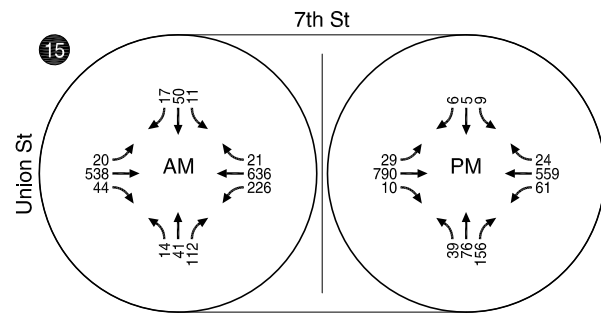
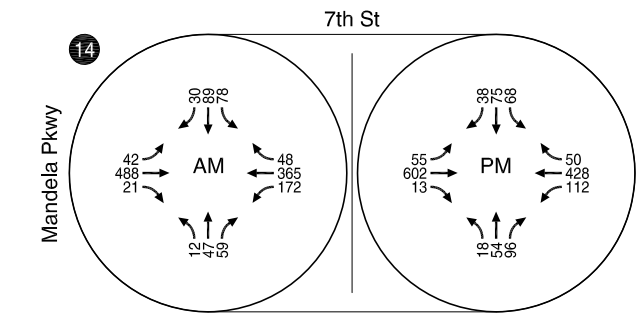
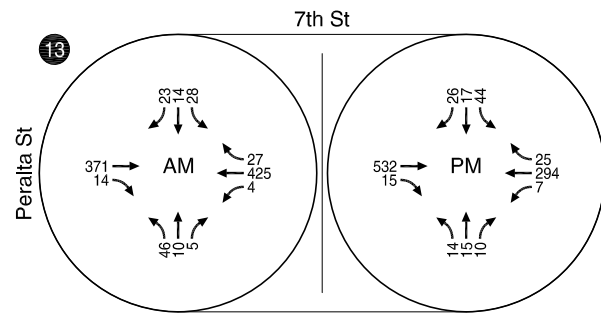
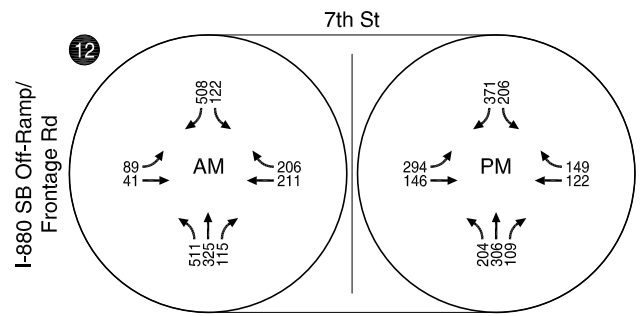
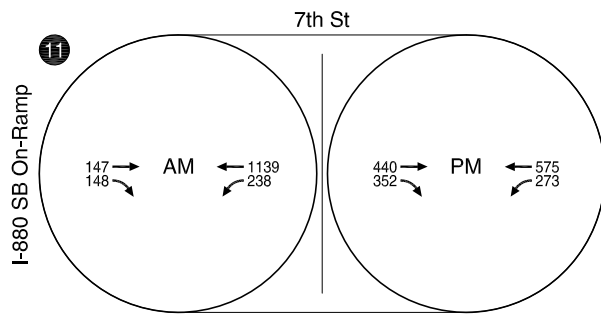
FIGURE



2020 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

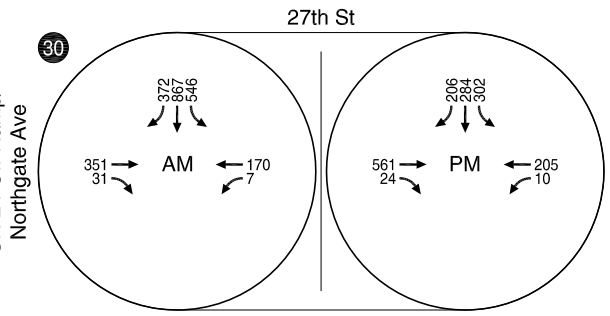
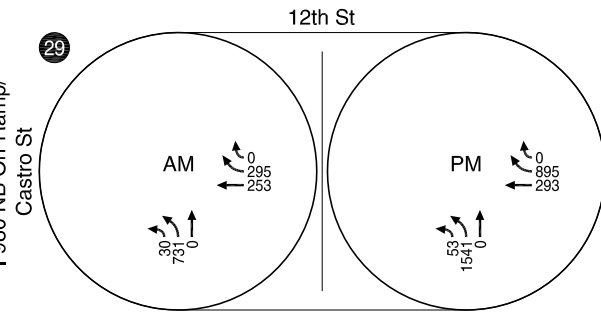
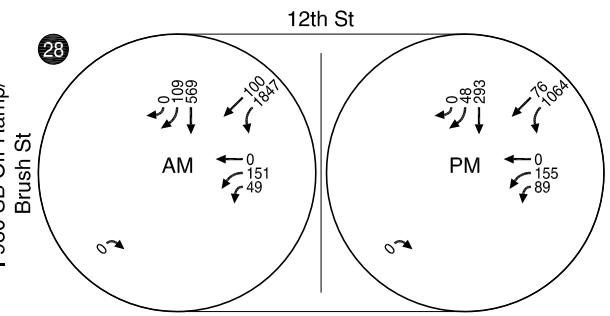
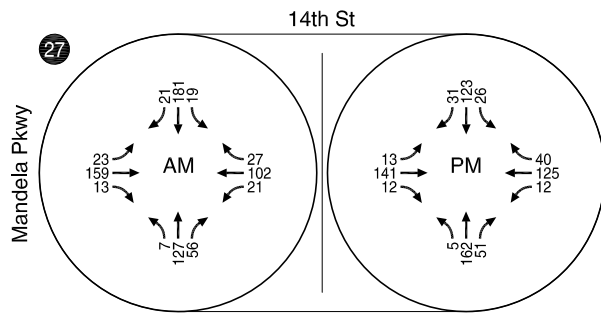
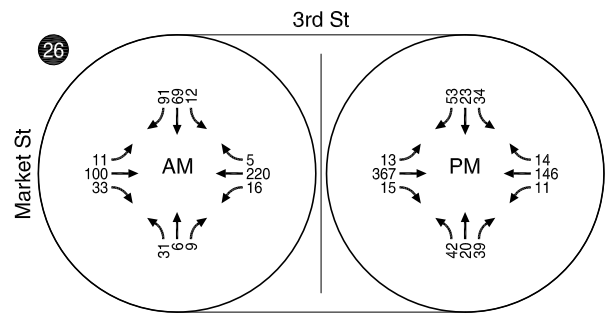
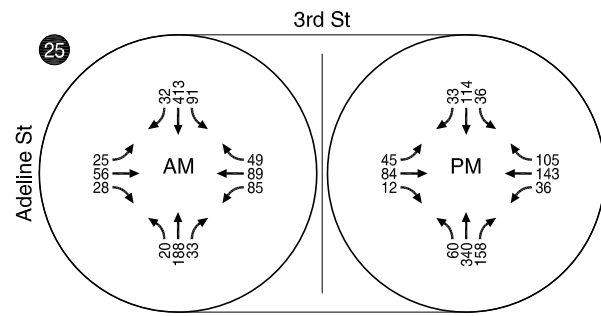
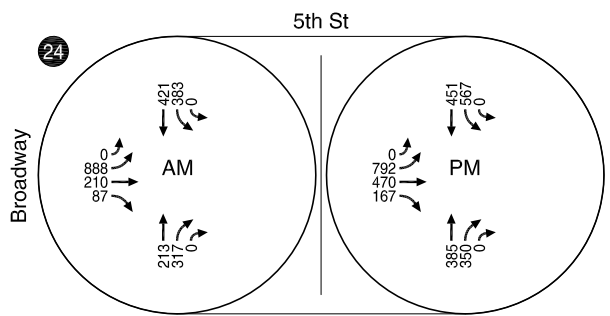
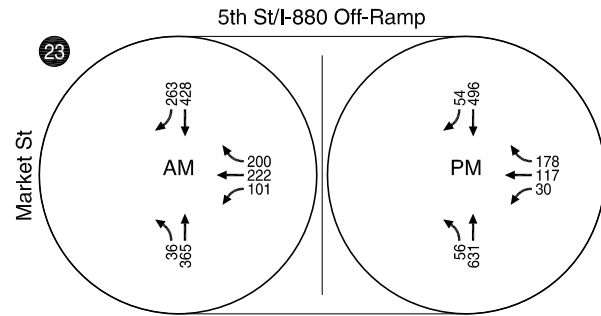
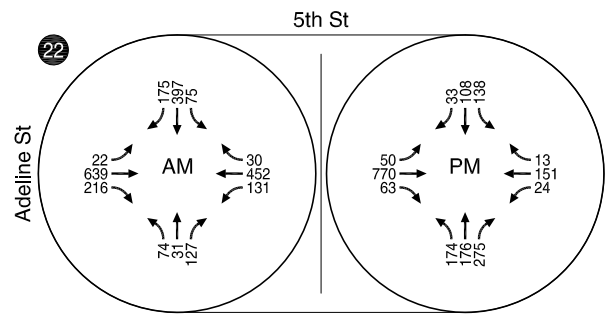
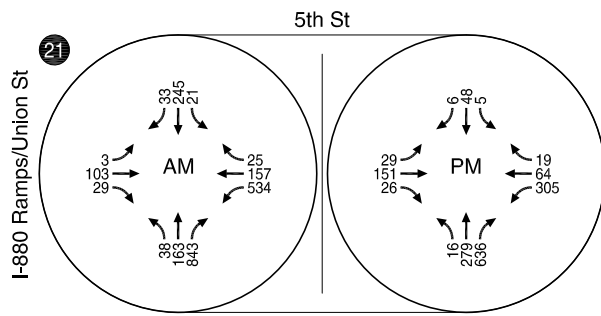
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2020 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

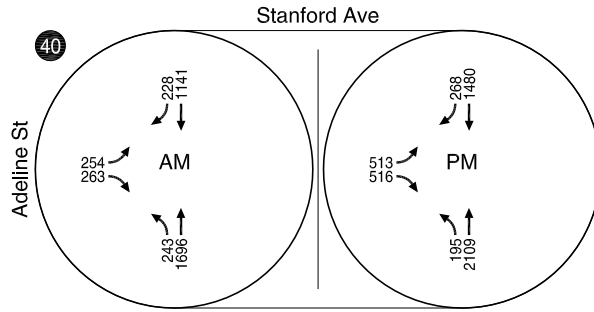
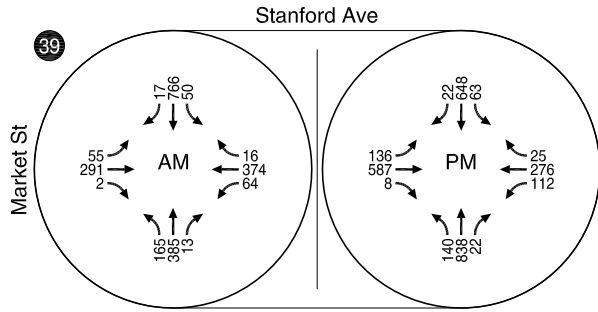
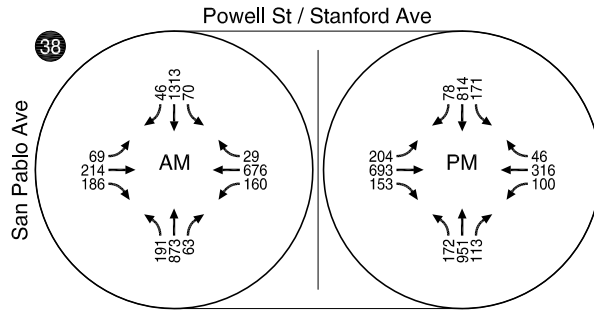
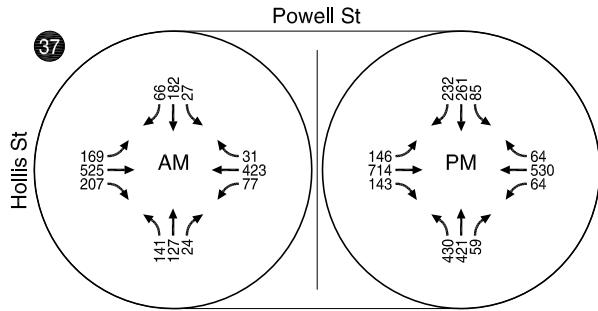
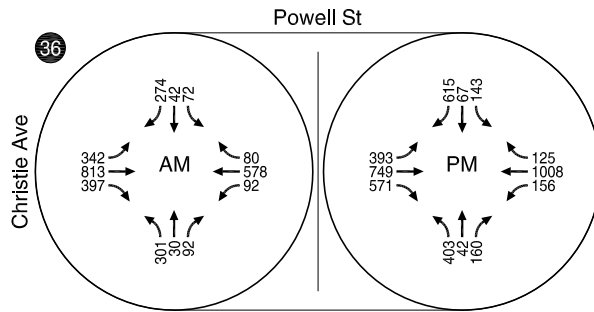
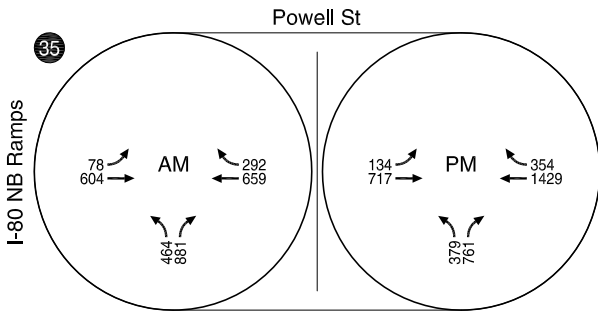
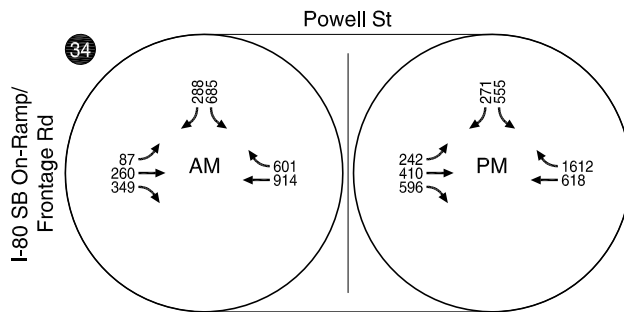
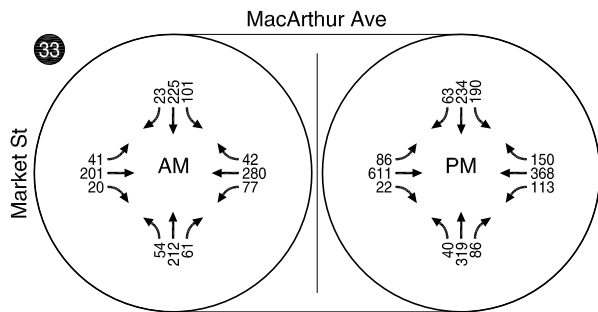
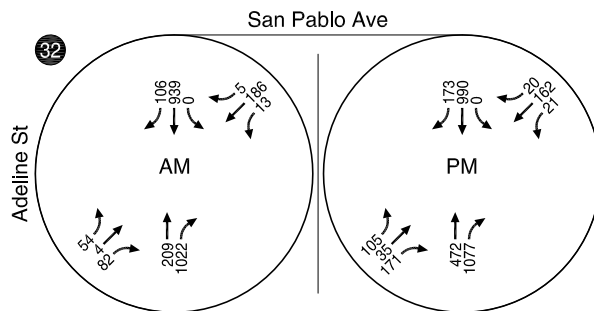
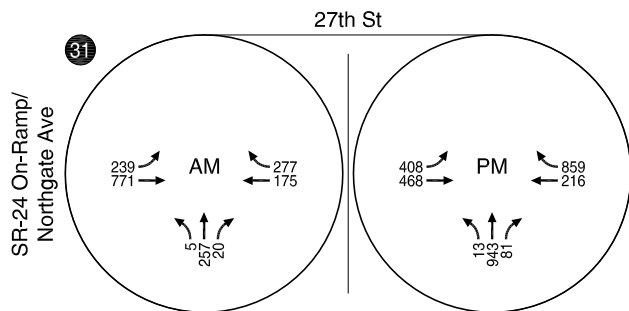
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2020 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

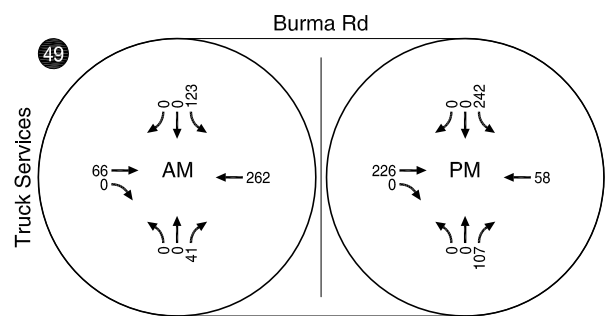
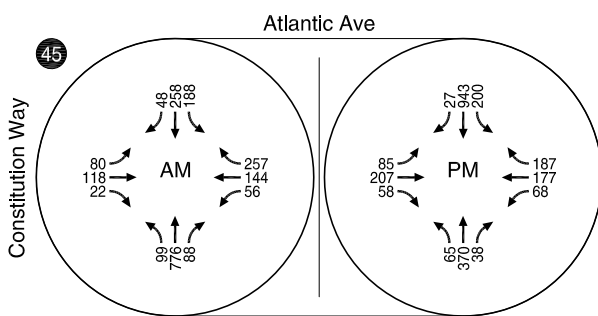
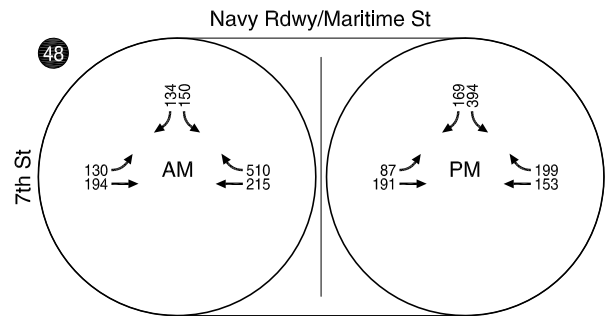
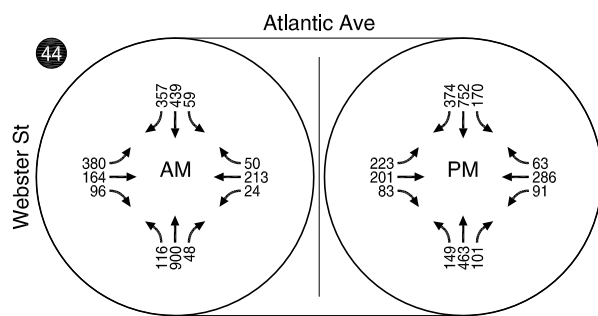
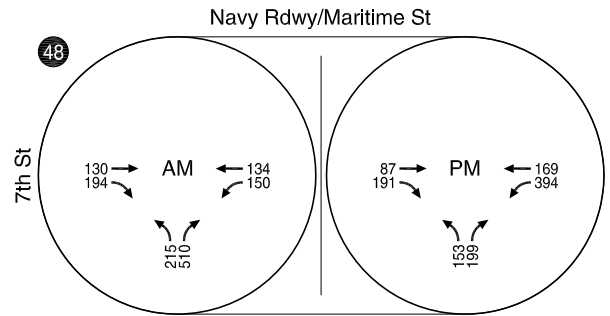
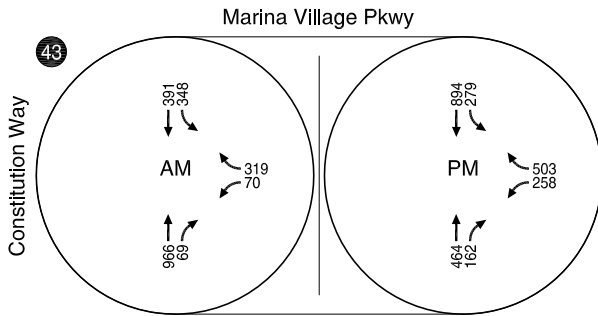
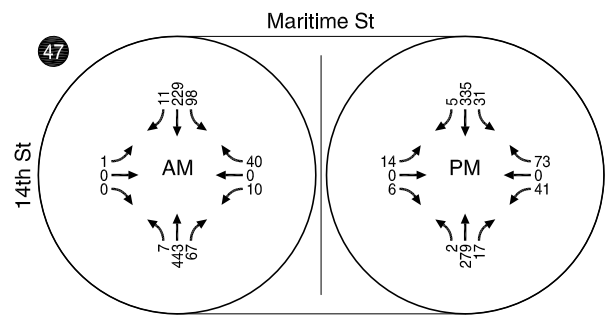
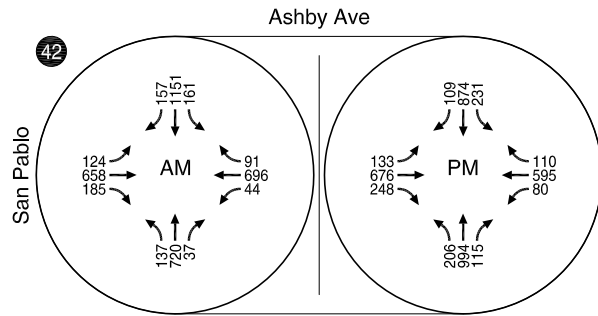
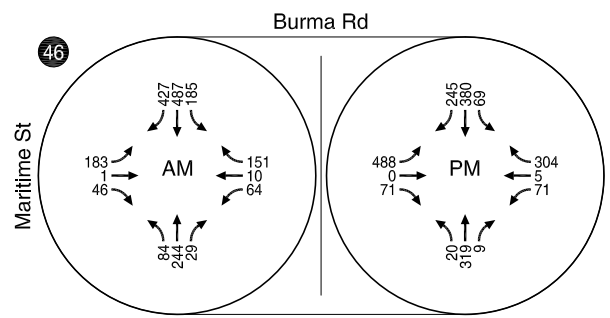
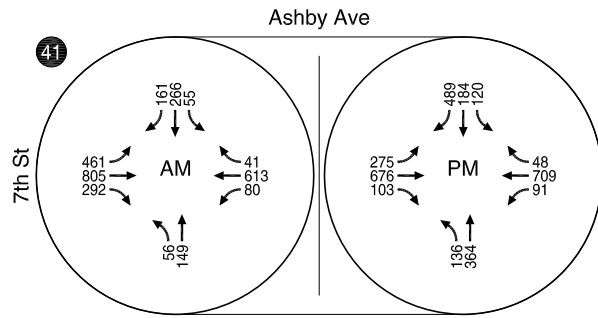
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2020 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

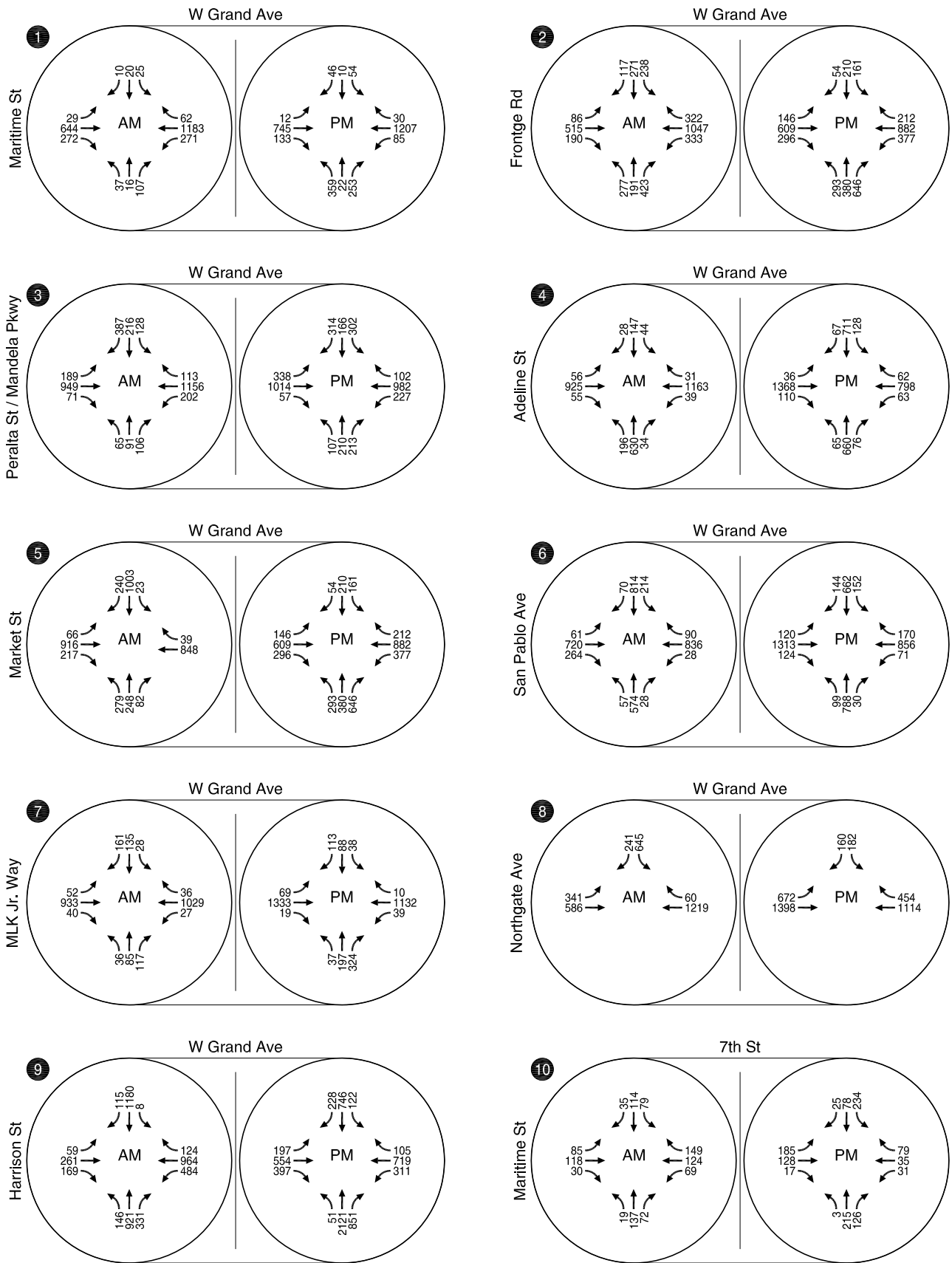
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2020 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

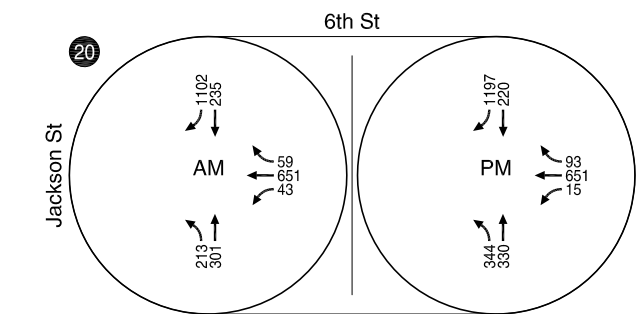
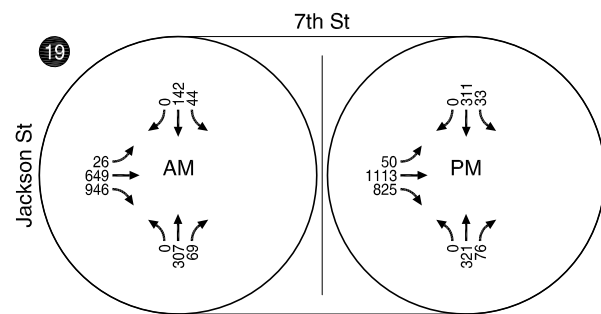
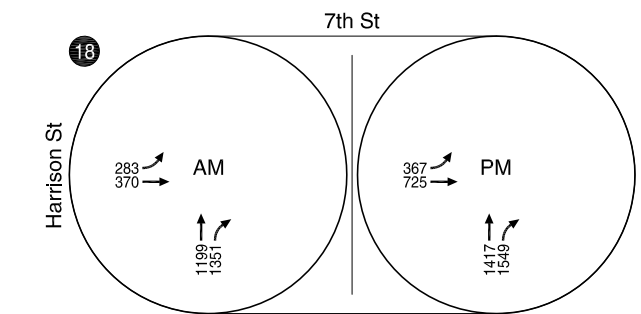
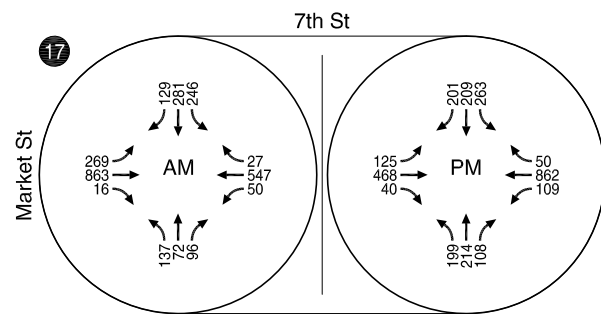
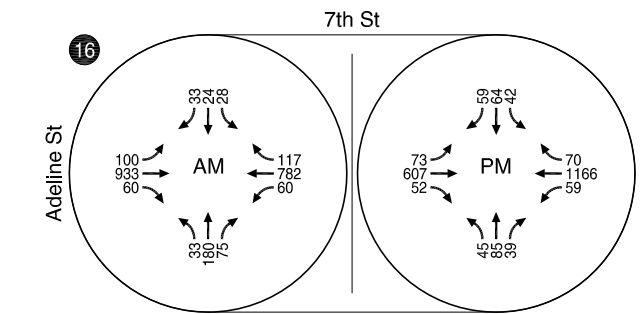
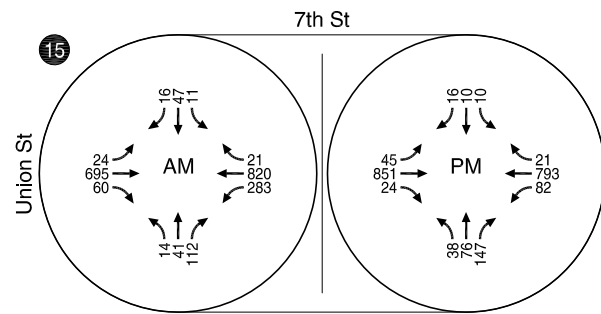
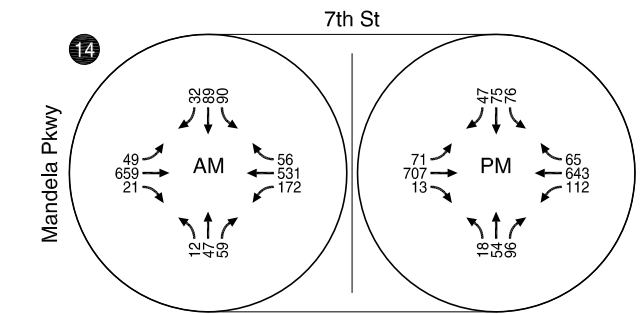
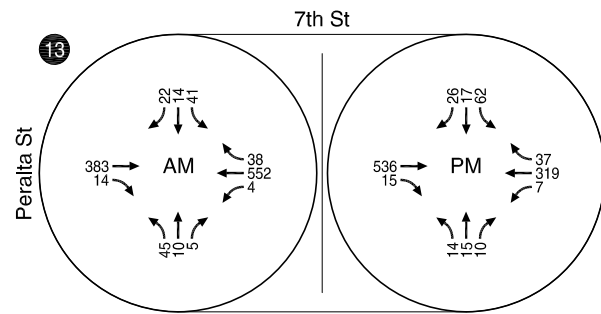
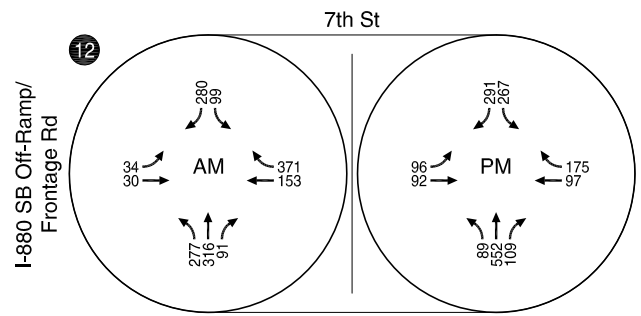
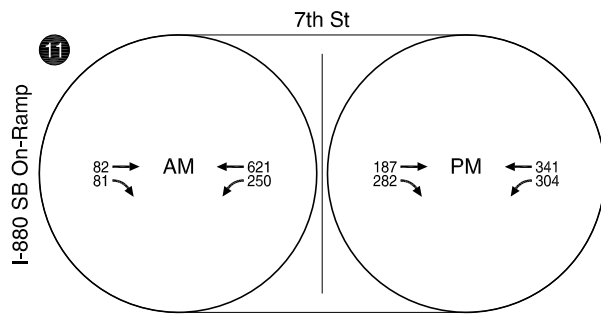
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**2035 AM & PM VOLUMES
OAKLAND, CALIFORNIA**

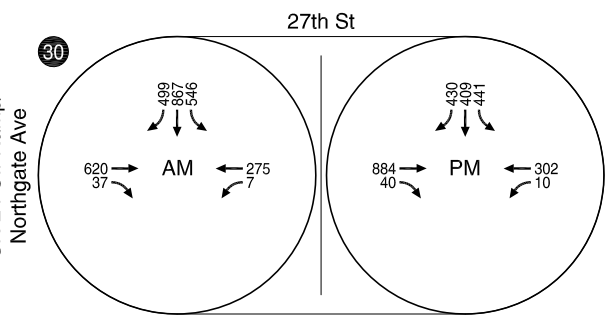
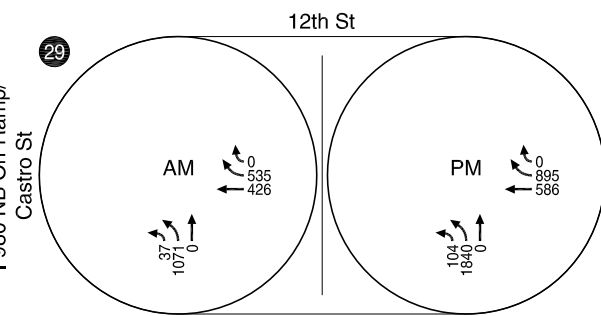
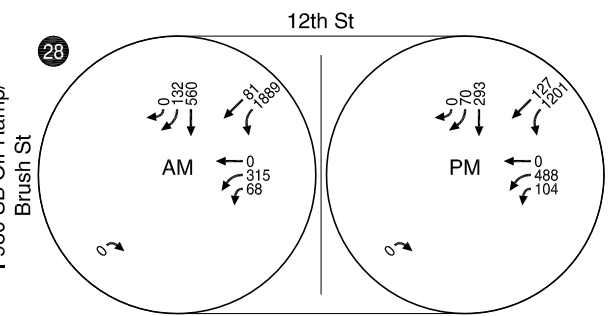
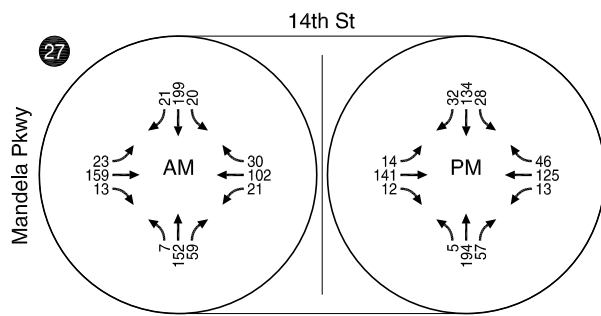
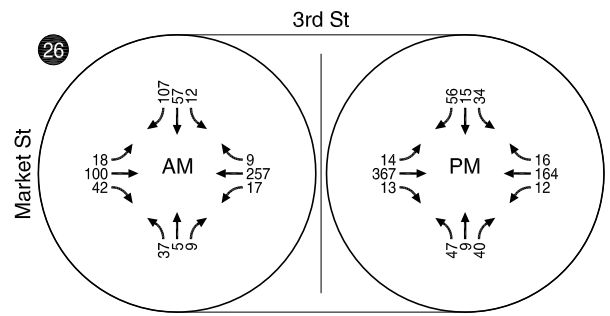
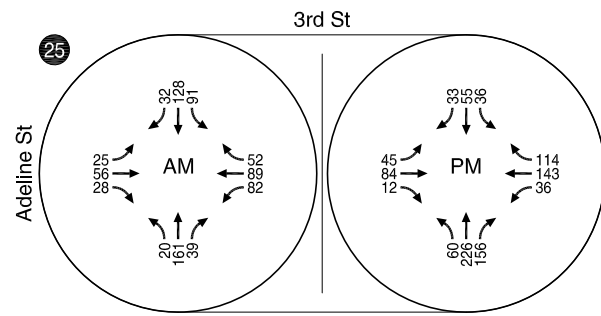
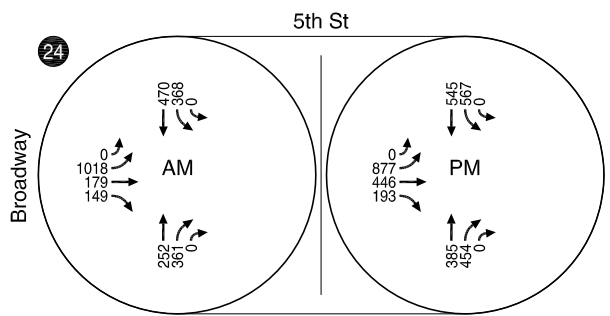
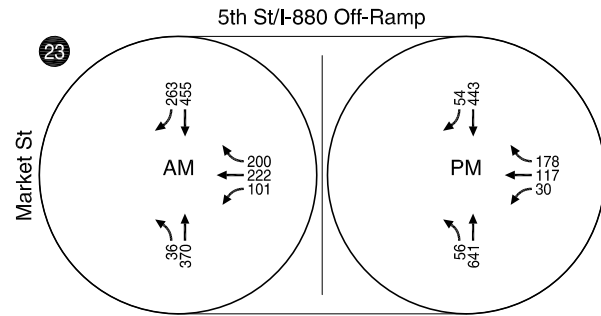
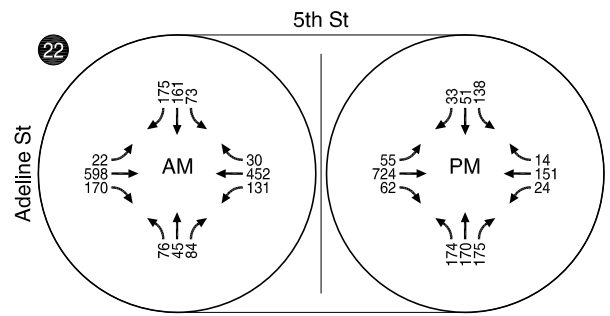
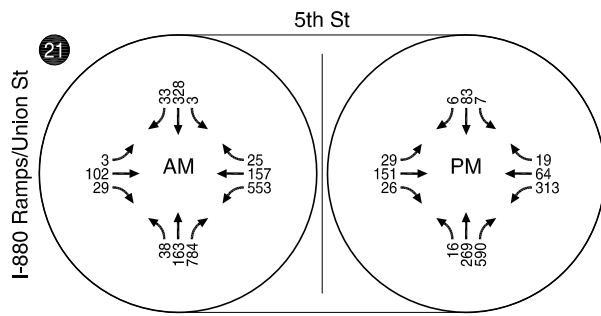
FIGURE



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**2035 AM AND PM VOLUMES
OAKLAND, CALIFORNIA**

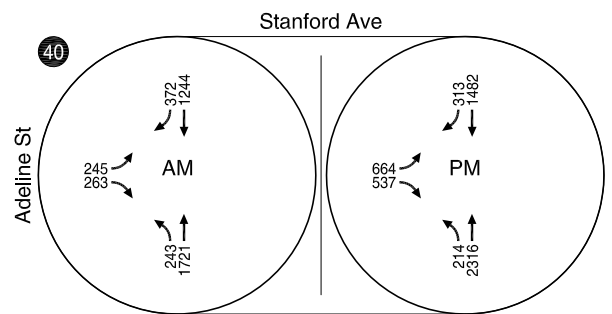
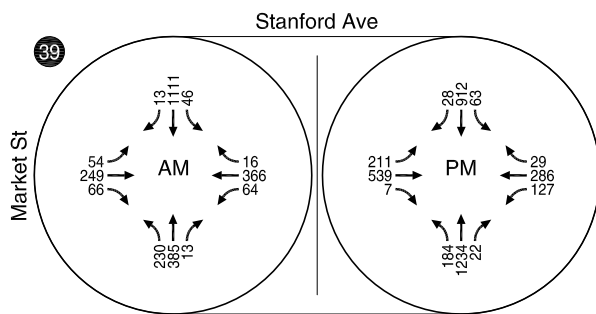
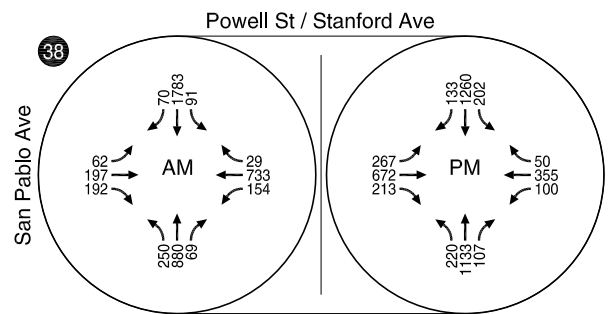
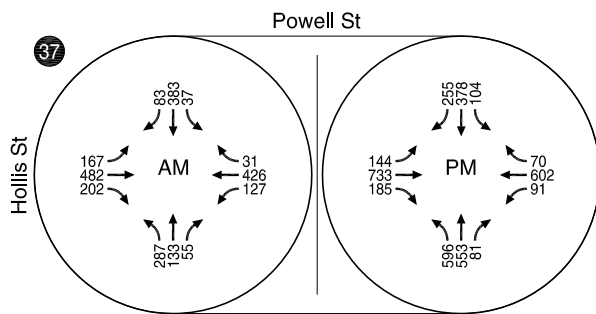
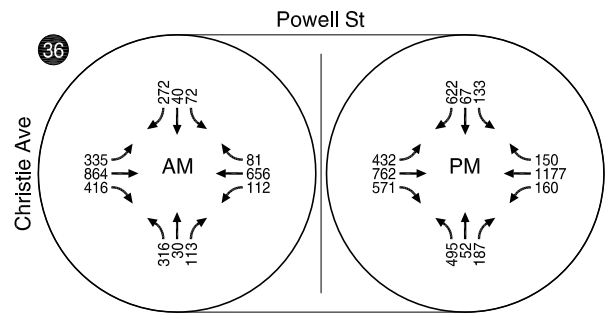
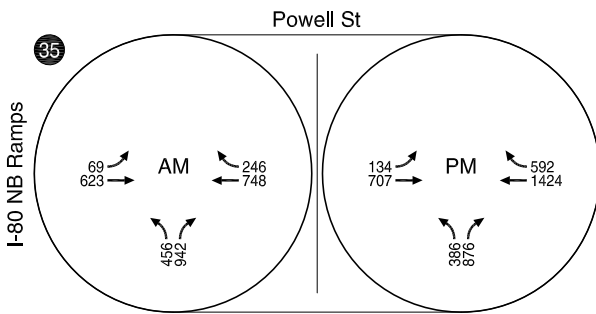
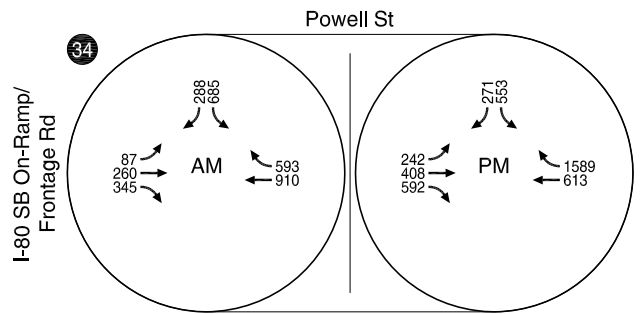
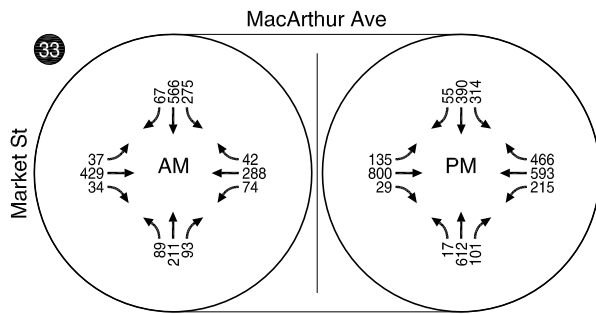
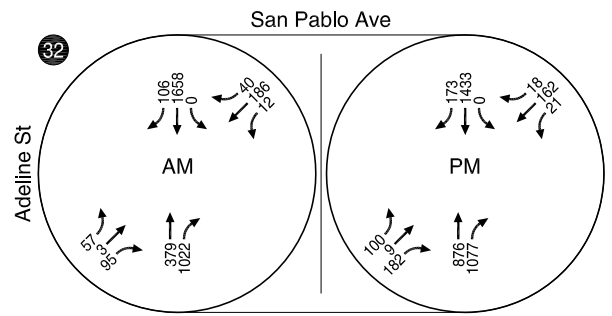
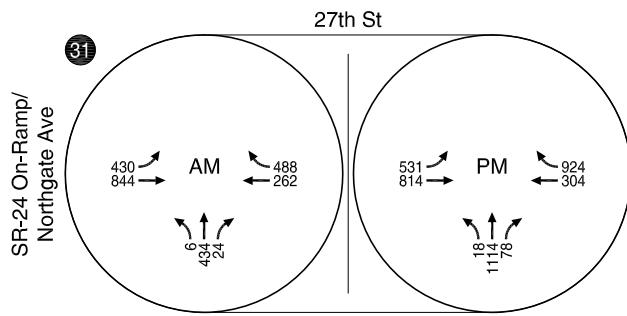
FIGURE



2035 AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

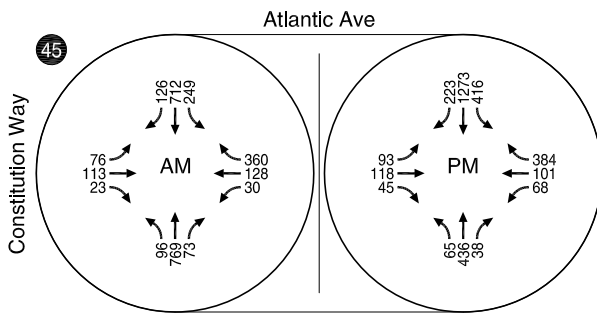
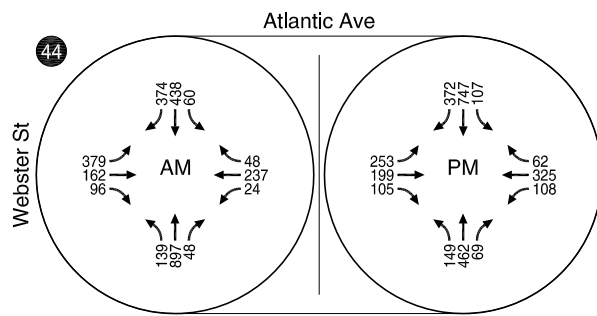
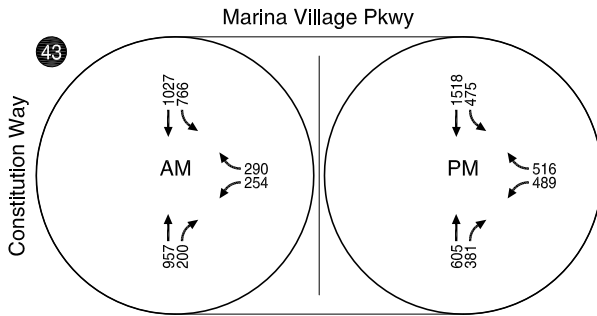
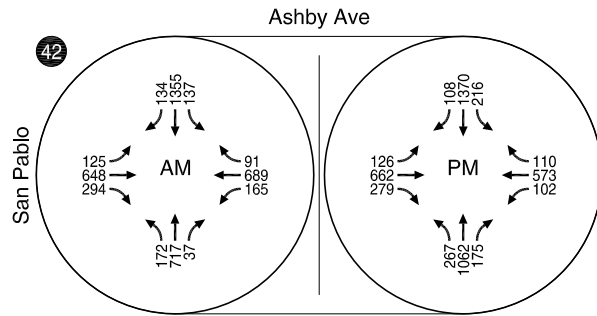
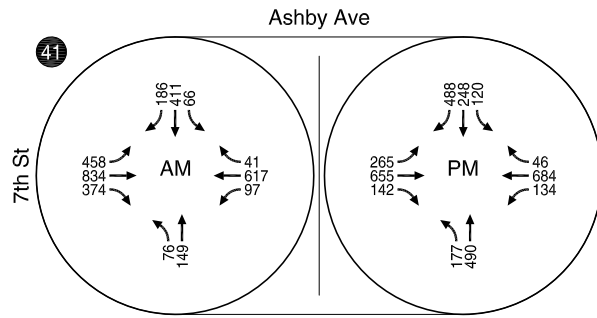
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**2035 AM AND PM VOLUMES
OAKLAND, CALIFORNIA**

FIGURE

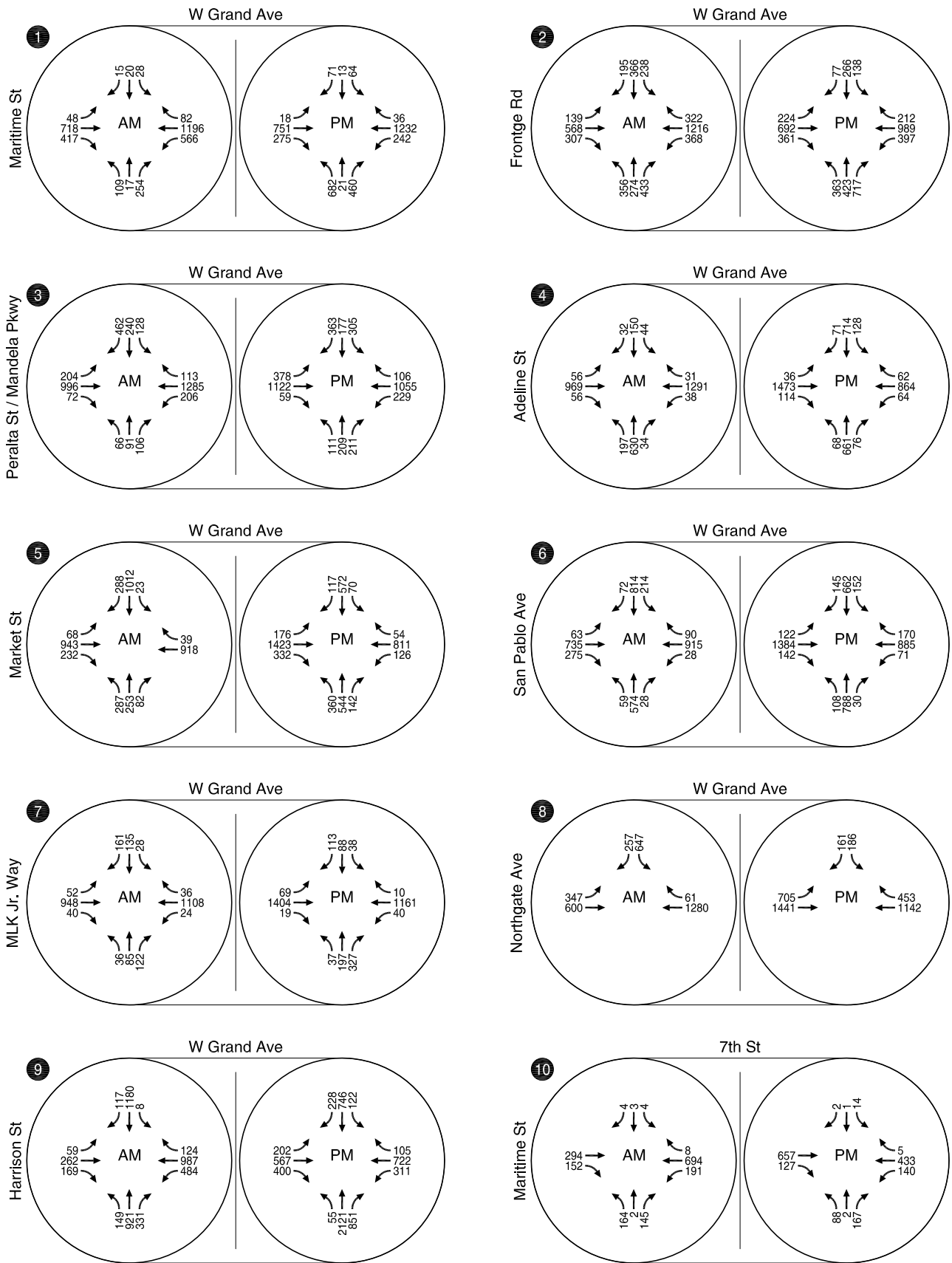
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**2035 AM AND PM VOLUMES
OAKLAND, CALIFORNIA**

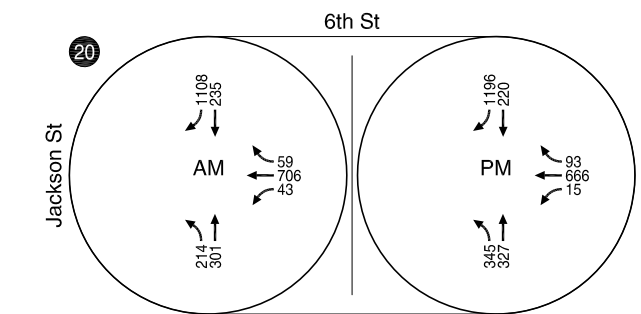
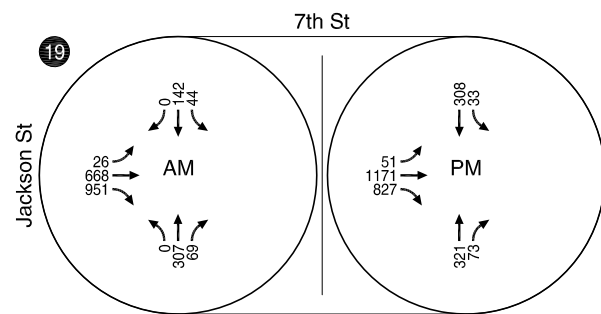
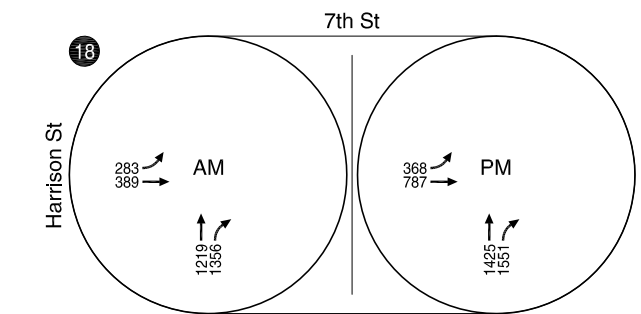
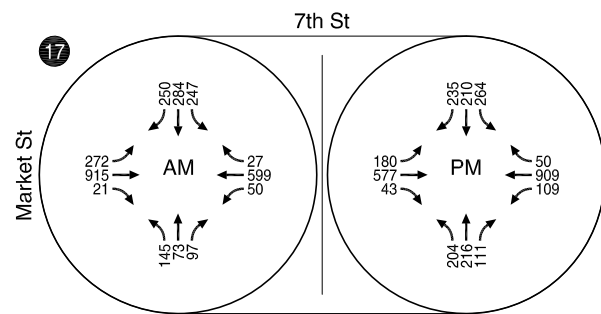
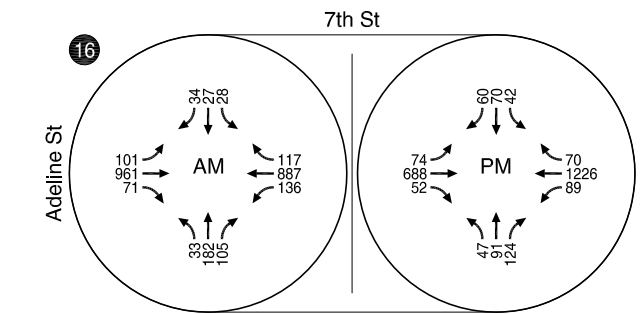
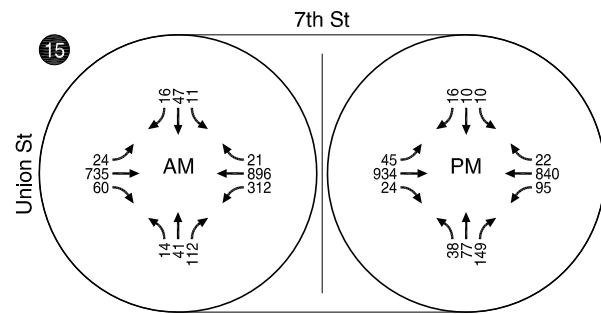
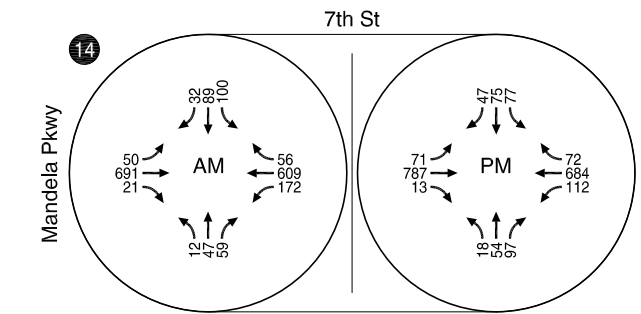
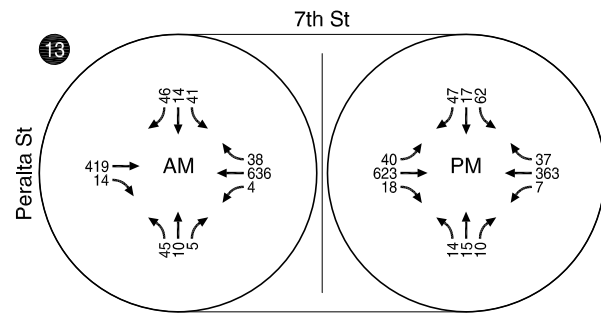
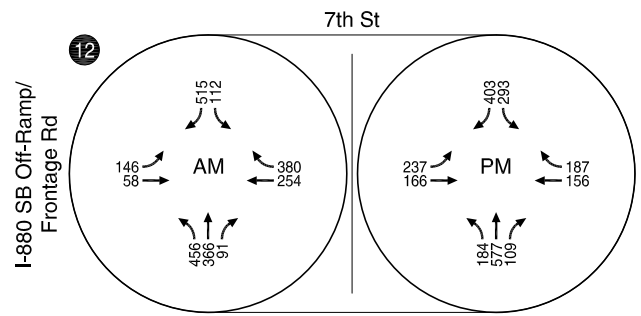
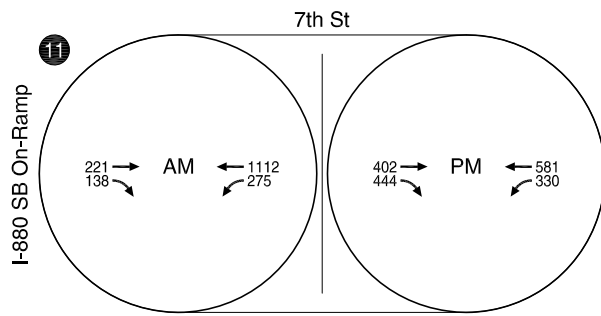
FIGURE



2035 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

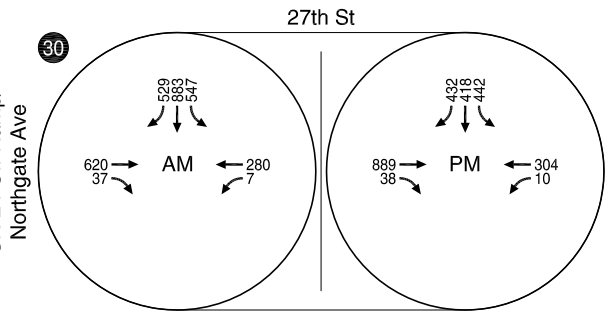
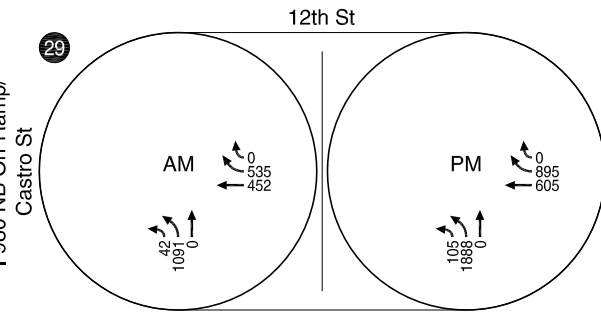
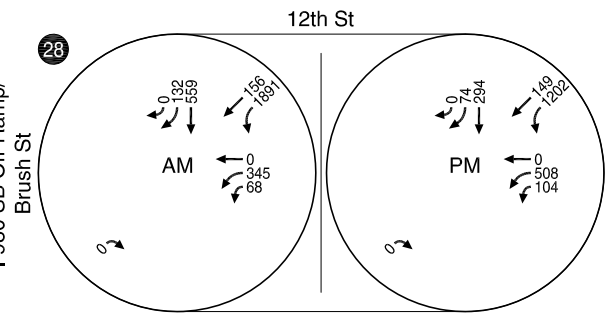
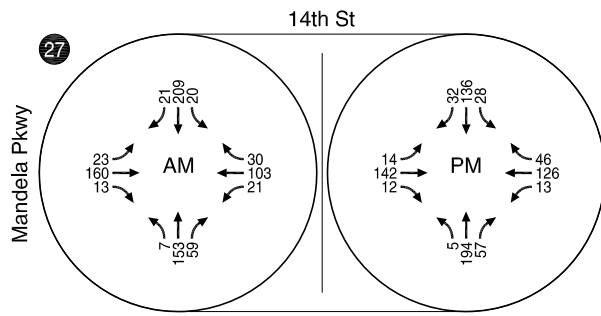
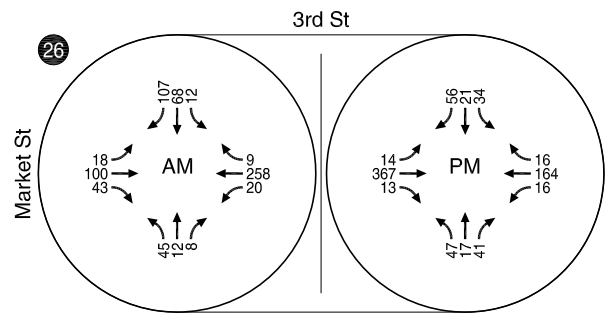
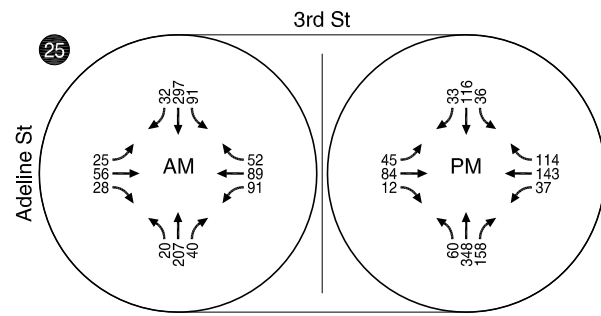
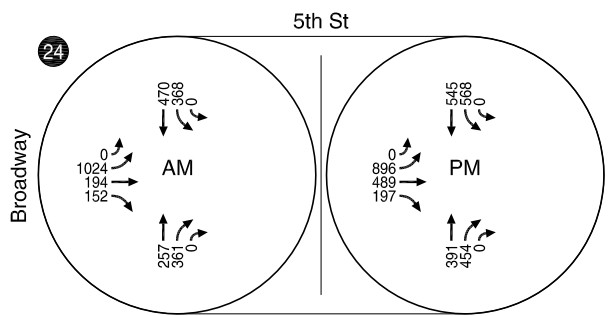
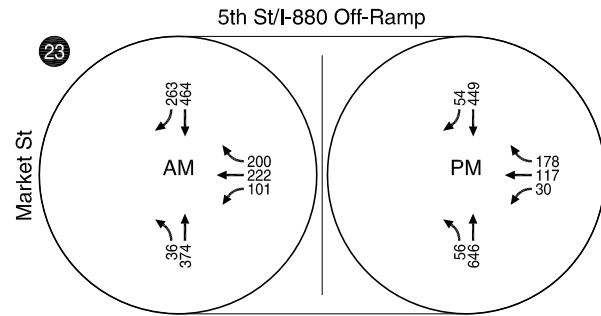
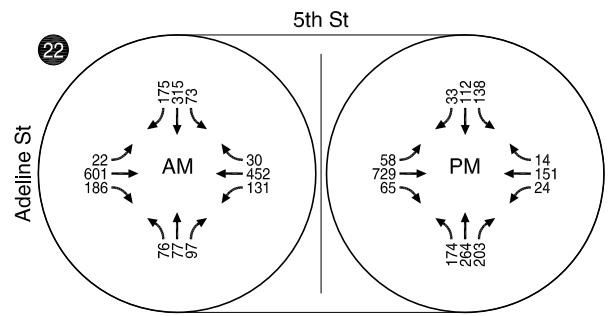
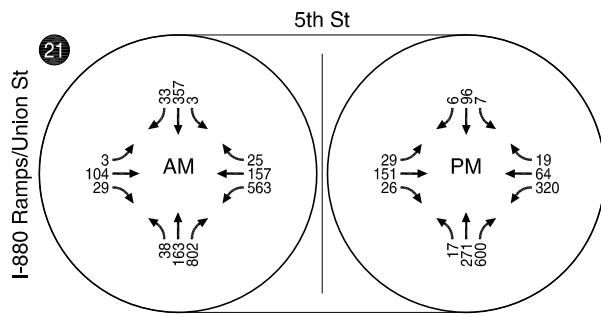
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2035 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

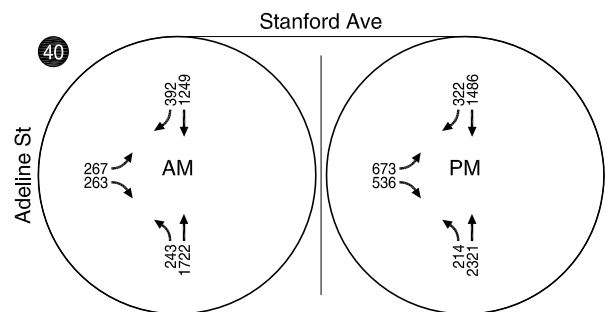
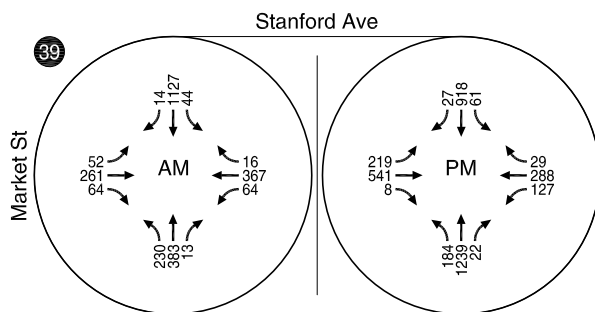
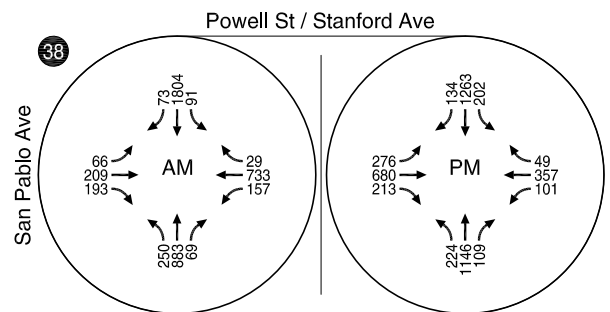
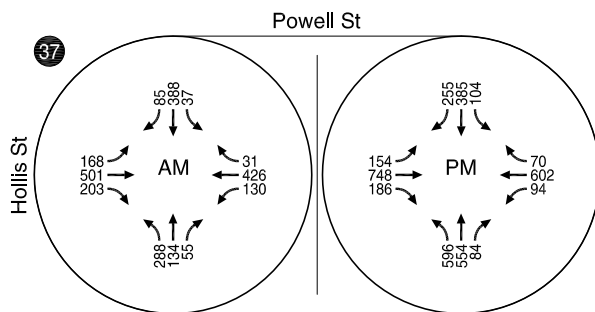
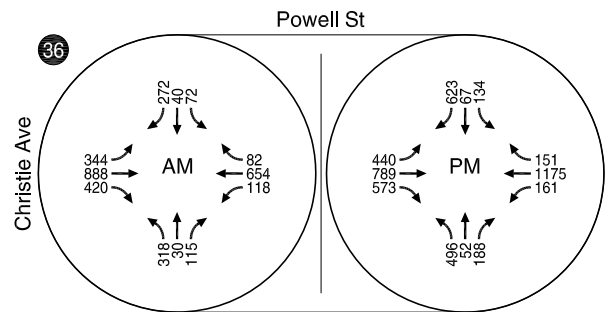
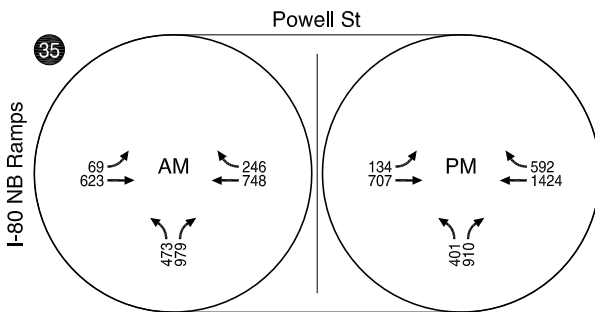
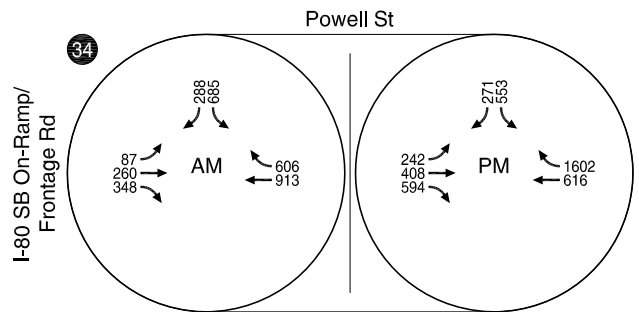
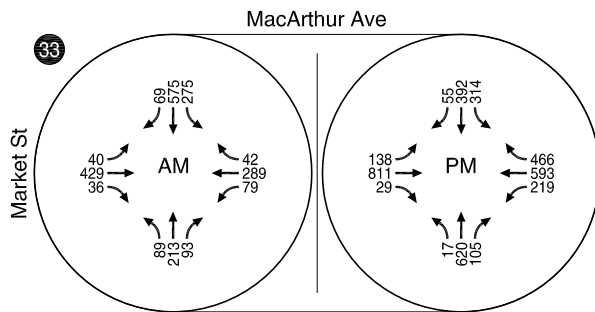
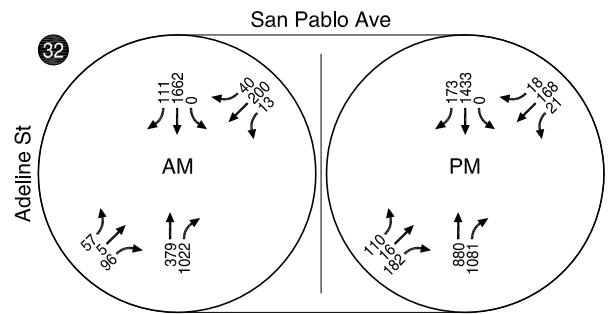
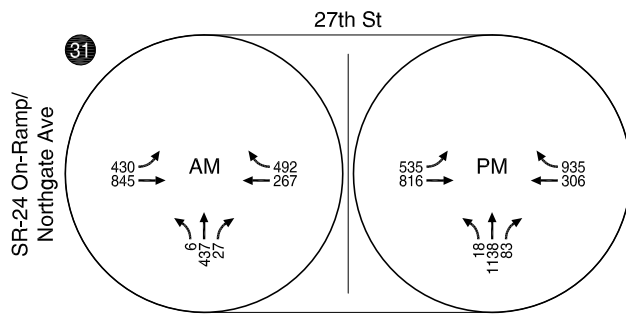
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2035 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

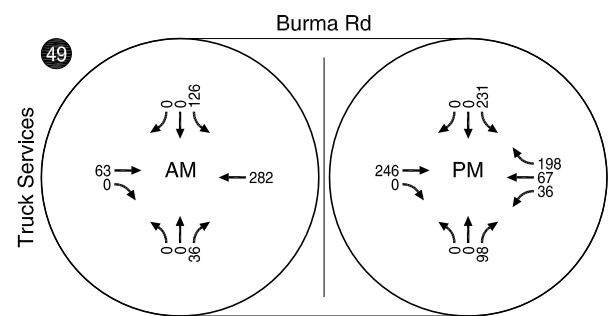
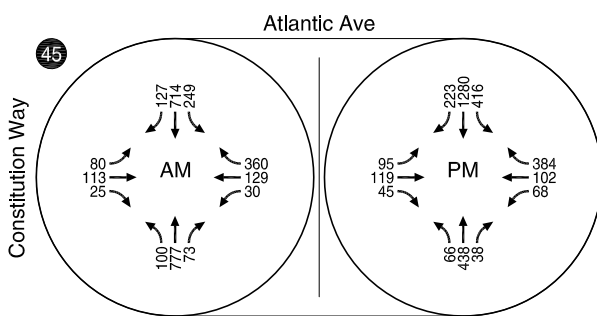
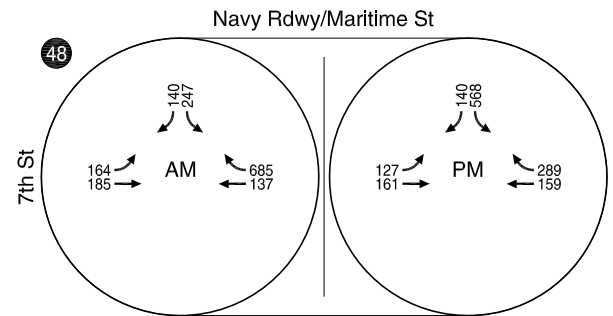
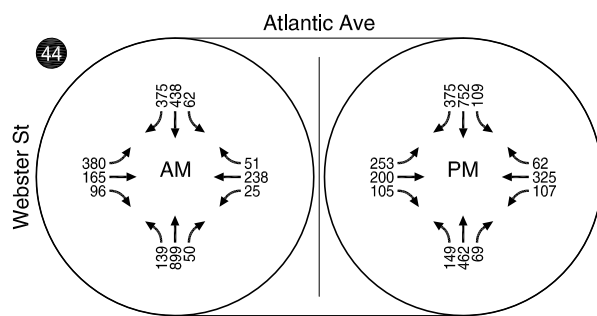
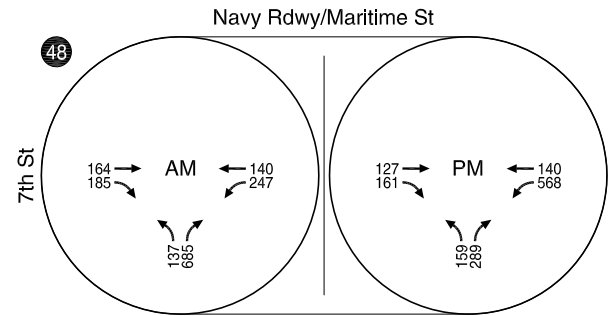
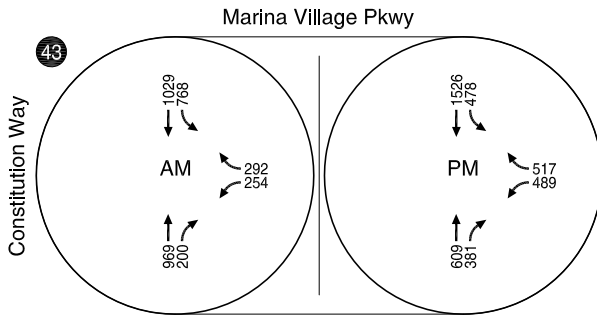
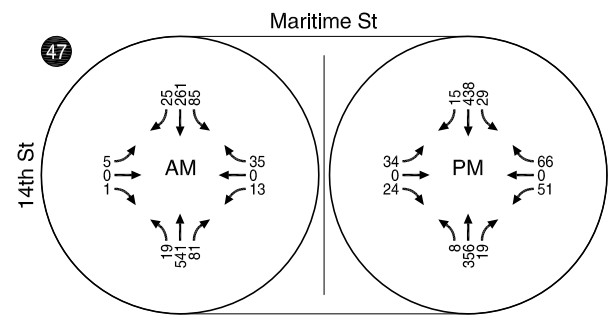
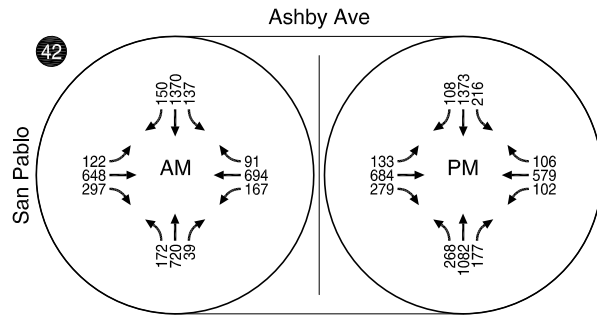
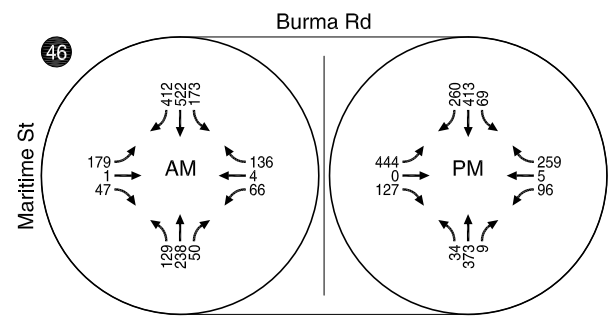
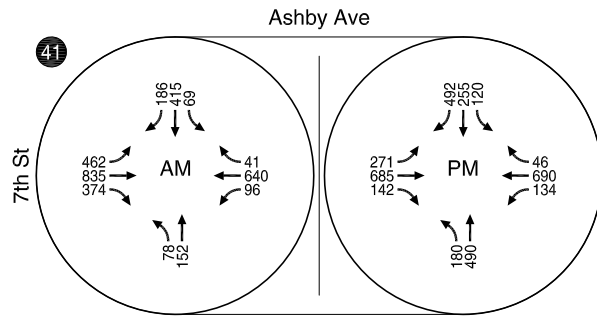
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2035 PLUS PROJECT AM AND PM VOLUMES
OAKLAND, CALIFORNIA

FIGURE

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2035 PLUS PROJECT AM AND PM VOLUMES OAKLAND, CALIFORNIA

FIGURE

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APPENDIX B - 3

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**Oakland Army Base EIR
Marine Terminal Acres**

2002 EIR

Terminal Area	Existing	Approved New	Total Approved	Planned	Total Proposed
Berths 57-58	0	248	248	67	315
Middle Harbor	79	0	79	42	121
7th St. Harbor	162	43	205	15	220
Outer Harbor	205	12	217	9	226
Berth 21	0	0	0	69	69
Subtotal	446	303	749	202	951
Inner Harbor Area	49	0	49	0	49
Total	495	303	798	202	1000

2011 Addendum: Area Near the Project

Terminal Area	Berth	Prior 2005	Existing 2011	2020	2035
Inner Harbor	SSA Terminals Berths 67, 68	53	53	53	53
	APL / Eagle Marine Services Berths 60, 61, 62, 63	80	80	120	120
	SSA Terminals Berths 57, 58, 59	150	150	150	150
	Hanjin / Total Terminals International Berths 55, 56	120	120	120	120
Outer Harbor	Evergreen Marine Berths 35, 37	73	73	73	73
	Berths 33, 34 Vacant	0	0	17	17
	Trapac Terminal Berths 30, 32	66	66	66	66
	Ports America Outer Harbor Terminals Berths 25, 26	44	44	44	44
	Ports America Outer Harbor Terminals Berths 20, 21, 22, 23, 24	166	166	204	204
Total	Total	752	752	847	847

The Port has two navigation channels, one along the southern boundary of the Port, and one along the northwestern boundary of the Port. The southern boundary is the Inner Harbor Channel, or the Oakland Estuary, and the northern boundary is the Outer Harbor Channel.

The Port's marine terminals were anticipated to expand as part of the 2002 EIR, the above table reflects anticipated Port marine terminal development. The proposed changes to 2020 and 2035 are not within the proposed project limits.

The APL Terminal is anticipated to grow to 120 acres through absorption of the adjacent Roundhouse site. The Ports America terminal is anticipated to increase by 38 acres due to the new berth 21 development. The vacant Berths 33-34 site is anticipated to be operational in 2020.

**Oakland Army Base EIR
Working Track Feet**

2002 EIR

Railyard	Existing	Approved New	Total Approved	Planned	Total Proposed
Approved J.I.T.	0	31,700	31,700	-31,700	0
Proposed J.I.T.	0	0	0	28,700	28,700
J.I.T. Net	0	31,700	31,700	-3,000	28,700
W. Oakland Yard	22,250	0	22,250	0	22,250
Total	22,250	31,700	53,950	-3,000	50,950

Proposed Project Plan

Railyard	Prior 2005	Existing 2011	2020	2035
OGTIC	0	0	23,610	23,610
OIG	13,000	15,300	15,300	15,300
UP Terminal	22,200	22,200	22,200	22,200
Total	35,200	37,500	61,110	61,110

* Warehouses will also include railroad tracks, but those tracks are not included in the above numbers, as these will be considered as part of the warehouse development.

* 2020 and 2035 projections for OGTIC railyard based on 6/28 email from James Kachelmeyer (CCG)

* The 2002 DEIR showed 31,700 working track feet as previously approved for the JIT. That amount of working track for the JIT (OIG) currently is not reasonably foreseeable.

**Oakland Army Base EIR
Marine & Rail Operating Assumptions**

2002 EIR

Factors	Marine	Rail
Weeks of operation per year	52	52
Days of operation per week	5	7
Peak Week / Average Week	1.25	1.19
Peak Weekday/Avg. Day of Week	1	1.33
Gate Moves / Lift	1.33	1.52
Truck Trips / Gate Move - Total	Varies	1.6
Over-the-Road	1.65	
Intermodal	1.9	
Composite Factor	1.21%	1.06%

Proposed Project Plan

Factors	Marine
Weeks of operation per year	52
Days of operation per week	5
Peak Week / Average Week	1.25
Peak Weekday/Avg. Day of Week	1
Gate Moves / Lift	1
Truck Trips / Gate Move - Total	Varies
Over-the-Road	1.65
Intermodal	1.9
Composite Factor	0.91%

**Oakland Army Base EIR
Intermodal Percentage of Total Containers**

2002 EIR

Terminal Area	Project Scenario	
	Total Approved	Total Proposed
All Marine Terminals	49.0%	49.0%

Proposed Project Plan

Terminal Area	Prior 2005	Existing 2011	2020	2035
No Project	34%	21%	27%	30%
Project			27%	40%

Intermodal cargo may include a combination of long-haul rail intermodal, short-haul rail intermodal, and barged cargo along a marine highway service to Stockton and Sacramento.

**Oakland Army Base EIR
Marine Traffic - Annual Lifts (Containers)**

2002 EIR

Zone / Terminal	Project Scenario	
	Total Approved	Total Proposed
1 & 2 Berths 57-58	635,245	723,975
3 Middle Harbor	202,356	278,098
4 7th St. Harbor	525,102	505,633
5 Outer Harbor	555,840	519,423
6 Berth 21	0	158,585
Total	1,918,543	2,185,714

Intermodal Percentage of Total Containers

Zone / Terminal	Project Scenario	
	Total Approved	Total Proposed
All Marine Terminals	49.0%	49.0%

Weekday Truck Trips - Over-the-Road

Zone / Terminal	Project Scenario	
	Total Approved	Total Proposed
1 & 2 Berths 57-58	3,418	3,896
3 Middle Harbor	1,089	1,496
4 7th St. Harbor	2,825	2,721
5 Outer Harbor	2,991	2,795
6 Berth 21	0	853
Total	10,323	11,761

Weekday Truck Trips - Intermodal

Zone / Terminal	Project Scenario	
	Total	Total
1 & 2 Berths 57-58	3,782	4,310
3 Middle Harbor	1,205	1,656
4 7th St. Harbor	3,126	3,010
5 Outer Harbor	3,309	3,092
6 Berth 21	0	944
Total	11,421	13,012

Weekday Truck Trips - Total

Zone / Terminal	Project Scenario	
	Total	Total
1 & 2 Berths 57-58	7,200	8,205
3 Middle Harbor	2,293	3,152
4 7th St. Harbor	5,951	5,731
5 Outer Harbor	6,300	5,887
6 Berth 21	0	1,797
Total	21,744	24,772

Proposed Project Plan (Annual Lift Capacity)

Terminal Area	2005 Actual	FY2011 Actual	2020	2035
Berths 67-68	105,058	81,060	112,012	140,841
Berths 60-63	130,434	132,298	253,612	318,885
Berths 57-59	404,697	393,546	317,015	398,606
Berths 55-56	156,064	252,455	253,612	318,885
Berths 35-37	163,631	134,102	154,281	193,988
Berths 33-34	0	0	35,928	45,175
Berths 30-32	107,966	141,583	138,853	174,590
Berths 25-26	62,636	60,637	92,991	116,925
Berths 20-24	160,313	150,241	431,141	542,105
Annual Lifts (Containers)	1,290,799	1,345,922	1,789,444	2,250,000
Annual Lifts (TEU)	2,273,990	2,342,504	3,221,000	4,050,000
TEU/Container	1.762	1.740	1.800	1.800

No Project

Annual Lifts (Containers)	1,290,799	1,345,922	1,789,444	2,250,000
Annual Lifts (TEU)	2,273,990	2,342,504	3,221,000	4,050,000

**Oakland Army Base EIR
Rail Traffic Capacity**

2002 DEIR

Annual Lifts - Sustainable

Zone / Terminal	Project Scenario	
	Total Approved	Total Proposed
J.I.T.	865,000	780,000
8 W. Oakland Yard	395,000	395,000
Total	1,260,000	1,175,000

Annual Lifts - Constrained

Zone / Terminal	Project Scenario	
	Total Approved	Total Proposed
J.I.T.	1,038,000	936,000
8 W. Oakland Yard	474,000	474,000
Total	1,512,000	1,410,000

Annual Lifts - Gridlocked

Zone / Terminal	Project Scenario	
	Total Approved	Total Proposed
J.I.T.	1,245,600	1,123,200
8 W. Oakland Yard	568,800	568,800
Total	1,814,400	1,692,000

2011 Oakland Army Base Plan

Annual Lifts - Sustainable

Terminal	Time Period			
	2005	2011 Current	2020 Proposed	2035 Proposed
OGTIC	0	0	330,000	330,000
OIG	210,000	210,000	210,000	210,000
UP Terminal	340,000	340,000	340,000	340,000
Total	550,000	550,000	880,000	880,000

Annual Lifts - Constrained

Terminal	Time Period			
	2005	2011 Current	2020 Proposed	2035 Proposed
OGTIC	0	0	400,000	400,000
OIG	250,000	250,000	250,000	250,000
UP Terminal	410,000	410,000	410,000	410,000
Total	660,000	660,000	1,060,000	1,060,000

Annual Lifts - Gridlocked

Terminal	Time Period			
	2005	2011 Current	2020 Proposed	2035 Proposed
OGTIC	0	0	480,000	480,000
OIG	300,000	300,000	300,000	300,000
UP Terminal	490,000	490,000	490,000	490,000
Total	790,000	790,000	1,270,000	1,270,000

* Rail traffic serving warehouses will also generate Port traffic, but are not included in the above numbers, as these will be considered as part of the warehouse development.

* OGTIC railyard constrained data per email from James Kachelmeyer (CCG) on June 28, 2011

* Sustainable is 20% less than constrained, gridlocked is 20% more than constrained.

**Oakland Army Base EIR
Traffic at the Port of Oakland**

**Proposed Project Plan
Annual Lifts - Marine Terminals**

Scenario	Marine Terminal Container Throughput							
	Total Demand	Intermodal				Other (over the-road)	Total Constrained Throughput	Excess Intermodal Container Demand
		Unconstrained		Constrained ⁽¹⁾				
		Percent	Number	Percent	Number			
2005	1,290,799	34.0%	438,872	34.0%	438,872	851,927	1,290,799	0
2011 Current	1,345,922	21.0%	282,644	21.0%	282,644	1,063,278	1,345,922	0
2020 No Project	1,789,444	27.0%	483,150	27.0%	483,150	1,306,294	1,789,444	0
2020 Proposed	1,789,444	27.0%	483,150	27.0%	483,150	1,306,294	1,789,444	0
2035 No Project	2,250,000	30.0%	675,000	28.5%	627,000	1,575,000	2,202,000	48,000
2035 Proposed	2,250,000	40.0%	900,000	40.0%	900,000	1,350,000	2,250,000	0

Annual Lifts - Railyards (Constrained⁽¹⁾)

Scenario	Rail Intermodal Throughput							Surplus Capacity ⁽³⁾
	Capacity	Operating Efficiency	Intermodal (Constrained)		Other (domestic & trailers)		Total	
			Number	Percent	Number ⁽²⁾	Percent		
2005	660,000	Constrained	438,872	68%	209,560	32%	648,431	11,569
2011 Current	660,000	Constrained	282,644	46%	338,136	54%	620,779	39,221
2020 No Project	660,000	Constrained	483,150	73%	176,850	27%	660,000	0
2020 Proposed	1,060,000	Constrained	483,150	48%	531,000	52%	1,014,150	45,850
2035 No Project	660,000	Constrained	627,000	95%	33,000	5%	660,000	0
2035 Proposed	1,060,000	Constrained	900,000	85%	160,000	15%	1,060,000	0

Scenario	Domestic & Trailer Demand ⁽⁴⁾	UP Railyard			Lathrop UP Intermodal Facility			Rail Demand Served at Other Facilities
		Potential Additional Capacity ⁽⁵⁾	Additional Intermodal Absorption	Additional Domestic & Trailer Absorption	Additional Capacity ⁽⁶⁾	Additional Intermodal Absorption	Additional Domestic & Trailer Absorption	
2005	209,560	259,000	0	0	0	0	0	0
2011 Current	338,136	259,000	0	0	0	0	0	0
2020 No Project	531,000	259,000	0	259,000	460,000	0	95,150	0
2020 Proposed	531,000	259,000	0	0	460,000	0	0	0
2035 No Project	531,000	259,000	48,000	211,000	460,000	0	287,000	0
2035 Proposed	531,000	259,000	0	259,000	460,000	0	112,000	0

102,413 Demand in 2000 (2002 DEIR)

531,000 Demand in 2020 (2002 DEIR)

Weekday Truck Trips (Constrained⁽¹⁾)

Scenario	Marine Terminals				Rail Intermodal Terminals (Port Area)					
	Total	Intermodal ⁽¹⁾		Other (over the-road)	Total	Intermodal ⁽⁷⁾		Other (domestic & trailers)		
		Number	Percent			Number	Percent	Number	Percent	
2005	11,791	4,009	34%	7,782	5,923	4,009	68%	1,914	32%	
2011 Current	12,294	2,582	21%	9,713	5,671	2,582	46%	3,089	54%	
2020 No Project	16,346	4,413	27%	11,932	8,395	4,413	53%	3,981	47%	
2020 Proposed	16,346	4,413	27%	11,932	9,264	4,413	48%	4,850	52%	
2035 No Project	20,553	6,166	30%	14,387	8,395	6,166	73%	2,229	27%	
2035 Proposed	20,553	8,221	40%	12,332	12,049	8,221	68%	3,827	32%	

(1) Intermodal traffic would be constrained by limited rail lift capacity at the Port of Oakland.

(2) Intermodal demand at the rail terminals may divert all but a nominal amount (5%) of domestic & trailer demand to other rail facilities.

(3) The surplus capacity for each alternative shows the number of additional lifts that could be accommodated at the indicated operating efficiency level.

(4) Domestic and trailer demand at the railyards would be 531,000 in 2010 (Summit Lynch 1995). Existing demand in 2002 DEIR was 102,413.

(5) The UP Railyard would expand capacity to absorb additional demand under constrained conditions. Additional capacity is based on implementation of Rail Plan RR3 or RR4 from the Maritime Development Alternative Study (Port of Oakland 2004).

(6) The existing capacity of 270,000 cargo container transfers ("lifts") per year would be increased to 730,000 lifts per year to meet projected regional needs (Union Pacific Expansion and Modernization Project DEIR, 2011).

Oakland Army Base EIR
Hourly Traffic Proportion of Daily Traffic

Period	Cars		Trucks to Rail Terminals		Trucks to Marine Terminals			
	Enter	Exit	Enter	Exit	Enter	Exit		
0:00	0.2%	0.5%	0.3%	0.1%				
1:00	0.3%	0.2%	0.3%	0.1%				
2:00	0.4%	0.3%	0.3%	0.1%				
3:00	0.2%	0.3%	0.1%	0.1%				
4:00	0.4%	0.2%	0.4%	0.1%				
5:00	2.8%	0.5%	0.9%	0.4%				
6:00	7.8%	1.0%	2.9%	0.5%				
7:00	7.9%	1.8%	4.5%	1.2%	3.1%	0.0%	161	0
8:00	3.7%	1.7%	4.6%	3.1%	4.8%	5.1% AM Peak Analysis Period	252	268
9:00	2.8%	1.9%	4.9%	4.6%	7.1%	8.7%	370	453
10:00	2.5%	2.5%	5.0%	3.9%	5.8%	6.4%	303	337
11:00	2.5%	4.8%	5.0%	5.1%	7.3%	6.6% Truck Peak Period	382	343
12:00	4.7%	3.7%	4.6%	2.1%	3.0%	5.2%	158	270
13:00	3.2%	2.6%	4.7%	4.3%	7.2%	5.1%	376	267
14:00	2.7%	3.6%	4.6%	4.5%	5.5%	6.4%	288	332
15:00	2.2%	5.9%	3.7%	3.7%	3.9%	4.7%	206	247
16:00	1.6%	5.9%	2.8%	4.9%	1.1%	2.5% PM Peak Analysis Period	55	130
17:00	1.4%	4.7%	1.2%	2.3%	0.0%	0.5%	0	27
18:00	0.9%	2.0%	0.9%	0.8%				
19:00	0.5%	1.3%	1.1%	1.0%				
20:00	0.6%	1.1%	0.7%	0.7%				
21:00	0.6%	0.7%	0.7%	0.8%				
22:00	0.9%	0.9%	0.5%	0.3%				
23:00	0.6%	0.8%	0.3%	0.4%				
TOTAL	51.2%	48.8%	54.7%	45.3%	48.8%	51.2%		

Sources: Auto/rail truck percentages from traffic counts taken on Middle Harbor Road south of 3rd Street (Wiltec 1996)
Truck percentages from Marine Terminal Traffic Analysis, Appendix J.2 (U.S. Navy and Port of Oakland 1997)

**Oakland Army Base EIR
Train Traffic at the Port of Oakland**

Annual Railyard Lifts

Scenario	OGTIC	OIG	UP	Total
2005	0	245,618	402,813	648,431
2011 Current	0	235,144	385,636	620,779
2020 No Project	0	250,000	669,000	919,000
2020 Proposed	382,698	239,186	392,266	1,014,150
2035 No Project	0	250,000	669,000	919,000
2035 Proposed	400,000	250,000	669,000	1,319,000

Number of Trains Served Daily

Scenario	OGTIC	OIG	UP	Total
2005	0.0	3.9	6.4	10.3
2011 Current	0.0	3.7	6.1	9.9
2020 No Project	0.0	4.0	10.6	14.6
2020 Proposed	5.7	3.8	6.2	15.7
2035 No Project	0.0	4.0	10.6	14.6
2035 Proposed	5.9	4.0	10.6	20.5

Proposed Port Plan

	Prior 2005	Existing 2011	2020	2035
OIG & UP				
Annual Lifts Served per Train	63,000	63,000	63,000	63,000
OGTIC				
Train Length (ft)	7,200	7,200	8,000	8,000
Train Cars per Train	22	22	25	25
Daily Lifts Served per Train	240	240	270	270
Annual Lifts Served per Train	67,575	67,575	98,550	98,550

Length of train car = 305
Wells per train car = 5
TEU capacity per well = 4
Space utilization = 95%
TEU / lift = 1.75

Assumptions from Port

Assume each train is made up of 305 ft long, 5-well intermodal cars.
Each well holds 4 TEU
Assume 5400 ft train has 17 - 305 ft cars
Assume 8000 ft train has 25 - 305 ft cars
Assume 95% space utilization on the train
Then a 5400 ft train holds 323 TEU (185 lifts at 1.75 TEU/lift)
Then a 8000 ft train holds 475 TEU (270 lifts)
Then one 5400 ft daily train moves 67,575 lifts per year
Then one 8000 ft daily train moves 98,550 lifts per year

Oakland Global Project

Redevelopment District Trip Generation (Passenger Cars Only)																		
Land Use	Amount	Trip Generation	Land Use Category	Source	Equivalent Amount	Distributor				Trips Generated								
						AM Peak		PM Peak		Daily	AM Peak Hour			PM Peak Hour				
						In	Out	In	Out		In	Out	Total	In	Out	Total		
Gateway Development Area																		
CW (WEST GATEWAY)**																		
OPTION A																		
TAZ	CW1 - BULK WAREHOUSE	146 KSF	Warehousing	ITE (150)	146 KSF	79%	21%	25%	75%	547	64	17	81	15	46	61	(20% trucks)(ITE 150)	
OPTION B																		
162	CW2 - R & D	115 KSF																
	CW3 - R & D	60 KSF																
	CW2, CW3 - Subtotal	175 KSF	Research & Development	ITE (760)	175 KSF	83%	17%	15%	85%	1,566	175	36	211	30	171	202	(1.84% trucks)(ITE 761)	
CC (CENTRAL GATEWAY)**																		
	CC1 - TRANSLOAD WAREHOUSE	50 KSF	Warehousing	ITE (150)	50 KSF	79%	21%	25%	75%	216	35	9	45	8	23	30	(20% trucks)(ITE 150)	
1415	CC2 - TRANSLOAD WAREHOUSE	160 KSF	Warehousing	ITE (150)	160 KSF	79%	21%	25%	75%	591	88	18	85	16	48	64	(20% trucks)(ITE 150)	
1416	CC3 - TRANSLOAD WAREHOUSE	161 KSF	Warehousing	ITE (150)	161 KSF	79%	21%	25%	75%	594	68	18	86	16	49	65	(20% trucks)(ITE 150)	
163	CC4 - TRANSLOAD WAREHOUSE	91 KSF																
	CC5 - TRANSLOAD WAREHOUSE	38 KSF																
	CC4, CC5 - Subtotal	129 KSF	Warehousing	ITE (150)	129 KSF	79%	21%	25%	75%	492	60	16	76	14	42	56	(20% trucks)(ITE 150)	
1410	CC6, CC7, CC8, CC9 - Subtotal	10.0 Acres	Truck Stop	SANBAG	10 Acres	41%	59%	43%	57%	1,366	40	58	99	135	180	315		
CN (NORTH GATEWAY)**																		
1412	CN1 - RECYCLING FACILITY	206 KSF	General Heavy Industrial	ITE (120)		83%	17%	21%	79%	284	80	16	97	27	102	129	(8% trucks)(ITE 130)	
160	CN2 - RECYCLING FACILITY	174 KSF	General Heavy Industrial	ITE (120)		83%	17%	21%	79%	240	68	14	82	23	86	109	(8% trucks)(ITE 130)	
1410	CN3 - TRUCK SERVICES	5.0 Acres	Truck Parking	'02 DEIR	5 Acres	41%	59%	43%	57%	124	5	2	7	2	7	9	(34% trucks)(ITE 030)	
CE (EAST GATEWAY)**																		
1408	CE1 - TRANSLOAD WAREHOUSE	105																
	CE2 - TRANSLOAD WAREHOUSE	63																
	CE3 - TRANSLOAD WAREHOUSE	275																
	CE1, CE2, CE3 - Subtotal	443 KSF	Warehousing	ITE (150)	443 KSF	79%	21%	25%	75%	1,417	118	31	150	31	93	123	(20% trucks)(ITE 150)	
170	PL10 - TRUCK PARKING	7 Acres	Truck Parking	'02 DEIR	7 Acres	41%	59%	43%	57%	173	6	3	9	3	10	13	(34% trucks)(ITE 030)	
	PL9 - TRANSLOAD WAREHOUSE	173 KSF	Warehousing	ITE (150)	173 KSF	79%	21%	25%	75%	631	70	19	89	17	51	68	(20% trucks)(ITE 150)	
Subtotal Gateway Development Area																		
171	Port Area (Includes OARB Port Area and Maritime Sub-district)										7,695	794	241	1,035	322	861	1,183	
OARB Port Area																		
	PL8 - TRANSLOAD WAREHOUSE	139 KSF	Warehousing	ITE (150)	139 KSF	79%	21%	25%	75%	522	62	17	79	15	44	59	(20% trucks)(ITE 150)	
169	PL5 - TRANSLOAD WAREHOUSE	57 KSF																
	PL6 - TRANSLOAD WAREHOUSE	44 KSF																
	PL5, PL6 - Subtotal	101 KSF	Warehousing	ITE (150)	101 KSF	79%	21%	25%	75%	398	52	14	66	12	36	48	(20% trucks)(ITE 150)	
1414	PL7 - TRANSLOAD WAREHOUSE	303 KSF	Warehousing	ITE (150)	303 KSF	79%	21%	25%	75%	1,023	96	25	121	24	73	97	(20% trucks)(ITE 150)	
164	PL1 - TRANSLOAD WAREHOUSE	37 KSF																
	PL2 - TRANSLOAD WAREHOUSE	44 KSF																
	PL3 - TRANSLOAD WAREHOUSE	43 KSF																
	PL4 - TRANSLOAD WAREHOUSE	43 KSF																
	PL1, PL2, PL3, PL4 - Subtotal	130.4 KSF	Warehousing	ITE (150)	130 KSF	79%	21%	25%	75%	495	60	16	76	14	42	56	(20% trucks)(ITE 150)	
1407	PL11 - TRUCK PARKING	8.0 Acres	Truck Parking	'02 DEIR	8 Acres	41%	59%	43%	57%	198	7	3	11	3	12	15	(34% trucks)(ITE 030)	
1409	PR1 - OGTIC Railyard	155 Emp.	Truck Terminal	ITE (030)	155 Emp.	40%	60%	47%	53%	715	26	12	38	11	42	54	(34% trucks)(ITE 030)	
Subtotal Port Project Area																		
										3,351	304	88	392	79	249	329		
Project Total										11,046	1,099	329	1,428	401	1,111	1,512		

Not Part of the Project

Marine Terminals																	
1401	Berths 20-26 Ports America	248 Acres	Marine Terminal	ITE (010)	248 Acres	68%	32%	68%	32%	1,834	67	31	98	67	31	98	
259	Berths 30-37 Trapac & Evergreen	156 Acres	Marine Terminal	ITE (010)	156 Acres	68%	32%	68%	32%	1,152	42	20	62	42	20	62	
1406	Berths 55-56 Hanjin	120 Acres	Marine Terminal	ITE (010)	120 Acres	68%	32%	68%	32%	888	32	15	48	32	15	48	
258	Berths 57-59 SSA	150 Acres	Marine Terminal	ITE (010)	150 Acres	68%	32%	68%	32%	1,109	41	19	60	41	19	60	
254	Berths 60-63 APL / Eagle	120 Acres	Marine Terminal	ITE (010)	120 Acres	68%	32%	68%	32%	888	32	15	48	32	15	48	
253	Berths 67-68 SSA	53 Acres	Marine Terminal	ITE (010)	53 Acres	68%	32%	68%	32%	392	14	7	21	14	7	21	
Maritime Support																	
1413	PAG Services	300 Emp.	General Office Building	ITE (710)	300 Emp.	68%	12%	17%	83%	1,120	151	21	172	29	142	171	
Rail Terminals ¹																	
260	OIG	100 Emp.	Truck Terminal	ITE (030)	100 Emp.	68%	32%	21%	79%	461	17	8	25	7	27	35	
257	UP	146 Emp.	Truck Terminal	ITE (030)	146 Emp.	68%	32%	21%	79%	674	25	12	36	11	40	51	
Subtotal Rail Terminals (includes OGTIC)										1,850	68	32	99	29	110	139	

Source: Trip Generation, 8th Edition Institute of Transportation Engineers, 2001

^a Truck trips are reported as one vehicle.

^b No new non-intermodal traffic would be generated due to changes in the size of rail terminal facilities.

Truck Trips in Port Area
2005 No Project

		Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	Total	Constrained Rail Lift Capacity
	Acres →	248	156	120	150	120	53	847	
Intermodal Rail									
Daily Truck Trips	OGTIC PR1								
	OIG	445	279	215	269	215	95	1,518	250,000
	UP	729	458	353	441	353	156	2,490	410,000
	Total	1,174	737	568	710	568	251	4,008	

Trips based on rail capacity relative to OGTIC
Trips based on rail capacity relative to OGTIC

Domestic Rail									% Domestic
Daily Truck Trips	OGTIC PR1								0
	OIG								80
	UP								1,834
	Total								1,914

From Assumptions . . . Worksheet

Marine Terminals								
Intermodal		1,174	737	568	710	568	251	4,009
Other (over the-road)		2,279	1,431	1,103	1,379	1,103	487	7,782
Total		3,453	2,168	1,671	2,089	1,671	738	11,791

From Assumptions . . . Worksheet

Warehouses Served by Rail and Truck (100% to and from Marine Terminals)									Sq. Ft.
	CC2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips	Total	195	123	95	118	95	42	667	#N/A

From AECOM

Truck Trips in Port Area
2005 No Project

Warehouses Served by Truck Only (Approximately 90% out to Roadways; 10% in to Marine Terminals)								Other	Total	Sq. Ft.
	CC1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips									464	#N/A

From AECOM

Note: Peak hour truck trips from individual warehouses would be essentially zero; all trips were considered out to roadways.

Heavy Industrial (Recycling) Daily Truck Trips (100% out to Roadways)							
Daily Truck Trips	Total						#N/A
CN1 (90% of Total Trips)							#N/A
CN2 (70% of Total Trips)							#N/A

From AECOM

Truck Services - CC6-CC9, CN3 (80% Port; 20% out to Roadways)							
Daily Truck Trips	Total						#N/A
CC6-CC9							#N/A
CN3							#N/A

From AECOM

Truck Parking - (80% Port; 20% out to Roadways)(80% Trucks; 20% Cars)							
Daily Truck Trips	Total						#N/A
PL10							#N/A
PL11							#N/A

From trip generation analysis

Research & Development - CW2-CW3 (1.84% Trucks)							
Daily Truck Trips	Total						#N/A

From trip generation analysis

Truck Trips in Port Area
2011 No Project

		Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	Total	Constrained Rail Lift Capacity
	Acres →	248	156	120	150	120	53	847	
Intermodal Rail									
Daily Truck Trips	OGTIC PR1								
	OIG	286	180	139	173	139	61	978	250,000
	UP	470	295	227	284	227	101	1,604	410,000
	Total	756	475	366	457	366	162	2,582	

Trips based on rail capacity relative to OGTIC
Trips based on rail capacity relative to OGTIC

Domestic Rail									% Domestic
Daily Truck Trips	OGTIC PR1								0
	OIG								51
	UP								3,038
	Total								3,089

From Assumptions . . . Worksheet

Marine Terminals								
Intermodal		756	475	366	457	366	162	2,582
Other (over the-road)		2,845	1,786	1,377	1,721	1,377	608	9,713
Total		3,601	2,261	1,743	2,178	1,743	770	12,294

From Assumptions . . . Worksheet

Warehouses Served by Rail and Truck (100% to and from Marine Terminals)									Sq. Ft.
	CC2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips	Total	195	123	95	118	95	42	667	#N/A

From AECOM

Truck Trips in Port Area
2011 No Project

Warehouses Served by Truck Only (Approximately 90% out to Roadways; 10% in to Marine Terminals)								Other	Total	Sq. Ft.
	CC1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips									464	#N/A

From AECOM

Note: Peak hour truck trips from individual warehouses would be essentially zero; all trips were considered out to roadways.

Heavy Industrial (Recycling) Daily Truck Trips (100% out to Roadways)							
Daily Truck Trips	Total						#N/A
CN1 (90% of Total Trips)							#N/A
CN2 (70% of Total Trips)							#N/A

From AECOM

Truck Services - CC6-CC9, CN3 (80% Port; 20% out to Roadways)							
Daily Truck Trips	Total						#N/A
CC6-CC9							#N/A
CN3							#N/A

From AECOM

Truck Parking - (80% Port; 20% out to Roadways)(80% Trucks; 20% Cars)							
Daily Truck Trips	Total						#N/A
PL10							#N/A
PL11							#N/A

From trip generation analysis

Research & Development - CW2-CW3 (1.84% Trucks)							
Daily Truck Trips	Total						#N/A

From trip generation analysis

Truck Trips in Port Area
2020 No Project

		Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	Total	Constrained Rail Lift Capacity
	Acres →	248	156	120	150	120	53	847	
Intermodal Rail									
Daily Truck Trips	OGTIC PR1								
	OIG	490	308	237	296	237	105	1,673	250,000
	UP	803	504	388	486	388	171	2,740	410,000
	Total	1,293	812	625	782	625	276	4,413	

Trips based on rail capacity relative to OGTIC
Trips based on rail capacity relative to OGTIC

Domestic Rail									% Domestic
Daily Truck Trips	OGTIC PR1								0
	OIG							88	5.0%
	UP							3,893	58.7%
	Total							3,981	

From Assumptions . . . Worksheet

Marine Terminals								
Intermodal		1,293	812	625	782	625	276	4,413
Other (over the-road)		3,495	2,194	1,691	2,114	1,691	747	11,932
	Total	4,788	3,006	2,316	2,896	2,316	1,023	16,346

From Assumptions . . . Worksheet

Warehouses Served by Rail and Truck (100% to and from Marine Terminals)									Sq. Ft.
	CC2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips	Total	195	123	95	118	95	42	667	#N/A

From AECOM

Truck Trips in Port Area
2020 No Project

Warehouses Served by Truck Only (Approximately 90% out to Roadways; 10% in to Marine Terminals)								Other	Total	Sq. Ft.
	CC1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips									464	#N/A

From AECOM

Note: Peak hour truck trips from individual warehouses would be essentially zero; all trips were considered out to roadways.

Heavy Industrial (Recycling) Daily Truck Trips (100% out to Roadways)							
Daily Truck Trips	Total						#N/A
CN1 (90% of Total Trips)							#N/A
CN2 (70% of Total Trips)							#N/A

From AECOM

Truck Services - CC6-CC9, CN3 (80% Port; 20% out to Roadways)							
Daily Truck Trips	Total						#N/A
CC6-CC9							#N/A
CN3							#N/A

From AECOM

Truck Parking - (80% Port; 20% out to Roadways)(80% Trucks; 20% Cars)							
Daily Truck Trips	Total						#N/A
PL10							#N/A
PL11							#N/A

From trip generation analysis

Research & Development - CW2-CW3 (1.84% Trucks)							
Daily Truck Trips	Total						#N/A

From trip generation analysis

Truck Trips in Port Area
2020 Project

		Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	Total	Constrained Rail Lift Capacity
	Acres →	248	156	120	150	120	53	847	
Intermodal Rail									
Daily Truck Trips	OGTIC PR1	1,105	287	221	277	221	98	2,210	400,000
	OIG	71	199	153	191	153	67	834	250,000
	UP	117	326	251	314	251	111	1,370	410,000
	Total	1,293	812	625	782	625	276	4,414	

From AECOM
Trips based on rail capacity relative to OGTIC
Trips based on rail capacity relative to OGTIC

Domestic Rail									% Domestic
Daily Truck Trips	OGTIC PR1							116	5.0%
	OIG							44	5.0%
	UP							4,690	77.4%
	Total							4,850	

From Assumptions . . . Worksheet

Marine Terminals								
Intermodal		1,293	812	625	782	625	276	4,413
Other (over the-road)		3,495	2,194	1,691	2,114	1,691	747	11,932
	Total	4,788	3,006	2,316	2,896	2,316	1,023	16,346

From Assumptions . . . Worksheet

Warehouses Served by Rail and Truck (100% to and from Marine Terminals)									Sq. Ft.
	CC2	23	14	11	14	11	5		160,080
	CC3	23	14	11	14	11	5		161,123
	CE1	15	9	7	9	7	3		105,000
	CE2	9	6	4	5	4	2		63,000
	CE3	39	25	19	24	19	8		274,560
	PL7	43	27	21	26	21	9		302,800
	PL8	20	12	10	12	10	4		138,600
	PL9	24	15	12	15	12	5		172,801
Daily Truck Trips	Total	195	123	95	118	95	42	667	1,377,964

From AECOM

Truck Trips in Port Area
2020 Project

Warehouses Served by Truck Only (Approximately 90% out to Roadways; 10% in to Marine Terminals)								Other	Total	Sq. Ft.	
	CC1	2	1	1	1	1	0	45	51	49,545	
	CC4	3	2	1	2	1	1	84	94	91,000	
	CC5	1	1	1	1	1	0	35	40	38,455	
	PL1	1	1	1	1	1	0	34	39	37,190	
	PL2	1	1	1	1	1	0	41	46	44,400	
	PL3	1	1	1	1	1	0	40	45	42,981	
	PL4	1	1	1	1	1	0	40	45	42,981	
	PL5	2	1	1	1	1	0	53	59	57,200	
	PL6	1	1	1	1	1	0	41	46	43,928	
Daily Truck Trips									464	447,680	From AECOM

Note: Peak hour truck trips from individual warehouses would be essentially zero; all trips were considered out to roadways.

Heavy Industrial (Recycling) Daily Truck Trips (100% out to Roadways)										
Daily Truck Trips	Total							244		From AECOM
CN1 (90% of Total Trips)								147		
CN2 (70% of Total Trips)								97		

Truck Services - CC6-CC9, CN3 (80% Port; 20% out to Roadways)										
Daily Truck Trips	Total							1,229		From AECOM
CC6-CC9								1,127		
CN3								102		

Truck Parking - (80% Port; 20% out to Roadways)(80% Trucks; 20% Cars)										
Daily Truck Trips	Total							296		From trip generation analysis
PL10								138		
PL11								158		

Research & Development - CW2-CW3 (1.84% Trucks)										
Daily Truck Trips	Total							29		From trip generation analysis

Truck Trips in Port Area
2035 No Project

		Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	Total	Constrained Rail Lift Capacity
	Acres →	248	156	120	150	120	53	847	
Intermodal Rail									
Daily Truck Trips	OGTIC PR1								
	OIG	684	430	331	414	331	146	2,336	250,000
	UP	1,122	704	543	678	543	240	3,830	410,000
	Total	1,806	1,134	874	1,092	874	386	6,166	

Trips based on rail capacity relative to OGTIC
Trips based on rail capacity relative to OGTIC

Domestic Rail									% Domestic
Daily Truck Trips	OGTIC PR1								0
	OIG								123
	UP								2,106
	Total								2,229

From Assumptions . . . Worksheet

Marine Terminals								
Intermodal		1,806	1,134	874	1,092	874	386	6,166
Other (over the-road)		4,214	2,646	2,039	2,549	2,039	901	14,387
Total		6,020	3,780	2,913	3,641	2,913	1,287	20,553

From Assumptions . . . Worksheet

Warehouses Served by Rail and Truck (100% to and from Marine Terminals)									Sq. Ft.
	CC2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CE3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips	Total	195	123	95	118	95	42	667	#N/A

From AECOM

Truck Trips in Port Area
2035 No Project

Warehouses Served by Truck Only (Approximately 90% out to Roadways; 10% in to Marine Terminals)								Other	Total	Sq. Ft.
	CC1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	CC5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	PL6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Daily Truck Trips									464	#N/A

From AECOM

Note: Peak hour truck trips from individual warehouses would be essentially zero; all trips were considered out to roadways.

Heavy Industrial (Recycling) Daily Truck Trips (100% out to Roadways)							
Daily Truck Trips	Total						#N/A
CN1 (90% of Total Trips)							#N/A
CN2 (70% of Total Trips)							#N/A

From AECOM

Truck Services - CC6-CC9, CN3 (80% Port; 20% out to Roadways)							
Daily Truck Trips	Total						#N/A
CC6-CC9							#N/A
CN3							#N/A

From AECOM

Truck Parking - (80% Port; 20% out to Roadways)(80% Trucks; 20% Cars)							
Daily Truck Trips	Total						#N/A
PL10							#N/A
PL11							#N/A

From trip generation analysis

Research & Development - CW2-CW3 (1.84% Trucks)							
Daily Truck Trips	Total						#N/A

From trip generation analysis

Truck Trips in Port Area
2035 Project

		Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	Total	Constrained Rail Lift Capacity
	Acres →	248	156	120	150	120	53	847	
Intermodal Rail									
Daily Truck Trips	OGTIC PR1	1,105	287	221	277	221	98	2,210	400,000
	OIG	494	464	358	447	358	158	2,279	250,000
	UP	809	761	586	732	586	259	3,733	410,000
	Total	2,408	1,512	1,165	1,456	1,165	515	8,222	

From AECOM
Trips based on rail capacity relative to OGTIC
Trips based on rail capacity relative to OGTIC

Domestic Rail									% Domestic
Daily Truck Trips	OGTIC PR1							116	5.0%
	OIG							120	5.0%
	UP							3,591	49.0%
	Total							3,827	

From Assumptions . . . Worksheet

Marine Terminals								
Intermodal		2,408	1,512	1,165	1,456	1,165	515	8,221
Other (over the-road)		3,612	2,268	1,748	2,185	1,748	772	12,332
	Total	6,020	3,780	2,913	3,641	2,913	1,287	20,553

From Assumptions . . . Worksheet

Warehouses Served by Rail and Truck (100% to and from Marine Terminals)									Sq. Ft.
	CC2	23	14	11	14	11	5		160,080
	CC3	23	14	11	14	11	5		161,123
	CE1	15	9	7	9	7	3		105,000
	CE2	9	6	4	5	4	2		63,000
	CE3	39	25	19	24	19	8		274,560
	PL7	43	27	21	26	21	9		302,800
	PL8	20	12	10	12	10	4		138,600
	PL9	24	15	12	15	12	5		172,801
Daily Truck Trips	Total	195	123	95	118	95	42	667	1,377,964

From AECOM

Truck Trips in Port Area
2035 Project

Warehouses Served by Truck Only (Approximately 90% out to Roadways; 10% in to Marine Terminals)								Other	Total	Sq. Ft.	
	CC1	2	1	1	1	1	0	45	51	49,545	
	CC4	3	2	1	2	1	1	84	94	91,000	
	CC5	1	1	1	1	1	0	35	40	38,455	
	PL1	1	1	1	1	1	0	34	39	37,190	
	PL2	1	1	1	1	1	0	41	46	44,400	
	PL3	1	1	1	1	1	0	40	45	42,981	
	PL4	1	1	1	1	1	0	40	45	42,981	
	PL5	2	1	1	1	1	0	53	59	57,200	
	PL6	1	1	1	1	1	0	41	46	43,928	
Daily Truck Trips									464	447,680	From AECOM

Note: Peak hour truck trips from individual warehouses would be essentially zero; all trips were considered out to roadways.

Heavy Industrial (Recycling) Daily Truck Trips (100% out to Roadways)										
Daily Truck Trips	Total							244		From AECOM
CN1 (90% of Total Trips)								147		
CN2 (70% of Total Trips)								97		

Truck Services - CC6-CC9, CN3 (80% Port; 20% out to Roadways)										
Daily Truck Trips	Total							1,229		From AECOM
CC6-CC9								1,127		
CN3								102		

Truck Parking - (80% Port; 20% out to Roadways)(80% Trucks; 20% Cars)										
Daily Truck Trips	Total							296		
PL10								138		From trip generation analysis
PL11								158		

Research & Development - CW2-CW3 (1.84% Trucks)										
Daily Truck Trips	Total							29		From trip generation analysis

Daily Truck Trip Ends - 2005 No Project

		OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL/Eagle	Berths 67-68 SSA	CC2	CC3	CE1-CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	80% Port	
From\To		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407				
OGTIC	1409				0	0	0	0	0	0																	0		
OIG	260				223	140	108	135	108	48																	40		
UP	257				365	229	177	221	177	78																	917		
Berths 20-26 F	1401	0	223	365							#N/A	#N/A	#N/A	#N/A	#N/A												1,140		
Berths 30-37 T	259	0	140	229							#N/A	#N/A	#N/A	#N/A	#N/A												716		
Berths 55-56 H	1406	0	108	177							#N/A	#N/A	#N/A	#N/A	#N/A												552		
Berths 57-59 S	258	0	135	221							#N/A	#N/A	#N/A	#N/A	#N/A												690		
Berths 60-63 A	254	0	108	177							#N/A	#N/A	#N/A	#N/A	#N/A												552		
Berths 67-68 S	253	0	48	78							#N/A	#N/A	#N/A	#N/A	#N/A												244		
CC2	1415				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
CC3	1416				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
CE1-CE3	1408				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
PL7	1414				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
PL8 - PL9	171				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
CW2 - CW3	162																										#N/A		
CC1	163																										#N/A		
CC4 - CC5	164																										#N/A		
PL1 - PL4	169																										#N/A		
PL5 - PL6	1412																										#N/A		
CN1	160																										#N/A		
CN2	1410	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A												#N/A	#N/A	
CC6 - CC9	1411	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A												#N/A	#N/A	
CN3	170	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A												#N/A	#N/A	
PL10	1407	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A												#N/A	#N/A	
PL11		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A												#N/A	#N/A	
Outside Port		0	40	917	1,140	716	552	690	552	244						#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A			
80% Port																													
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking								

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Truck Trip Ends - 2005 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409			0	0	0	0	0	0																	0	
OIG	260			21	13	10	13	10	5																	3	
UP	257			35	22	17	21	17	8																	56	
Berths 20-26 Ports America	1401	0	23	37						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	117	
Berths 30-37 Trapac & Evergreen	259	0	14	23						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	73	
Berths 55-56 Hanjin	1406	0	11	18						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	57	
Berths 57-59 SSA	258	0	14	23						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	71	
Berths 60-63 APL / Eagle	254	0	11	18						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	57	
Berths 67-68 SSA	253	0	5	8						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	25	
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A	
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A	
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A	
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A	
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A	
CW2 - CW3	162																									#N/A	
CC1	163																									#N/A	
CC4 - CC5	164																									#N/A	
PL1 - PL4	169																									#N/A	
PL5 - PL6	1412																									#N/A	
CN1	160																									#N/A	
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A
PL11																										#N/A	
Outside Port		0	5	83	110	69	53	67	53	23					#N/A	###	###	###	#N/A	###	#N/A	#N/A	###	#N/A	#N/A	#N/A	
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking						

	Enter	Exit
Trucks at Rail Terminals	4.6%	3.1%
Trucks at Marine Terminals	4.8%	5.1%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

PM Truck Trip Ends - 2005 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0													#N/A	#N/A	###	#N/A	0
OIG	260			5	3	2	3	2	1													#N/A	#N/A	###	#N/A	2
UP	257			8	5	4	5	4	2													#N/A	#N/A	###	#N/A	92
Berths 20-26 P	1401	0	11	18						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	57
Berths 30-37	259	0	7	11						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	36
Berths 55-56 H	1406	0	5	9						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	27
Berths 57-59 S	258	0	7	11						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	34
Berths 60-63 A	254	0	5	9						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	27
Berths 67-68 S	253	0	2	4						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	12
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL11																										#N/A
Outside Port		0	1	53	24	15	12	15	12	5					#N/A	###	###	###	#N/A	###	#N/A	#N/A	###	#N/A	#N/A	#N/A
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.	Truck Parking						

	Enter	Exit
Trucks at Rail Terminals	2.8%	4.9%
Trucks at Marine Terminals	1.1%	2.5%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Passenger Car Trip Ends - 2005 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Tramac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									12	
OIG	260																										8
UP	257																										12
Berths 20-26 Ports America	1401																										31
Berths 30-37 Tramac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										18
CC3	1416																										18
CE1- CE3	1408																										31
PL7	1414																										25
PL8 - PL9	171																										35
CW2 - CW3	162																										45
CC1	163																										16
CC4 - CC5	164																										16
PL1 - PL4	169																										14
PL5 - PL6	1412																										16
CN1	160																										14
CN2	1410																										58
CC6 - CC9	1411																										2
CN3	170																										3
PL10	1407																										3
PL11																											3
Outside Port		26	17	25	67	42	32	41	32	14	68	68	118	96	133	211	60	60	52	80	68	40	5	6	7		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.		Truck Parking						

PM Passenger Car Trip Ends - 2005 No Project

	From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																										42	
OIG	260																											27
UP	257																											40
Berths 20-26 Ports America	1401																											31
Berths 30-37 Trapac & Evergreen	259																											20
Berths 55-56 Hanjin	1406																											15
Berths 57-59 SSA	258																											19
Berths 60-63 APL / Eagle	254																											15
Berths 67-68 SSA	253																											7
CC2	1415																											48
CC3	1416																											49
CE1- CE3	1408																											93
PL7	1414																											73
PL8 - PL9	171																											95
CW2 - CW3	162																											194
CC1	163																											42
CC4 - CC5	163																											42
PL1 - PL4	164																											36
PL5 - PL6	169																											102
CN1	1412																											86
CN2	160																											180
CC6 - CC9	1410																											7
CN3	1411																											10
PL10	170																											12
PL11	1407																											3
Outside Port		11	7	11	67	42	32	41	32	14	16	16	31	24	32	38	14	14	12	27	23	135	2	3	3			
		Rail			Marine Terminals						Rail-to-Truck						Truck-to-Truck				T.S.	Truck Parking						

Daily Truck Trip Ends - 2011 No Project

		OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL/Eagle	Berths 67-68 SSA	CC2	CC3	CE1-CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	80% Port	
From\To		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407				
OGTIC	1409				0	0	0	0	0	0																	0		
OIG	260				143	90	70	87	70	31																	26		
UP	257				235	148	114	142	114	51																	1,519		
Berths 20-26 F	1401	0	143	235							#N/A	#N/A	#N/A	#N/A	#N/A												1,423		
Berths 30-37 T	259	0	90	148							#N/A	#N/A	#N/A	#N/A	#N/A												893		
Berths 55-56 H	1406	0	70	114							#N/A	#N/A	#N/A	#N/A	#N/A												689		
Berths 57-59 S	258	0	87	142							#N/A	#N/A	#N/A	#N/A	#N/A												861		
Berths 60-63 A	254	0	70	114							#N/A	#N/A	#N/A	#N/A	#N/A												689		
Berths 67-68 S	253	0	31	51							#N/A	#N/A	#N/A	#N/A	#N/A												304		
CC2	1415				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
CC3	1416				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
CE1-CE3	1408				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
PL7	1414				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
PL8 - PL9	171				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																			
CW2 - CW3	162																												
CC1	162																												
CC4 - CC5	163																												
PL1 - PL4	164																												
PL5 - PL6	169																												
CN1	1412																												
CN2	160																												
CC6 - CC9	1410	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
CN3	1411	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
PL10	170	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
PL11	1407	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Outside Port		0	26	1,519	1,423	893	689	861	689	304						#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A			
80% Port																													
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking								

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Truck Trip Ends - 2011 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0																	0
OIG	260			14	9	7	8	7	3																	2
UP	257			23	14	11	14	11	5																	94
Berths 20-26 Ports America	1401	0	15	24						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	146
Berths 30-37 Trapac & Evergreen	259	0	9	15						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	92
Berths 55-56 Hanjin	1406	0	7	12						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	71
Berths 57-59 SSA	258	0	9	15						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	88
Berths 60-63 APL / Eagle	254	0	7	12						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	71
Berths 67-68 SSA	253	0	3	5						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	31
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A
PL11																										#N/A
Outside Port		0	3	139	137	86	66	83	66	29					#N/A	###	###	###	#N/A	###	#N/A	#N/A	###	#N/A	#N/A	
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	4.6%	3.1%
Trucks at Marine Terminals	4.8%	5.1%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

PM Truck Trip Ends - 2011 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0													#N/A	#N/A	###	#N/A	0
OIG	260			3	2	1	2	1	1													#N/A	#N/A	###	#N/A	1
UP	257			5	3	2	3	2	1													#N/A	#N/A	###	#N/A	150
Berths 20-26 P	1401	0	7	12						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	71
Berths 30-37	259	0	4	7						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	44
Berths 55-56 H	1406	0	3	6						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	34
Berths 57-59 S	258	0	4	7						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	43
Berths 60-63 A	254	0	3	6						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	34
Berths 67-68 S	253	0	2	3						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	15
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL11		#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
Outside Port		0	1	85	30	19	14	18	14	6					#N/A	###	###	###	#N/A	###	#N/A	#N/A	###	#N/A	#N/A	
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	2.8%	4.9%
Trucks at Marine Terminals	1.1%	2.5%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Passenger Car Trip Ends - 2011 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									12	
OIG	260																										8
UP	257																										12
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										18
CC3	1416																										18
CE1- CE3	1408																										31
PL7	1414																										25
PL8 - PL9	171																										35
CW2 - CW3	162																										45
CC1	163																										16
CC4 - CC5	164																										16
PL1 - PL4	169																										14
PL5 - PL6	1412																										16
CN1	160																										14
CN2	1410																										58
CC6 - CC9	1411																										2
CN3	170																										3
PL10	1407																										3
PL11																											3
Outside Port		26	17	25	67	42	32	41	32	14	68	68	118	96	133	211	60	60	52	80	68	40	5	6	7		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.	Truck Parking							

PM Passenger Car Trip Ends - 2011 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									42	
OIG	260																										27
UP	257																										40
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										48
CC3	1416																										49
CE1- CE3	1408																										93
PL7	1414																										73
PL8 - PL9	171																										95
CW2 - CW3	162																										194
CC1	163																										42
CC4 - CC5	164																										42
PL1 - PL4	169																										36
PL5 - PL6	1412																										102
CN1	160																										86
CN2	1410																										180
CC6 - CC9	1411																										7
CN3	170																										10
PL10	1407																										12
PL11																											
Outside Port		11	7	11	67	42	32	41	32	14	16	16	31	24	32	38	14	14	12	27	23	135	2	3	3		
		Rail		Marine Terminals				Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking									

Daily Truck Trip Ends - 2020 No Project

		OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL/Eagle	Berths 67-68 SSA	CC2	CC3	CE1-CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	80% Port
From\To		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409				0	0	0	0	0	0																	0	
OIG	260				245	154	119	148	119	53																	44	
UP	257				402	252	194	243	194	86																	1,947	
Berths 20-26 F	1401	0	245	402							#N/A	#N/A	#N/A	#N/A	#N/A												1,748	
Berths 30-37 T	259	0	154	252							#N/A	#N/A	#N/A	#N/A	#N/A												1,097	
Berths 55-56 H	1406	0	119	194							#N/A	#N/A	#N/A	#N/A	#N/A												846	
Berths 57-59 S	258	0	148	243							#N/A	#N/A	#N/A	#N/A	#N/A												1,057	
Berths 60-63 A	254	0	119	194							#N/A	#N/A	#N/A	#N/A	#N/A												846	
Berths 67-68 S	253	0	53	86							#N/A	#N/A	#N/A	#N/A	#N/A												374	
CC2	1415				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
CC3	1416				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
CE1-CE3	1408				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
PL7	1414				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
PL8 - PL9	171				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
CW2 - CW3	162																										#N/A	
CC1	163																										#N/A	
CC4 - CC5	164																										#N/A	
PL1 - PL4	169																										#N/A	
PL5 - PL6	1412																										#N/A	
CN1	160																										#N/A	
CN2	1410	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
CC6 - CC9	1411	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
CN3	170	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
PL10	1407	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
PL11		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Outside Port		0	44	1,947	1,748	1,097	846	1,057	846	374	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
80% Port																												
		Rail			Marine Terminals					Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking								

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Truck Trip Ends - 2020 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0																	0
OIG	260			24	15	11	14	11	5																	3
UP	257			39	24	19	23	19	8																	120
Berths 20-26 Ports America	1401	0	25	41						#N/A	#N/A	#N/A	#N/A	###												179
Berths 30-37 Trapac & Evergreen	259	0	16	26						#N/A	#N/A	#N/A	#N/A	###												113
Berths 55-56 Hanjin	1406	0	12	20						#N/A	#N/A	#N/A	#N/A	###												87
Berths 57-59 SSA	258	0	15	25						#N/A	#N/A	#N/A	#N/A	###												108
Berths 60-63 APL / Eagle	254	0	12	20						#N/A	#N/A	#N/A	#N/A	###												87
Berths 67-68 SSA	253	0	5	9						#N/A	#N/A	#N/A	#N/A	###												38
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
PL11																										#N/A
Outside Port		0	5	178	169	106	82	102	82	36					#N/A	###	###	###	#N/A	###	#N/A	###	#N/A	###	#N/A	
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	4.6%	3.1%
Trucks at Marine Terminals	4.8%	5.1%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

PM Truck Trip Ends - 2020 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0																	0
OIG	260			5	3	2	3	2	1																	2
UP	257			8	5	4	5	4	2																	193
Berths 20-26 Ports America	1401	0	12	20						#N/A	#N/A	#N/A	#N/A	###												87
Berths 30-37 Trapac & Evergreen	259	0	8	13						#N/A	#N/A	#N/A	#N/A	###												55
Berths 55-56 Hanjin	1406	0	6	10						#N/A	#N/A	#N/A	#N/A	###												42
Berths 57-59 SSA	258	0	7	12						#N/A	#N/A	#N/A	#N/A	###												53
Berths 60-63 APL / Eagle	254	0	6	10						#N/A	#N/A	#N/A	#N/A	###												42
Berths 67-68 SSA	253	0	3	4						#N/A	#N/A	#N/A	#N/A	###												19
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###																	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###												#N/A
PL11																										#N/A
Outside Port		0	1	110	37	23	18	22	18	8					#N/A	###	###	###	###	#N/A	###	#N/A	###	#N/A		#N/A
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	2.8%	4.9%
Trucks at Marine Terminals	1.1%	2.5%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Passenger Car Trip Ends - 2020 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									12	
OIG	260																										8
UP	257																										12
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										18
CC3	1416																										18
CE1- CE3	1408																										31
PL7	1414																										25
PL8 - PL9	171																										35
CW2 - CW3	162																										45
CC1	163																										16
CC4 - CC5	164																										16
PL1 - PL4	169																										14
PL5 - PL6	1412																										16
CN1	160																										14
CN2	1410																										14
CC6 - CC9	1411																										58
CN3	170																										2
PL10	1407																										3
PL11	1407																										3
Outside Port		26	17	25	67	42	32	41	32	14	68	68	118	96	133	211	60	60	52	80	68	40	5	6	7		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.	Truck Parking							

PM Passenger Car Trip Ends - 2020 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									42	
OIG	260																										27
UP	257																										40
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										48
CC3	1416																										49
CE1- CE3	1408																										93
PL7	1414																										73
PL8 - PL9	171																										95
CW2 - CW3	162																										194
CC1	163																										42
CC4 - CC5	164																										42
PL1 - PL4	169																										36
PL5 - PL6	1412																										102
CN1	160																										86
CN2	1410																										180
CC6 - CC9	1411																										7
CN3	170																										10
PL10	1407																										12
PL11																											
Outside Port		11	7	11	67	42	32	41	32	14	16	16	31	24	32	38	14	14	12	27	23	135	2	3	3		
		Rail			Marine Terminals					Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking							

Daily Truck Trip Ends - 2020 Project

From\To		OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL/Eagle	Berths 67-68 SSA	CC2	CC3	CE1-CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	80% Port
		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409				553	144	111	139	111	49													98	9	12	14	58	
OIG	260				36	100	77	96	77	34													37	3	5	5	22	
UP	257				59	163	126	157	126	56													61	5	7	9	2,345	
Berths 20-26 F	1401	553	36	59							12	12	32	22	22								66	6	8	9	1,748	
Berths 30-37 T	259	144	100	163							7	7	20	14	14								41	4	5	6	1,097	
Berths 55-56 H	1406	111	77	126							6	6	15	11	11								32	3	4	4	846	
Berths 57-59 S	258	139	96	157							7	7	19	13	14								40	4	5	6	1,057	
Berths 60-63 A	254	111	77	126							6	6	15	11	11								32	3	4	4	846	
Berths 67-68 S	253	49	34	56							3	3	7	5	5								14	1	2	2	374	
CC2	1415				12	7	6	7	6	3													3	0	0	0		
CC3	1416				12	7	6	7	6	3													3	0	0	0		
CE1-CE3	1408				32	20	15	19	15	7													9	1	1	1		
PL7	1414				22	14	11	13	11	5													7	1	1	1		
PL8 - PL9	171				22	14	11	14	11	5													7	1	1	1		
CW2 - CW3	162																										40	
CC1	163																										67	
CC4 - CC5	164																										88	
PL1 - PL4	169																										53	
CN1	1412																										74	
CN2	160																										48	
CC6 - CC9	1410	98	37	61	66	41	32	40	32	14	3	3	9	7	7												113	564
CN3	1411	9	3	5	6	4	3	4	3	1	0	0	1	1	1												10	51
PL10	170	12	5	7	8	5	4	5	4	2	0	0	1	1	1												14	69
PL11	1407	14	5	9	9	6	4	6	4	2	0	0	1	1	1												16	79
Outside Port		58	22	2,345	1,748	1,097	846	1,057	846	374						40	67	87.5	52.5	74	48		113	10	14	16		
80% Port																							564	51	69	79		
		Rail			Marine Terminals					Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking								

Note: the travel demand model is used to generate trips for cells showing "#N/A.

AM Truck Trip Ends - 2020 Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			53	14	11	13	11	5													6	1	1	1	5
OIG	260			3	10	7	9	7	3													2	0	0	0	2
UP	257			6	16	12	15	12	5													4	0	0	1	143
Berths 20-26 Ports America	1401	57	4	6						1	1	3	2	2								7	1	1	1	179
Berths 30-37 Trapac & Evergreen	259	15	10	17						1	1	2	1	1								4	0	1	1	113
Berths 55-56 Hanjin	1406	11	8	13						1	1	1	1	1								3	0	0	0	87
Berths 57-59 SSA	258	14	10	16						1	1	2	1	1								4	0	1	1	108
Berths 60-63 APL / Eagle	254	11	8	13						1	1	1	1	1								3	0	0	0	87
Berths 67-68 SSA	253	5	3	6						0	0	1	0	0								1	0	0	0	38
CC2	1415			1	0	0	0	0	0													0	0	0	0	
CC3	1416			1	0	0	0	0	0													0	0	0	0	
CE1- CE3	1408			2	1	1	1	1	0													1	0	0	0	
PL7	1414			1	1	1	1	1	0													1	0	0	0	
PL8 - PL9	171			1	1	1	1	1	0													1	0	0	0	
CW2 - CW3	162																									4
CC1	163																									7
CC4 - CC5	164																									9
PL1 - PL4	169																									5
PL5 - PL6	1412																									8
CN1	160																									5
CC6 - CC9	1410	9	3	6	6	4	3	4	3	1	0	0	1	1	1											12
CN3	1411	1	0	1	1	0	0	0	0	0	0	0	0	0	0											1
PL10	170	1	0	1	1	0	0	0	0	0	0	0	0	0	0											1
PL11	1407	1	0	1	1	1	0	1	0	0	0	0	0	0	0											2
Outside Port		7	3	213	169	106	82	102	82	36					4	6	8	5	7	5	11	1	1	2		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	4.6%	3.1%
Trucks at Marine Terminals	4.8%	5.1%

Note: the travel demand model is used to generate trips for cells showing "#N/A.

PM Truck Trip Ends - 2020 Project

	From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409				12	3	2	3	2	1													10	1	1	1	3
OIG	260				1	2	2	2	2	1													4	0	0	1	1
UP	257				1	3	3	3	3	1													6	1	1	1	234
Berths 20-26 Ports America	1401	27	2	3							1	1	2	1	1								3	0	0	0	87
Berths 30-37 Trapac & Evergreen	259	7	5	8							0	0	1	1	1								2	0	0	0	55
Berths 55-56 Hanjin	1406	5	4	6							0	0	1	1	1								2	0	0	0	42
Berths 57-59 SSA	258	7	5	8							0	0	1	1	1								2	0	0	0	53
Berths 60-63 APL / Eagle	254	5	4	6							0	0	1	1	1								2	0	0	0	42
Berths 67-68 SSA	253	2	2	3							0	0	0	0	0								1	0	0	0	19
CC2	1415				1	1	1	1	1	0													0	0	0	0	
CC3	1416				1	1	1	1	1	0													0	0	0	0	
CE1- CE3	1408				3	2	1	2	1	1													0	0	0	0	
PL7	1414				2	1	1	1	1	0													0	0	0	0	
PL8 - PL9	171				2	1	1	1	1	0													0	0	0	0	
CW2 - CW3	162																										2
CC1	163																										3
CC4 - CC5	164																										4
PL1 - PL4	169																										3
CN1	1412																										4
CN2	160																										2
CC6 - CC9	1410	5	2	3	1	1	1	1	1	0	0	0	0	0	0								5	2	3		6
CN3	1411	0	0	0	0	0	0	0	0	0	0	0	0	0	0								0	0	0		1
PL10	170	1	0	0	0	0	0	0	0	0	0	0	0	0	0								1	0	0		1
PL11	1407	1	0	0	0	0	0	0	0	0	0	0	0	0	0								1	0	0		1
Outside Port		1	1	134	37	23	18	22	18	8						1	1	2	1	2	1	11	1	1	2		
		Rail			Marine Terminals						Rail-to-Truck						Truck-to-Truck					T.S.	Truck Parking				

	Enter	Exit
Trucks at Rail Terminals	2.8%	4.9%
Trucks at Marine Terminals	1.1%	2.5%

Note: the travel demand model is used to generate trips for cells showing "#N/A.

AM Passenger Car Trip Ends - 2020 Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									12	
OIG	260																										8
UP	257																										12
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										18
CC3	1416																										18
CE1- CE3	1408																										31
PL7	1414																										25
PL8 - PL9	171																										35
CW2 - CW3	162																										45
CC1	163																										16
CC4 - CC5	164																										16
PL1 - PL4	169																										14
PL5 - PL6	1412																										16
CN1	160																										14
CN2	1410																										14
CC6 - CC9	1411																										58
CN3	170																										2
PL10	1407																										3
PL11																											3
Outside Port		26	17	25	67	42	32	41	32	14	68	68	118	96	133	211	60	60	52	80	68	40	5	6	7		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.		Truck Parking						

PM Passenger Car Trip Ends - 2020 Project

From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407	Outside Port			
	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11			
OGTIC	1409																									42		
OIG	260																										27	
UP	257																										40	
Berths 20-26 Ports America	1401																										31	
Berths 30-37 Trapac & Evergreen	259																										20	
Berths 55-56 Hanjin	1406																										15	
Berths 57-59 SSA	258																										19	
Berths 60-63 APL / Eagle	254																										15	
Berths 67-68 SSA	253																										7	
CC2	1415																										48	
CC3	1416																										49	
CE1- CE3	1408																										93	
PL7	1414																										73	
PL8 - PL9	171																										95	
CW2 - CW3	162																										194	
CC1	163																										42	
CC4 - CC5	164																										42	
PL1 - PL4	169																										36	
PL5 - PL6	1412																										102	
CN1	160																										86	
CN2	1410																										180	
CC6 - CC9	1411																										7	
CN3	170																										10	
PL10	1407																										12	
PL11	1407																										3	
Outside Port		11	7	11	67	42	32	41	32	14	16	16	31	24	32	38	14	14	12	27	23	135	2	3	3			
		Rail		Marine Terminals				Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking										

Daily Truck Trip Ends - 2035 No Project

		OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL/Eagle	Berths 67-68 SSA	CC2	CC3	CE1-CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	80% Port
From\To		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409				0	0	0	0	0	0																	0	
OIG	260				342	215	166	207	166	73																	62	
UP	257				561	352	272	339	272	120																	1,053	
Berths 20-26 F	1401	0	342	561							#N/A	#N/A	#N/A	#N/A	#N/A												2,107	
Berths 30-37 T	259	0	215	352							#N/A	#N/A	#N/A	#N/A	#N/A												1,323	
Berths 55-56 H	1406	0	166	272							#N/A	#N/A	#N/A	#N/A	#N/A												1,020	
Berths 57-59 S	258	0	207	339							#N/A	#N/A	#N/A	#N/A	#N/A												1,275	
Berths 60-63 A	254	0	166	272							#N/A	#N/A	#N/A	#N/A	#N/A												1,020	
Berths 67-68 S	253	0	73	120							#N/A	#N/A	#N/A	#N/A	#N/A												451	
CC2	1415				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
CC3	1416				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
CE1-CE3	1408				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
PL7	1414				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
PL8 - PL9	171				#N/A	#N/A	#N/A	#N/A	#N/A	#N/A																		
CW2 - CW3	162																											#N/A
CC1	163																											#N/A
CC4 - CC5	164																											#N/A
PL1 - PL4	169																											#N/A
PL5 - PL6	1412																											#N/A
CN1	160																											#N/A
CN2	1410	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
CC6 - CC9	1411	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
CN3	170	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
PL10	1407	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
PL11		#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A													#N/A
Outside Port		0	62	1,053	2,107	1,323	1,020	1,275	1,020	451						#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A		
80% Port																												
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking							

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Truck Trip Ends - 2035 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0													#N/A	#N/A	###	#N/A	0
OIG	260			33	21	16	20	16	7													#N/A	#N/A	###	#N/A	5
UP	257			54	34	26	33	26	12													#N/A	#N/A	###	#N/A	64
Berths 20-26 Ports America	1401	0	35	58						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	216
Berths 30-37 Trapac & Evergreen	259	0	22	36						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	136
Berths 55-56 Hanjin	1406	0	17	28						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	105
Berths 57-59 SSA	258	0	21	35						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	131
Berths 60-63 APL / Eagle	254	0	17	28						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	105
Berths 67-68 SSA	253	0	7	12						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	46
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL11																										#N/A
Outside Port		0	7	96	203	128	98	123	98	43					#N/A	###	###	###	#N/A	###	#N/A	#N/A	###	#N/A	#N/A	
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	4.6%	3.1%
Trucks at Marine Terminals	4.8%	5.1%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

PM Truck Trip Ends - 2035 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			0	0	0	0	0	0													#N/A	#N/A	###	#N/A	0
OIG	260			7	5	3	4	3	2													#N/A	#N/A	###	#N/A	3
UP	257			12	7	6	7	6	3													#N/A	#N/A	###	#N/A	106
Berths 20-26 Ports America	1401	0	17	28						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	105
Berths 30-37 Trapac & Evergreen	259	0	11	18						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	66
Berths 55-56 Hanjin	1406	0	8	14						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	51
Berths 57-59 SSA	258	0	10	17						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	63
Berths 60-63 APL / Eagle	254	0	8	14						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	51
Berths 67-68 SSA	253	0	4	6						#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	22
CC2	1415			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CC3	1416			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CE1- CE3	1408			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL7	1414			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
PL8 - PL9	171			#N/A	#N/A	#N/A	#N/A	#N/A	###													#N/A	#N/A	###	#N/A	#N/A
CW2 - CW3	162																									#N/A
CC1	163																									#N/A
CC4 - CC5	164																									#N/A
PL1 - PL4	169																									#N/A
PL5 - PL6	1412																									#N/A
CN1	160																									#N/A
CN2	1410	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CC6 - CC9	1411	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
CN3	170	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL10	1407	#N/A	###	#N/A	#N/A	#N/A	#N/A	#N/A	###	#N/A	#N/A	#N/A	#N/A	###								#N/A	#N/A	###	#N/A	#N/A
PL11																										#N/A
Outside Port		0	2	60	44	28	21	27	21	9					#N/A	###	###	###	#N/A	###	#N/A	#N/A	###	#N/A	#N/A	
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.	Truck Parking						

	Enter	Exit
Trucks at Rail Terminals	2.8%	4.9%
Trucks at Marine Terminals	1.1%	2.5%

Note: the travel demand model is used to generate trips for cells showing "#N/A".

AM Passenger Car Trip Ends - 2035 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									12	
OIG	260																										8
UP	257																										12
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										18
CC3	1416																										18
CE1- CE3	1408																										31
PL7	1414																										25
PL8 - PL9	171																										35
CW2 - CW3	162																										45
CC1	163																										16
CC4 - CC5	164																										16
PL1 - PL4	169																										14
PL5 - PL6	1412																										16
CN1	160																										14
CN2	1410																										14
CC6 - CC9	1411																										58
CN3	170																										2
PL10	1407																										3
PL11																											3
Outside Port		26	17	25	67	42	32	41	32	14	68	68	118	96	133	211	60	60	52	80	68	40	5	6	7		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.	Truck Parking							

PM Passenger Car Trip Ends - 2035 No Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									42	
OIG	260																										27
UP	257																										40
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										48
CC3	1416																										49
CE1- CE3	1408																										93
PL7	1414																										73
PL8 - PL9	171																										95
CW2 - CW3	162																										194
CC1	163																										42
CC4 - CC5	164																										42
PL1 - PL4	169																										36
PL5 - PL6	1412																										102
CN1	160																										86
CN2	1410																										180
CC6 - CC9	1411																										7
CN3	170																										10
PL10	1407																										12
PL11																											
Outside Port		11	7	11	67	42	32	41	32	14	16	16	31	24	32	38	14	14	12	27	23	135	2	3	3		
		Rail			Marine Terminals					Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking							

Daily Truck Trip Ends - 2035 Project

From\To		OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL/Eagle	Berths 67-68 SSA	CC2	CC3	CE1-CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	80% Port
		1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409				553	144	111	139	111	49													56	5	7	8	58	
OIG	260				247	232	179	224	179	79													58	5	7	8	60	
UP	257				405	381	293	366	293	130													95	9	12	13	1,796	
Berths 20-26 F	1401	553	247	405							12	12	32	22	22								66	6	8	9	1,806	
Berths 30-37 T	259	144	232	381							7	7	20	14	14								41	4	5	6	1,134	
Berths 55-56 H	1406	111	179	293							6	6	15	11	11								32	3	4	4	874	
Berths 57-59 S	258	139	224	366							7	7	19	13	14								40	4	5	6	1,093	
Berths 60-63 A	254	111	179	293							6	6	15	11	11								32	3	4	4	874	
Berths 67-68 S	253	49	79	130							3	3	7	5	5								14	1	2	2	386	
CC2	1415				12	7	6	7	6	3													2	0	0	0		
CC3	1416				12	7	6	7	6	3													2	0	0	0		
CE1-CE3	1408				32	20	15	19	15	7													5	0	1	1		
PL7	1414				22	14	11	13	11	5													4	0	0	1		
PL8 - PL9	171				22	14	11	14	11	5													4	0	0	1		
CW2 - CW3	162																										40	
CC1	163																										67	
CC4 - CC5	164																										88	
PL1 - PL4	169																										53	
PL5 - PL6	1412																										74	
CN1	160																										48	
CC6 - CC9	1410	56	58	95	66	41	32	40	32	14	2	2	5	4	4												113	564
CN3	1411	5	5	9	6	4	3	4	3	1	0	0	0	0	0												10	51
PL10	170	7	7	12	8	5	4	5	4	2	0	0	1	0	0												14	69
PL11	1407	8	8	13	9	6	4	6	4	2	0	0	1	1	1												16	79
Outside Port		58	60	1,796	1,806	1,134	874	1,093	874	386						40	67	87.5	52.5	74	48	113	10	14	16			
80% Port																							564	51	69	79		
		Rail			Marine Terminals					Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking								

Note: the travel demand model is used to generate trips for cells showing "#N/A.

AM Truck Trip Ends - 2035 Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			53	14	11	13	11	5													3	0	0	0	5
OIG	260			24	22	17	22	17	8													4	0	0	1	5
UP	257			39	37	28	35	28	12													6	1	1	1	109
Berths 20-26 Ports America	1401	57	25	41						1	1	3	2	2								7	1	1	1	185
Berths 30-37 Trapac & Evergreen	259	15	24	39						1	1	2	1	1								4	0	1	1	116
Berths 55-56 Hanjin	1406	11	18	30						1	1	1	1	1								3	0	0	0	90
Berths 57-59 SSA	258	14	23	38						1	1	2	1	1								4	0	1	1	112
Berths 60-63 APL / Eagle	254	11	18	30						1	1	1	1	1								3	0	0	0	90
Berths 67-68 SSA	253	5	8	13						0	0	1	0	0								1	0	0	0	40
CC2	1415			1	0	0	0	0	0													0	0	0	0	
CC3	1416			1	0	0	0	0	0													0	0	0	0	
CE1- CE3	1408			2	1	1	1	1	0													1	0	0	0	
PL7	1414			1	1	1	1	1	0													0	0	0	0	
PL8 - PL9	171			1	1	1	1	1	0													0	0	0	0	
CW2 - CW3	162																									4
CC1	163																									7
CC4 - CC5	164																									9
PL1 - PL4	169																									5
PL5 - PL6	1412																									8
CN1	160																									5
CC6 - CC9	1410	5	5	9	6	4	3	4	3	1	0	0	1	0	0											12
CN3	1411	0	0	1	1	0	0	0	0	0	0	0	0	0	0											1
PL10	170	1	1	1	1	0	0	0	0	0	0	0	0	0	0											1
PL11	1407	1	1	1	1	1	0	1	0	0	0	0	0	0	0											2
Outside Port		7	7	162	174	109	84	105	84	37					4	6	8	5	7	5	11	1	1	2		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck					T.S.	Truck Parking					

	Enter	Exit
Trucks at Rail Terminals	4.6%	3.1%
Trucks at Marine Terminals	4.8%	5.1%

Note: the travel demand model is used to generate trips for cells showing "#N/A.

PM Truck Trip Ends - 2035 Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port
From\To	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407		
OGTIC	1409			12	3	2	3	2	1													5	0	1	1	3
OIG	260			5	5	4	5	4	2													6	1	1	1	3
UP	257			9	8	6	8	6	3													9	1	1	1	182
Berths 20-26 Ports America	1401	27	12	20						1	1	2	1	1								3	0	0	0	90
Berths 30-37 Trapac & Evergreen	259	7	12	19						0	0	1	1	1								2	0	0	0	56
Berths 55-56 Hanjin	1406	5	9	15						0	0	1	1	1								2	0	0	0	43
Berths 57-59 SSA	258	7	11	18						0	0	1	1	1								2	0	0	0	54
Berths 60-63 APL / Eagle	254	5	9	15						0	0	1	1	1								2	0	0	0	43
Berths 67-68 SSA	253	2	4	6						0	0	0	0	0								1	0	0	0	19
CC2	1415			1	1	1	1	1	0													0	0	0	0	
CC3	1416			1	1	1	1	1	0													0	0	0	0	
CE1- CE3	1408			3	2	1	2	1	1													0	0	0	0	
PL7	1414			2	1	1	1	1	0													0	0	0	0	
PL8 - PL9	171			2	1	1	1	1	0													0	0	0	0	
CW2 - CW3	162																									2
CC1	163																									3
CC4 - CC5	164																									4
PL1 - PL4	169																									3
CN1	1412																									4
CN2	160																									2
CC6 - CC9	1410	3	3	5	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
CN3	1411	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
PL10	170	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
PL11	1407	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Outside Port		1	2	104	38	24	18	23	18	8					1	1	2	1	2	1	11	1	1	2		
		Rail		Marine Terminals					Rail-to-Truck				Truck-to-Truck				T.S.	Truck Parking								

	Enter	Exit
Trucks at Rail Terminals	2.8%	4.9%
Trucks at Marine Terminals	1.1%	2.5%

Note: the travel demand model is used to generate trips for cells showing "#N/A.

AM Passenger Car Trip Ends - 2035 Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									12	
OIG	260																										8
UP	257																										12
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										18
CC3	1416																										18
CE1- CE3	1408																										31
PL7	1414																										25
PL8 - PL9	171																										35
CW2 - CW3	162																										45
CC1	163																										16
CC4 - CC5	164																										16
PL1 - PL4	169																										14
PL5 - PL6	1412																										16
CN1	160																										14
CN2	1410																										58
CC6 - CC9	1411																										2
CN3	170																										3
PL10	1407																										3
PL11																											3
Outside Port		26	17	25	67	42	32	41	32	14	68	68	118	96	133	211	60	60	52	80	68	40	5	6	7		
		Rail			Marine Terminals					Rail-to-Truck					Truck-to-Truck				T.S.		Truck Parking						

PM Passenger Car Trip Ends - 2035 Project

From\To	OGTIC	OIG	UP	Berths 20-26 Ports America	Berths 30-37 Trapac & Evergreen	Berths 55-56 Hanjin	Berths 57-59 SSA	Berths 60-63 APL / Eagle	Berths 67-68 SSA	CC2	CC3	CE1- CE3	PL7	PL8 - PL9	CW2 - CW3	CC1	CC4 - CC5	PL1 - PL4	PL5 - PL6	CN1	CN2	CC6 - CC9	CN3	PL10	PL11	Outside Port	
	1409	260	257	1401	259	1406	258	254	253	1415	1416	1408	1414	171	162	163	164	169	1412	160	1410	1411	170	1407			
OGTIC	1409																									42	
OIG	260																										27
UP	257																										40
Berths 20-26 Ports America	1401																										31
Berths 30-37 Trapac & Evergreen	259																										20
Berths 55-56 Hanjin	1406																										15
Berths 57-59 SSA	258																										19
Berths 60-63 APL / Eagle	254																										15
Berths 67-68 SSA	253																										7
CC2	1415																										48
CC3	1416																										49
CE1- CE3	1408																										93
PL7	1414																										73
PL8 - PL9	171																										95
CW2 - CW3	162																										194
CC1	163																										42
CC4 - CC5	164																										42
PL1 - PL4	169																										36
PL5 - PL6	1412																										102
CN1	160																										86
CN2	1410																										180
CC6 - CC9	1411																										7
CN3	170																										10
PL10	1407																										12
PL11																											
Outside Port		11	7	11	67	42	32	41	32	14	16	16	31	24	32	38	14	14	12	27	23	135	2	3	3		
		Rail		Marine Terminals				Rail-to-Truck				Truck-to-Truck				T.S.		Truck Parking									

APPENDIX B - 4

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Travel Forecasting Methodology – Oakland Army Base Reuse EIR

Travel forecasts were prepared for the Oakland Army Base project using the most current version of the Alameda CTC Countywide Travel Demand Model (the Model). The Model was recently updated (June 2011) with socio-demographic data consistent with the most recent ABAG Projections 2009. The regional transportation network is consistent with the latest MTC Regional Transportation Plan and the countywide network conforms to the latest Alameda Countywide Plan.

The Model was calibrated for year 2000 conditions, and validated for 2005 conditions to regional and local screenlines using 2005 counts. Forecasts were developed for 2020 and 2035 conditions.

The model is a standard 4-step model with trip generation, trip distribution, mode choice and trip assignment that are consistent with the MTC Regional BAYCAST-90 model system.

The trip generation process uses calibrated rates by trip purpose derived from the MTC 2000 Household Survey to compute person trips based on households and population at the production end, and six categories of employment at the attraction end. Truck trips are forecast based on a special generator module that pinpoints truck activity from origin-destination surveys and truck counts and allocates these to special truck generators like the Port of Oakland, Oakland Airport and external Bay area destinations.

Trips are distributed based on the standard gravity type model that was calibrated using the surveyed trip length frequency distribution. The distributed trips are then split into walk, bike, and auto and transit modes prior to assigning them onto the highway and transit networks. Trip assignment in the model is performed for multiple time periods including, a.m. 1-hour, p.m. 1-hour and daily conditions.

Detailed documentation for the Alameda CTC countywide model and the MTC BAYCAST-90 model are available on the respective websites.

Kittelsohn staff reviewed the model inputs against the project description in the study area for accuracy and compared these to traffic counts and roadway configurations from recent Google aeriels. Based on a review of the project plans, it was determined that the traffic analysis would benefit from additional traffic analysis zones (TAZs) and added network detail to better represent the project site. A total of 20 finer TAZs were added in the project area together with additional network to better define zonal access, cross streets and project circulation. In addition, minor coding corrections were made to the network to reflect any recent roadway improvements that were not accurately reflected, including the Grand Avenue street improvements, 7th Street improvements, turn prohibitions at Powell Street and Frontage Road.

Model data sets were developed for all analysis scenarios, including:

1. Existing Year (2012) no-project
2. Existing year (2012) plus project
3. 2020 no-project
4. 2020 plus project
5. 2035 no-project

6. 2035 plus project

Estimates of land use (primarily jobs), trucks and cars were derived for the project area for both no project and plus project conditions. No projects estimates were based on the 1995 baseline conditions identified in the previous EIR conducted in 2001.

Truck travel within the Port and to areas outside the Port were also computed based on information on operational Origin-Destination patterns and ITE trip generation.

The data estimates were input into the model for each scenario and used to develop the regional trip generation, trip distribution and mode choice projections for each horizon year and project scenario. Then prior to the trip assignment step, estimates of Port and Project vicinity traffic (estimates of trucks and cars) based on ITE trip generation were manually added into the model using a Fratar matrix methodology to override the raw model estimates and hence improve the project area traffic assignments.

Finally, the trip assignment results were extracted for the 49 study intersections and reviewed for growth and accuracy. The intersection volumes were then manually adjusted using appropriate NCHRP-255 methods (industry standard incremental adjustment with furness balancing technique) to minimize the base year model error against counts. The adjustments were done using the Kittelson/Dowling TURNS 2.0 software. The resulting adjusted turn volumes for each scenario were imported into the SYNCHRO intersection analysis model. Following one round of level of service analysis, it was determined that the unconstrained trip assignments from the model were greatly overpredicting future baseline traffic compared to available capacity with many intersections exceeding LOS F conditions. This was due to the model forecasting volume to capacity ratios far exceeding v/c of 1.0, and in some cases of $v/c > 1.80$ at key regional roads and gateways. In reality, this oversaturated demand would either tend to form long queues or would spread outside the peak 1-hour of travel. In order to develop more realistic future baseline forecasts with v/c ratios approaching 1.0 at the most congested locations, the Alameda CTC had developed a constrained methodology reviews link flows and v/c ratios and peak spreads the future demand to provide more realistic operations level traffic projections for the study intersections.

Implementation of the model trip assignment constraining procedure resulted in more reasonable future baseline (no project) forecasts and level of service conditions. The constrained methodology was not applied to the plus project conditions that it was felt this would mask the project contribution and therefore not produce the most conservative conditions necessary for the traffic analysis.

The plus project conditions were analyzed using a different methodology. In order to maintain the most conservative estimates for the plus project conditions as possible, the plus project scenarios were analyzed using unconstrained trip assignments. And in order to minimize any model oscillations associated with diversions, a select zone analysis was conducted for all project related TAZs under both no project and plus project conditions to determine the project increment. The project increment or delta between the select zone assignments between the plus project and no project runs was then added to the constrained adjusted future baseline traffic volumes to develop future plus project

volumes. For the Existing plus project scenario, the above project increment from 2020 was added to the existing year counts. Finally, any negative differences (plus project volumes lower than no project volumes) were “floored” to the no project traffic estimates. This methodology ensured the project was analyzed using the most conservative estimates possible, while keeping any model diversions or model oscillations between the two runs to a minimum. The finalized adjusted no project and plus project traffic forecasts for each future year and for all intersection turn movements for all 49 study intersections were finally imported into the SYNCHRO model for intersection LOS and HCM analysis for link level LOS.

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APPENDIX B - 5

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HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗		↖	↖	↖	↖	↗	↗
Volume (vph)	18	152	178	218	489	48	32	16	65	20	20	10
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3539	975	1570	3489		1633	1062	792	1805	1768	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3539	975	1570	3489		1633	1062	792	1805	1768	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	165	193	237	532	52	35	17	71	22	22	11
RTOR Reduction (vph)	0	0	139	0	4	0	0	0	61	0	10	0
Lane Group Flow (vph)	20	165	54	237	580	0	26	26	10	22	23	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	2%	62%	15%	2%	0%	5%	100%	100%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	1.0	17.3	17.3	15.9	32.2		8.3	8.3	8.3	3.6	3.6	
Effective Green, g (s)	1.0	17.3	17.3	15.9	32.2		8.3	8.3	8.3	3.6	3.6	
Actuated g/C Ratio	0.02	0.28	0.28	0.26	0.52		0.13	0.13	0.13	0.06	0.06	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	29	994	274	405	1824		220	143	107	105	103	
v/s Ratio Prot	0.01	0.05		c0.15	c0.17		0.02	c0.02		0.01	c0.01	
v/s Ratio Perm			0.06						0.01			
v/c Ratio	0.69	0.17	0.20	0.59	0.32		0.12	0.18	0.09	0.21	0.22	
Uniform Delay, d1	30.1	16.7	16.9	20.0	8.4		23.4	23.6	23.3	27.6	27.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	51.3	0.1	0.6	2.2	0.2		0.3	0.8	0.5	1.0	1.1	
Delay (s)	81.4	16.8	17.5	22.1	8.6		23.8	24.5	23.8	28.6	28.7	
Level of Service	F	B	B	C	A		C	C	C	C	C	
Approach Delay (s)		20.6			12.5			24.0			28.7	
Approach LOS		C			B			C			C	

Intersection Summary

HCM Average Control Delay	16.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	61.6	Sum of lost time (s)	11.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	170	41	107	537	221	119	110	174	148	110	76
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.91		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3379		1271	3406	1553	1752	2271		1787	2850	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	3379		1271	3406	1553	1752	2271		1787	2850	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	185	45	116	584	240	129	120	189	161	120	83
RTOR Reduction (vph)	0	31	0	0	0	151	0	158	0	0	74	0
Lane Group Flow (vph)	43	199	0	116	584	89	129	151	0	161	129	0
Confl. Peds. (#/hr)			5									
Heavy Vehicles (%)	1%	3%	5%	42%	6%	4%	3%	45%	44%	1%	32%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	1.9	16.7		5.7	20.5	20.5	10.3	9.2		7.3	6.2	
Effective Green, g (s)	1.9	16.7		5.7	20.5	20.5	10.3	9.2		7.3	6.2	
Actuated g/C Ratio	0.03	0.30		0.10	0.37	0.37	0.19	0.17		0.13	0.11	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	61	1019		131	1260	575	326	377		235	319	
v/s Ratio Prot	0.02	0.06		c0.09	c0.17		c0.07	0.07		c0.09	0.05	
v/s Ratio Perm						0.06						
v/c Ratio	0.70	0.19		0.89	0.46	0.15	0.40	0.40		0.69	0.41	
Uniform Delay, d1	26.5	14.4		24.5	13.3	11.7	19.8	20.6		23.0	22.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	31.8	0.2		46.3	0.5	0.2	0.9	0.8		8.3	1.0	
Delay (s)	58.3	14.5		70.9	13.7	11.9	20.8	21.5		31.3	23.9	
Level of Service	E	B		E	B	B	C	C		C	C	
Approach Delay (s)		21.4			20.3			21.3			27.1	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	7.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012

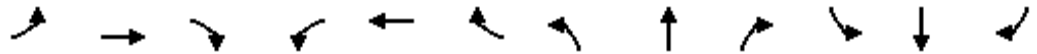


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑	↑↑						↑↑	
Volume (vph)	0	447	71	171	623	0	0	0	0	16	141	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.98		1.00	1.00						0.93	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		4891		1798	3343						3145	
Flt Permitted		1.00		0.43	1.00						1.00	
Satd. Flow (perm)		4891		814	3343						3145	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	486	77	186	677	0	0	0	0	17	153	157
RTOR Reduction (vph)	0	20	0	0	0	0	0	0	0	0	121	0
Lane Group Flow (vph)	0	543	0	186	677	0	0	0	0	0	206	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	6%	4%	1%	0%	8%	1%	0%	0%	0%	2%	0%	11%
Turn Type		NA		Perm	NA						Perm	NA
Protected Phases		4			8							6
Permitted Phases				8						6		
Actuated Green, G (s)		23.3		23.3	23.3							9.8
Effective Green, g (s)		23.3		23.3	23.3							9.8
Actuated g/C Ratio		0.54		0.54	0.54							0.23
Clearance Time (s)		5.0		5.0	5.0							5.0
Vehicle Extension (s)		2.0		2.0	2.0							2.0
Lane Grp Cap (vph)		2644		440	1807							715
v/s Ratio Prot		0.11			0.20							
v/s Ratio Perm				0.23								0.07
v/c Ratio		0.21		0.42	0.37							0.29
Uniform Delay, d1		5.1		5.9	5.7							13.8
Progression Factor		1.00		0.40	0.35							1.00
Incremental Delay, d2		0.0		0.2	0.0							0.1
Delay (s)		5.1		2.6	2.0							13.8
Level of Service		A		A	A							B
Approach Delay (s)		5.1			2.2			0.0				13.8
Approach LOS		A			A			A				B
Intersection Summary												
HCM Average Control Delay			5.3		HCM Level of Service					A		
HCM Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			43.1		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			46.3%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	113	350	0	0	729	31	65	91	83	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.95				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5021			5050			3291				
Flt Permitted		0.72			1.00			0.99				
Satd. Flow (perm)		3654			5050			3291				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	123	380	0	0	792	34	71	99	90	0	0	0
RTOR Reduction (vph)	0	0	0	0	4	0	0	70	0	0	0	0
Lane Group Flow (vph)	0	503	0	0	822	0	0	190	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		23.3			23.3			9.8				
Effective Green, g (s)		23.3			23.3			9.8				
Actuated g/C Ratio		0.54			0.54			0.23				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1975			2730			748				
v/s Ratio Prot					0.16							
v/s Ratio Perm		0.14						0.06				
v/c Ratio		0.25			0.30			0.25				
Uniform Delay, d1		5.3			5.4			13.7				
Progression Factor		0.32			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.1				
Delay (s)		1.7			5.5			13.7				
Level of Service		A			A			B				
Approach Delay (s)		1.7			5.5			13.7			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	43.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕			↕↕↕			↕↕			↕↕	
Volume (vph)	52	227	42	34	329	31	193	630	34	42	147	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		4885			4844			3540			3498	
Flt Permitted		0.83			0.89			0.81			0.62	
Satd. Flow (perm)		4109			4332			2893			2184	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	247	46	37	358	34	210	685	37	46	160	29
RTOR Reduction (vph)	0	19	0	0	13	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	331		0	416		0	929		0	221	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		47.5			47.5			24.0			24.0	
Effective Green, g (s)		47.5			47.5			24.0			24.0	
Actuated g/C Ratio		0.59			0.59			0.30			0.30	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2440			2572			868			655	
v/s Ratio Prot												
v/s Ratio Perm		0.08			c0.10			c0.32			0.10	
v/c Ratio		0.14			0.16			1.07			0.34	
Uniform Delay, d1		7.2			7.3			28.0			21.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.1			51.0			1.4	
Delay (s)		7.3			7.4			79.0			23.2	
Level of Service		A			A			E			C	
Approach Delay (s)		7.3			7.4			79.0			23.2	
Approach LOS		A			A			E			C	

Intersection Summary

HCM Average Control Delay	43.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕↕	↗
Volume (vph)	24	447	40	91	800	39	87	197	82	13	212	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)		3437	1502		3227	1547	1674	1845	1574		1859	1559
Flt Permitted		0.88	1.00		0.83	1.00	0.31	1.00	1.00		0.98	1.00
Satd. Flow (perm)		3034	1502		2677	1547	554	1845	1574		1822	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	486	43	99	870	42	95	214	89	14	230	42
RTOR Reduction (vph)	0	0	12	0	0	8	0	0	73	0	0	34
Lane Group Flow (vph)	0	512	31	0	969	34	95	214	16	0	244	8
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	3%	39%	8%	0%	7%	3%	0%	0%	2%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		64.4	64.4		64.4	64.4	16.6	16.6	16.6		16.6	16.6
Effective Green, g (s)		64.4	64.4		64.4	64.4	16.6	16.6	16.6		16.6	16.6
Actuated g/C Ratio		0.72	0.72		0.72	0.72	0.18	0.18	0.18		0.18	0.18
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		2171	1075		1916	1107	102	340	290		336	288
v/s Ratio Prot								0.12				
v/s Ratio Perm		0.17	0.02		0.36	0.02	0.17		0.01		0.13	0.00
v/c Ratio		0.24	0.03		0.51	0.03	0.93	0.63	0.06		0.73	0.03
Uniform Delay, d1		4.4	3.7		5.7	3.7	36.1	33.9	30.2		34.6	30.1
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		0.3	0.0		1.0	0.1	66.4	2.6	0.0		6.5	0.0
Delay (s)		4.6	3.8		6.7	3.8	102.6	36.5	30.3		41.0	30.1
Level of Service		A	A		A	A	F	D	C		D	C
Approach Delay (s)		4.6			6.5			50.9			39.4	
Approach LOS		A			A			D			D	

Intersection Summary

HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	14	488	43	13	693	59	49	382	28	214	462	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	0.99	1.00	1.00	1.00	1.00		0.99	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3437	1510	1792	3252	1555	1663	3535		1775	3500	
Flt Permitted		0.93	1.00	0.41	1.00	1.00	0.35	1.00		0.45	1.00	
Satd. Flow (perm)		3204	1510	782	3252	1555	618	3535		838	3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	530	47	14	753	64	53	415	30	233	502	73
RTOR Reduction (vph)	0	0	22	0	0	25	0	8	0	0	18	0
Lane Group Flow (vph)	0	545	25	14	753	39	53	437	0	233	557	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	5%	4%	0%	11%	1%	8%	1%	0%	1%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		45.7	45.7	45.7	45.7	45.7	29.8	29.8		29.8	29.8	
Effective Green, g (s)		45.7	45.7	45.7	45.7	45.7	29.8	29.8		29.8	29.8	
Actuated g/C Ratio		0.54	0.54	0.54	0.54	0.54	0.35	0.35		0.35	0.35	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1723	812	420	1748	836	217	1239		294	1227	
v/s Ratio Prot					c0.23			0.12				0.16
v/s Ratio Perm		0.17	0.02	0.02		0.02	0.09			c0.28		
v/c Ratio		0.32	0.03	0.03	0.43	0.05	0.24	0.35		0.79	0.45	
Uniform Delay, d1		10.9	9.2	9.3	11.8	9.3	19.6	20.4		24.8	21.3	
Progression Factor		1.00	1.00	1.09	0.79	1.38	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.1	0.1	0.8	0.1	1.2	0.4		14.3	0.4	
Delay (s)		11.4	9.3	10.2	10.2	13.0	20.8	20.8		39.1	21.7	
Level of Service		B	A	B	B	B	C	C		D	C	
Approach Delay (s)		11.3			10.4			20.8			26.7	
Approach LOS		B			B			C			C	

Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	
Volume (vph)	52	702	35	12	529	35	36	85	85	27	135	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	1797	3471	1579	1681	3610	1579		3551	1362		3287	
Flt Permitted	0.44	1.00	1.00	0.35	1.00	1.00		0.69	1.00		0.92	
Satd. Flow (perm)	824	3471	1579	627	3610	1579		2501	1362		3034	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	763	38	13	575	38	39	92	92	29	147	175
RTOR Reduction (vph)	0	0	9	0	0	9	0	0	79	0	150	0
Lane Group Flow (vph)	57	763	29	13	575	29	0	131	13	0	201	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	7%	0%	0%	0%	0%	16%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	64.5	64.5	64.5	64.5	64.5	64.5		12.0	12.0		12.0	
Effective Green, g (s)	64.5	64.5	64.5	64.5	64.5	64.5		12.0	12.0		12.0	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76		0.14	0.14		0.14	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	625	2634	1198	476	2739	1198		353	192		428	
v/s Ratio Prot		c0.22			0.16							
v/s Ratio Perm	0.07		0.02	0.02		0.02		0.05	0.01		c0.07	
v/c Ratio	0.09	0.29	0.02	0.03	0.21	0.02		0.37	0.07		0.47	
Uniform Delay, d1	2.7	3.2	2.5	2.5	2.9	2.5		33.1	31.6		33.6	
Progression Factor	1.00	1.22	0.91	2.03	2.48	3.38		1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3	0.0	0.1	0.2	0.0		0.2	0.1		0.3	
Delay (s)	2.9	4.1	2.3	5.2	7.4	8.6		33.3	31.7		33.9	
Level of Service	A	A	A	A	A	A		C	C		C	
Approach Delay (s)		4.0			7.5			32.7			33.9	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	191	532	671	60	645	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3343	3374	1492	3387	1323
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3343	3374	1492	3387	1323
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	578	729	65	701	254
RTOR Reduction (vph)	0	0	0	30	4	167
Lane Group Flow (vph)	208	578	729	35	722	62
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	8%	7%	5%	3%	8%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	14.1	53.9	35.8	35.8	23.1	23.1
Effective Green, g (s)	14.1	53.9	35.8	35.8	23.1	23.1
Actuated g/C Ratio	0.17	0.63	0.42	0.42	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	294	2120	1421	628	920	360
v/s Ratio Prot	c0.12	0.17	c0.22		c0.21	
v/s Ratio Perm				0.02		0.05
v/c Ratio	0.71	0.27	0.51	0.06	0.79	0.17
Uniform Delay, d1	33.5	6.9	18.2	14.6	28.7	23.6
Progression Factor	0.93	1.58	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.3	1.3	0.2	4.1	0.1
Delay (s)	37.2	11.2	19.5	14.8	32.8	23.7
Level of Service	D	B	B	B	C	C
Approach Delay (s)		18.1	19.1		30.6	
Approach LOS		B	B		C	

Intersection Summary

HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗↘	↑↑	↗	↗↘	↑↑	↗		↖↗↘	↗		↖↗↘	↗
Volume (vph)	57	239	128	484	704	124	63	717	244	8	1131	78
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)	3502	3505	1532	3502	3574	1532		5113	1517		5084	1532
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.93	1.00
Satd. Flow (perm)	3502	3505	1532	3502	3574	1532		3564	1517		4737	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	260	139	526	765	135	68	779	265	9	1229	85
RTOR Reduction (vph)	0	0	5	0	0	59	0	0	173	0	0	31
Lane Group Flow (vph)	62	260	134	526	765	76	0	847	92	0	1238	54
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	3%	0%	0%	1%	0%	1%	1%	1%	0%	2%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		2	6		6
Actuated Green, G (s)	5.9	31.8	31.8	11.8	37.7	37.7		31.4	31.4		31.4	31.4
Effective Green, g (s)	5.9	31.8	31.8	11.8	37.7	37.7		31.4	31.4		31.4	31.4
Actuated g/C Ratio	0.07	0.35	0.35	0.13	0.42	0.42		0.35	0.35		0.35	0.35
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	1238	541	459	1497	642		1243	529		1653	534
v/s Ratio Prot	0.02	0.07		c0.15	c0.21							
v/s Ratio Perm			c0.09			0.05		0.24	0.06		c0.26	0.04
v/c Ratio	0.27	0.21	0.25	1.15	0.51	0.12		0.68	0.17		0.75	0.10
Uniform Delay, d1	40.0	20.3	20.6	39.1	19.3	16.0		25.0	20.3		25.8	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.4	1.1	88.5	1.2	0.4		1.6	0.2		1.9	0.1
Delay (s)	40.6	20.7	21.7	127.6	20.6	16.4		26.6	20.5		27.7	19.9
Level of Service	D	C	C	F	C	B		C	C		C	B
Approach Delay (s)		23.7			59.7			25.1			27.2	
Approach LOS		C			E			C			C	

Intersection Summary

HCM Average Control Delay	37.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗		↖	↗	
Volume (vph)	84	118	30	69	124	147	19	104	72	79	74	2
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	902	1880	795	976	2028	1015	902	1720		950	1847	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	902	1880	795	976	2028	1015	902	1720		950	1847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	128	33	75	135	160	21	113	78	86	80	2
RTOR Reduction (vph)	0	0	26	0	0	127	0	60	0	0	1	0
Lane Group Flow (vph)	91	128	7	75	135	33	21	131	0	86	81	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	100%	92%	100%	85%	78%	56%	100%	97%	94%	90%	97%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						
Actuated Green, G (s)	10.9	15.4	15.4	9.5	14.0	14.0	2.9	15.5		10.4	23.0	
Effective Green, g (s)	10.9	15.4	15.4	9.5	14.0	14.0	2.9	15.5		10.4	23.0	
Actuated g/C Ratio	0.16	0.23	0.23	0.14	0.21	0.21	0.04	0.23		0.15	0.34	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	145	427	181	137	419	210	39	393		146	627	
v/s Ratio Prot	c0.10	c0.07		0.08	0.07		0.02	c0.08		c0.09	0.04	
v/s Ratio Perm			0.01			0.03						
v/c Ratio	0.63	0.30	0.04	0.55	0.32	0.16	0.54	0.33		0.59	0.13	
Uniform Delay, d1	26.6	21.7	20.4	27.1	22.9	22.1	31.8	21.8		26.7	15.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.2	0.4	0.1	4.4	0.4	0.4	13.5	0.5		6.0	0.1	
Delay (s)	34.8	22.1	20.5	31.6	23.3	22.4	45.3	22.3		32.7	15.6	
Level of Service	C	C	C	C	C	C	D	C		C	B	
Approach Delay (s)		26.5			24.6			24.6			24.3	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	67.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖↗	↑↑		
Volume (vph)	82	80	159	615	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1760		3303	2075		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1760		3303	2075		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	87	173	668	0	0
RTOR Reduction (vph)	49	0	0	0	0	0
Lane Group Flow (vph)	127	0	173	668	0	0
Heavy Vehicles (%)	84%	96%	6%	74%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	9.3		3.9	21.2		
Effective Green, g (s)	9.3		3.9	21.2		
Actuated g/C Ratio	0.44		0.18	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	772		608	2075		
v/s Ratio Prot	0.07		0.05	0.32		
v/s Ratio Perm						
v/c Ratio	0.16		0.28	0.32		
Uniform Delay, d1	3.6		7.4	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.1		0.3	0.1		
Delay (s)	3.7		7.7	0.1		
Level of Service	A		A	A		
Approach Delay (s)	3.7			1.7	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	2.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	21.2	Sum of lost time (s)	0.0
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑		↘	↔		↘		↗
Volume (vph)	34	30	0	0	147	124	277	195	91	83	0	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.93		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (prot)	960	2099			2907		978	2752		1770		1588
Flt Permitted	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (perm)	960	2099			2907		978	2752		1770		1588
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	33	0	0	160	135	301	212	99	90	0	207
RTOR Reduction (vph)	0	0	0	0	107	0	0	33	0	0	0	175
Lane Group Flow (vph)	37	33	0	0	188	0	205	374	0	90	0	32
Heavy Vehicles (%)	88%	72%	0%	0%	28%	1%	68%	6%	2%	2%	0%	79%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	2.6	18.0			11.4		16.7	16.7		8.4		8.4
Effective Green, g (s)	2.6	18.0			11.4		16.7	16.7		8.4		8.4
Actuated g/C Ratio	0.05	0.33			0.21		0.30	0.30		0.15		0.15
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	45	686			601		296	834		270		242
v/s Ratio Prot	c0.04	0.02			c0.06		c0.21	0.14		c0.05		0.02
v/s Ratio Perm												
v/c Ratio	0.82	0.05			0.31		0.69	0.45		0.33		0.13
Uniform Delay, d1	26.0	12.7			18.5		16.9	15.5		20.8		20.2
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	70.2	0.0			0.3		6.8	0.4		0.7		0.2
Delay (s)	96.2	12.7			18.8		23.8	15.9		21.6		20.4
Level of Service	F	B			B		C	B		C		C
Approach Delay (s)		56.8			18.8			18.5			20.8	
Approach LOS		E			B			B			C	

Intersection Summary

HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	19	334	14	4	300	27	45	10	5	28	14	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			0.99	1.00		0.99	
Frt		0.99			0.99			1.00	0.85		0.96	
Flt Protected		1.00			1.00			0.96	1.00		0.98	
Satd. Flow (prot)		3121			3207			1808	1575		1764	
Flt Permitted		0.93			0.95			0.77	1.00		0.87	
Satd. Flow (perm)		2902			3055			1453	1575		1571	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	363	15	4	326	29	49	11	5	30	15	17
RTOR Reduction (vph)	0	3	0	0	7	0	0	0	4	0	13	0
Lane Group Flow (vph)	0	396	0	0	352	0	0	60	1	0	49	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	16%	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		69.0			69.0			23.0	23.0			23.0
Effective Green, g (s)		69.0			69.0			23.0	23.0			23.0
Actuated g/C Ratio		0.69			0.69			0.23	0.23			0.23
Clearance Time (s)		4.0			4.0			4.0	4.0			4.0
Lane Grp Cap (vph)		2002			2108			334	362			361
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.12			c0.04	0.00			0.03
v/c Ratio		0.20			0.17			0.18	0.00			0.14
Uniform Delay, d1		5.6			5.4			30.9	29.7			30.6
Progression Factor		1.00			0.89			1.00	1.00			1.00
Incremental Delay, d2		0.2			0.2			1.2	0.0			0.8
Delay (s)		5.8			5.0			32.1	29.7			31.4
Level of Service		A			A			C	C			C
Approach Delay (s)		5.8			5.0			31.9				31.4
Approach LOS		A			A			C				C

Intersection Summary

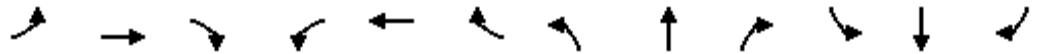
HCM Average Control Delay	9.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	323	21	172	308	44	12	47	59	72	89	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1688		1805	3375			1728		1787	1817	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.45	1.00	
Satd. Flow (perm)	1805	1688		1805	3375			1670		847	1817	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	351	23	187	335	48	13	51	64	78	97	32
RTOR Reduction (vph)	0	2	0	0	7	0	0	42	0	0	14	0
Lane Group Flow (vph)	39	372	0	187	376	0	0	86	0	78	115	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	12%	0%	0%	5%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	3.6	62.3		14.8	73.5			11.9		11.9	11.9	
Effective Green, g (s)	3.6	62.3		14.8	73.5			11.9		11.9	11.9	
Actuated g/C Ratio	0.04	0.62		0.15	0.74			0.12		0.12	0.12	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	65	1052		267	2481			199		101	216	
v/s Ratio Prot	c0.02	c0.22		c0.10	0.11							0.06
v/s Ratio Perm								0.05		c0.09		
v/c Ratio	0.60	0.35		0.70	0.15			0.43		0.77	0.53	
Uniform Delay, d1	47.5	9.1		40.5	4.0			40.9		42.7	41.4	
Progression Factor	0.89	0.92		0.64	3.29			1.00		1.00	1.00	
Incremental Delay, d2	9.5	0.9		6.2	0.1			0.5		27.6	1.3	
Delay (s)	51.7	9.3		32.3	13.1			41.5		70.3	42.7	
Level of Service	D	A		C	B			D		E	D	
Approach Delay (s)		13.3			19.4			41.5			53.1	
Approach LOS		B			B			D			D	

Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	423	8	226	563	21	14	41	112	11	46	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1797	3248		1747	3453			1874	1524		1827	
Flt Permitted	0.34	1.00		0.43	1.00			0.95	1.00		0.97	
Satd. Flow (perm)	637	3248		800	3453			1798	1524		1787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	460	9	246	612	23	15	45	122	12	50	15
RTOR Reduction (vph)	0	2	0	0	3	0	0	0	66	0	8	0
Lane Group Flow (vph)	17	467	0	246	632	0	0	60	56	0	69	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	11%	0%	3%	4%	0%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2		2	2		2
Actuated Green, G (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	293	1494		368	1588			827	701		822	
v/s Ratio Prot		0.14			0.18							
v/s Ratio Perm	0.03			c0.31				0.03	0.04		c0.04	
v/c Ratio	0.06	0.31		0.67	0.40			0.07	0.08		0.08	
Uniform Delay, d1	15.0	17.0		21.1	17.8			15.1	15.1		15.2	
Progression Factor	0.85	0.92		0.85	0.88			1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.5		9.3	0.7			0.2	0.2		0.2	
Delay (s)	13.0	16.2		27.1	16.4			15.3	15.4		15.4	
Level of Service	B	B		C	B			B	B		B	
Approach Delay (s)		16.1			19.4			15.3			15.4	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	100	685	57	47	445	110	31	180	74	22	24	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1801	3279		1030	3471	1527	1344	1772			3000	
Flt Permitted	0.46	1.00		0.31	1.00	1.00	0.70	1.00			0.84	
Satd. Flow (perm)	875	3279		334	3471	1527	996	1772			2559	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	745	62	51	484	120	34	196	80	24	26	27
RTOR Reduction (vph)	0	6	0	0	0	43	0	45	0	0	19	0
Lane Group Flow (vph)	109	801	0	51	484	77	34	231	0	0	58	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	8%	17%	75%	4%	4%	33%	100%	78%	0%	33%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Effective Green, g (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.28	0.28			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	560	2099		214	2221	977	279	496			717	
v/s Ratio Prot		c0.24			0.14			c0.13				
v/s Ratio Perm	0.12			0.15		0.05	0.03				0.02	
v/c Ratio	0.19	0.38		0.24	0.22	0.08	0.12	0.47			0.08	
Uniform Delay, d1	7.4	8.6		7.6	7.5	6.8	26.8	29.8			26.5	
Progression Factor	0.45	0.42		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	0.8	0.5		2.6	0.2	0.2	0.9	3.1			0.2	
Delay (s)	4.1	4.1		10.3	7.8	7.0	27.7	32.9			26.7	
Level of Service	A	A		B	A	A	C	C			C	
Approach Delay (s)		4.1			7.8			32.4			26.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	712	15	50	385	27	57	72	96	116	154	14
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1577	4088		1801	4574		1759	1810	1584	1775	3539	1247
Flt Permitted	0.48	1.00		0.28	1.00		0.65	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	802	4088		525	4574		1197	1810	1584	1320	3539	1247
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	774	16	54	418	29	62	78	104	126	167	15
RTOR Reduction (vph)	0	3	0	0	13	0	0	0	47	0	0	7
Lane Group Flow (vph)	184	787	0	54	434	0	62	78	57	126	167	8
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	14%	27%	0%	0%	13%	0%	2%	5%	0%	1%	2%	27%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	24.7	24.7		24.7	24.7		40.8	40.8	40.8	40.8	40.8	40.8
Effective Green, g (s)	24.7	24.7		24.7	24.7		40.8	40.8	40.8	40.8	40.8	40.8
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.54	0.54	0.54	0.54	0.54	0.54
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	264	1346		173	1506		651	985	862	718	1925	678
v/s Ratio Prot		0.19			0.09			0.04				0.05
v/s Ratio Perm	c0.23			0.10			0.05		0.04	c0.10		0.01
v/c Ratio	0.70	0.58		0.31	0.29		0.10	0.08	0.07	0.18	0.09	0.01
Uniform Delay, d1	21.9	20.9		18.8	18.6		8.2	8.1	8.1	8.6	8.2	7.8
Progression Factor	1.00	1.00		1.00	1.00		1.17	1.16	1.56	1.00	1.00	1.00
Incremental Delay, d2	6.3	0.4		0.4	0.0		0.3	0.1	0.1	0.5	0.1	0.0
Delay (s)	28.2	21.3		19.2	18.7		9.8	9.6	12.7	9.2	8.3	7.9
Level of Service	C	C		B	B		A	A	B	A	A	A
Approach Delay (s)		22.6			18.7			11.0			8.6	
Approach LOS		C			B			B			A	

Intersection Summary

HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↑↑↑						↑↑↑	↑				
Volume (vph)	100	370	0	0	0	0	0	1066	1351	0	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0						5.0	5.0				
Lane Util. Factor		0.91						0.86	0.86				
Frbp, ped/bikes		1.00						1.00	1.00				
Flpb, ped/bikes		1.00						1.00	1.00				
Frt		1.00						0.94	0.85				
Flt Protected		0.99						1.00	1.00				
Satd. Flow (prot)		4441						4599	1375				
Flt Permitted		0.99						1.00	1.00				
Satd. Flow (perm)		4441						4599	1375				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	109	402	0	0	0	0	0	1159	1468	0	0	0	
RTOR Reduction (vph)	0	10	0	0	0	0	0	191	179	0	0	0	
Lane Group Flow (vph)	0	501	0	0	0	0	0	1702	555	0	0	0	
Confl. Peds. (#/hr)	20												
Heavy Vehicles (%)	5%	18%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	
Turn Type	Perm	NA						NA	custom				
Protected Phases		2						1					
Permitted Phases	2								5				
Actuated Green, G (s)		27.0						23.0	28.7				
Effective Green, g (s)		27.0						23.0	28.7				
Actuated g/C Ratio		0.45						0.38	0.48				
Clearance Time (s)		5.0						5.0	5.0				
Vehicle Extension (s)		3.0						3.0	3.0				
Lane Grp Cap (vph)		1998						1763	658				
v/s Ratio Prot								c0.37					
v/s Ratio Perm		0.11							c0.40				
v/c Ratio		0.25						0.97	0.84				
Uniform Delay, d1		10.2						18.1	13.7				
Progression Factor		1.00						1.00	1.00				
Incremental Delay, d2		0.3						14.1	9.7				
Delay (s)		10.5						32.2	23.3				
Level of Service		B						C	C				
Approach Delay (s)		10.5			0.0			29.7			0.0		
Approach LOS		B			A			C			A		
Intersection Summary													
HCM Average Control Delay			26.6		HCM Level of Service					C			
HCM Volume to Capacity ratio			0.56										
Actuated Cycle Length (s)			60.0		Sum of lost time (s)					5.0			
Intersection Capacity Utilization			73.3%		ICU Level of Service					D			
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	26	610	946	0	0	0	0	307	60	20	142	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.94	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			0.99	
Satd. Flow (prot)		4413	1355					1812			1734	
Flt Permitted		1.00	1.00					1.00			0.94	
Satd. Flow (perm)		4413	1355					1812			1643	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	663	1028	0	0	0	0	334	65	22	154	0
RTOR Reduction (vph)	0	340	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	865	514	0	0	0	0	391	0	0	176	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	6%	4%	1%	0%	0%	0%	0%	2%	2%	0%	10%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)		19.0	60.0					32.0			32.0	
Effective Green, g (s)		19.0	60.0					32.0			32.0	
Actuated g/C Ratio		0.32	1.00					0.53			0.53	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		1397	1355					966			876	
v/s Ratio Prot								0.22				
v/s Ratio Perm		0.20	0.38								0.11	
v/c Ratio		0.62	0.38					0.40			0.20	
Uniform Delay, d1		17.4	0.0					8.3			7.3	
Progression Factor		0.98	1.00					0.70			1.00	
Incremental Delay, d2		0.4	0.5					1.2			0.5	
Delay (s)		17.5	0.5					7.1			7.8	
Level of Service		B	A					A			A	
Approach Delay (s)		12.5			0.0			7.1			7.8	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	23	330	32	213	301	0	0	235	1102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.99	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1792	1517	1717	1863			1582	1477
Flt Permitted				0.95	1.00	1.00	0.22	1.00			1.00	1.00
Satd. Flow (perm)				1730	1792	1517	391	1863			1582	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	25	359	35	232	327	0	0	255	1198
RTOR Reduction (vph)	0	0	0	0	0	27	0	0	0	0	52	0
Lane Group Flow (vph)	0	0	0	25	359	8	232	327	0	0	694	707
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	6%	0%	5%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	433	367	225	1071			910	1477
v/s Ratio Prot					c0.20			0.18			0.44	
v/s Ratio Perm				0.01		0.01	c0.59					0.48
v/c Ratio				0.06	0.83	0.02	1.03	0.31			0.76	0.48
Uniform Delay, d1				17.5	21.6	17.3	12.8	6.6			9.6	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.66	1.00
Incremental Delay, d2				0.3	16.6	0.1	68.3	0.7			5.8	1.1
Delay (s)				17.8	38.2	17.5	81.1	7.3			12.2	1.1
Level of Service				B	D	B	F	A			B	A
Approach Delay (s)		0.0			35.2			37.9			6.8	
Approach LOS		A			D			D			A	

Intersection Summary

HCM Average Control Delay	18.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘		↗	↕		↗	↕			↕	
Volume (vph)	3	102	29	493	157	25	38	163	784	3	228	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.88			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1828		1220	3526		1805	2943			3442	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.75	
Satd. Flow (perm)	1805	1828		1220	3526		1805	2943			2598	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	111	32	536	171	27	41	177	852	3	248	36
RTOR Reduction (vph)	0	10	0	0	9	0	0	610	0	0	11	0
Lane Group Flow (vph)	3	133	0	536	189	0	41	419	0	0	276	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	48%	0%	0%	0%	4%	6%	0%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	1.1	17.1		29.5	45.5		2.2	20.3			14.1	
Effective Green, g (s)	1.1	17.1		29.5	45.5		2.2	20.3			14.1	
Actuated g/C Ratio	0.01	0.22		0.37	0.58		0.03	0.26			0.18	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	25	396		456	2033		50	757			464	
v/s Ratio Prot	0.00	c0.07		c0.44	0.05		0.02	c0.14				
v/s Ratio Perm											0.11	
v/c Ratio	0.12	0.34		1.18	0.09		0.82	0.86dr			0.59	
Uniform Delay, d1	38.4	26.1		24.7	7.5		38.2	25.4			29.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.1	0.5		99.9	0.0		63.8	0.9			2.0	
Delay (s)	40.6	26.6		124.6	7.5		102.0	26.3			31.8	
Level of Service	D	C		F	A		F	C			C	
Approach Delay (s)		26.9			93.0			29.2			31.8	
Approach LOS		C			F			C			C	

Intersection Summary

HCM Average Control Delay	50.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	78.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	22	598	170	131	452	30	74	43	82	73	160	175
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3254		1805	3570		1805	1702		1643	2318	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3254		1805	3570		1805	1702		1643	2318	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	650	185	142	491	33	80	47	89	79	174	190
RTOR Reduction (vph)	0	19	0	0	3	0	0	77	0	0	158	0
Lane Group Flow (vph)	24	816	0	142	521	0	80	59	0	71	214	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	9%	0%	0%	0%	0%	74%	96%	0%	77%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	2.7	30.9		12.2	40.9		11.8	11.8		14.2	14.2	
Effective Green, g (s)	2.7	30.9		12.2	40.9		11.8	11.8		14.2	14.2	
Actuated g/C Ratio	0.03	0.36		0.14	0.48		0.14	0.14		0.17	0.17	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	57	1182		259	1716		250	236		274	387	
v/s Ratio Prot	0.01	c0.25		c0.08	0.15		c0.04	0.03		0.04	c0.09	
v/s Ratio Perm												
v/c Ratio	0.42	0.69		0.55	0.30		0.32	0.25		0.26	0.55	
Uniform Delay, d1	40.4	23.0		33.9	13.4		33.0	32.7		30.9	32.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.0	1.9		2.4	0.1		1.0	0.8		0.7	2.1	
Delay (s)	45.4	24.9		36.3	13.6		34.0	33.5		31.6	34.6	
Level of Service	D	C		D	B		C	C		C	C	
Approach Delay (s)		25.5			18.4			33.7			34.1	
Approach LOS		C			B			C			C	

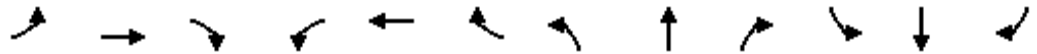
Intersection Summary

HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	85.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	101	222	200	36	365	0	0	140	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3546	1583	1792	990			3167	1581
Flt Permitted					0.98	1.00	0.66	1.00			1.00	1.00
Satd. Flow (perm)					3546	1583	1237	990			3167	1581
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	110	241	217	39	397	0	0	152	286
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	97
Lane Group Flow (vph)	0	0	0	0	351	46	39	397	0	0	152	189
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	15%	88%	0%	0%	0%	0%	92%	100%	0%	14%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					15.9	15.9	49.6	49.6			49.6	49.6
Effective Green, g (s)					15.9	15.9	49.6	49.6			49.6	49.6
Actuated g/C Ratio					0.21	0.21	0.66	0.66			0.66	0.66
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					752	336	818	655			2094	1046
v/s Ratio Prot								c0.40			0.05	
v/s Ratio Perm					0.10	0.03	0.03					0.12
v/c Ratio					0.47	0.14	0.05	0.61			0.07	0.18
Uniform Delay, d1					25.8	24.0	4.4	7.2			4.5	4.9
Progression Factor					1.00	1.00	1.00	1.00			0.82	0.83
Incremental Delay, d2					0.5	0.2	0.1	4.1			0.1	0.4
Delay (s)					26.3	24.2	4.6	11.3			3.8	4.4
Level of Service					C	C	A	B			A	A
Approach Delay (s)		0.0			25.5			10.7			4.2	
Approach LOS		A			C			B			A	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	688	139	65	142	233	0	368	348
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.91			1.00	1.00
Flt Protected	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2727	1553	4421			1736	1881
Flt Permitted	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2727	1553	4421			1736	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	748	151	71	154	253	0	400	378
RTOR Reduction (vph)	0	0	37	0	0	0	0	0
Lane Group Flow (vph)	374	525	34	407	0	0	400	378
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	78%	4%	4%	2%	0%	4%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	20.2	20.2	20.2	23.8			17.5	44.8
Effective Green, g (s)	20.2	20.2	20.2	23.8			17.5	44.8
Actuated g/C Ratio	0.27	0.27	0.27	0.32			0.23	0.60
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	443	734	418	1403			405	1124
v/s Ratio Prot				0.09			c0.23	c0.20
v/s Ratio Perm	c0.23	0.19	0.02					
v/c Ratio	0.84	0.72	0.08	0.29			0.99	0.34
Uniform Delay, d1	25.9	24.8	20.5	19.2			28.6	7.6
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	13.2	2.8	0.0	0.5			40.9	0.1
Delay (s)	39.1	27.6	20.5	19.8			69.6	7.7
Level of Service	D	C	C	B			E	A
Approach Delay (s)		31.5		19.8				39.5
Approach LOS		C		B				D





















Intersection Summary

HCM Average Control Delay	32.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	56	28	81	89	49	20	156	35	91	128	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	61	30	88	97	53	22	170	38	99	139	35
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	88	30	185	53	107	123	168	104				
Volume Left (vph)	27	0	88	0	22	0	99	0				
Volume Right (vph)	0	30	0	53	0	38	0	35				
Hadj (s)	0.15	-0.70	1.05	-0.70	1.29	1.34	0.85	0.66				
Departure Headway (s)	6.6	5.7	7.3	5.5	7.3	7.4	6.8	6.7				
Degree Utilization, x	0.16	0.05	0.37	0.08	0.22	0.25	0.32	0.19				
Capacity (veh/h)	509	580	474	613	472	469	505	518				
Control Delay (s)	9.7	7.8	13.3	7.8	11.2	11.6	11.8	10.1				
Approach Delay (s)	9.2		12.1		11.4		11.2					
Approach LOS	A		B		B		B					
Intersection Summary												
Delay			11.2									
HCM Level of Service			B									
Intersection Capacity Utilization			41.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↖	↗		↕		↖	↗	
Volume (veh/h)	11	100	35	14	217	5	27	1	9	12	48	91
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	109	38	15	236	5	29	1	10	13	52	99
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	246			152			534	414	119	419	447	246
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	246			152			534	414	119	419	447	246
tC, single (s)	4.1			4.7			8.1	7.5	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			4.4	4.9	3.3	3.5	4.7	3.3
p0 queue free %	99			99			88	100	99	98	87	87
cM capacity (veh/h)	1326			1136			255	393	931	524	392	789

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	121	38	251	5	40	13	35	116
Volume Left	12	0	15	0	29	13	0	0
Volume Right	0	38	0	5	10	0	0	99
cSH	1326	1700	1136	1700	313	524	392	685
Volume to Capacity	0.01	0.02	0.01	0.00	0.13	0.02	0.09	0.17
Queue Length 95th (ft)	1	0	1	0	11	2	7	15
Control Delay (s)	0.8	0.0	0.6	0.0	18.2	12.0	15.1	11.3
Lane LOS	A		A		C	B	C	B
Approach Delay (s)	0.6		0.6		18.2	12.2		
Approach LOS					C	B		

Intersection Summary

Average Delay	4.8
Intersection Capacity Utilization	39.7%
ICU Level of Service	A
Analysis Period (min)	15

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	182	13	21	102	0	0	0	0	18	168	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.98	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		3610	1550		3566						3524	
Flt Permitted		1.00	1.00		0.91						1.00	
Satd. Flow (perm)		3610	1550		3258						3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	198	14	23	111	0	0	0	0	20	183	23
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	198	10	0	134	0	0	0	0	0	208	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.9	54.9		54.9							13.1
Effective Green, g (s)		54.9	54.9		54.9							13.1
Actuated g/C Ratio		0.72	0.72		0.72							0.17
Clearance Time (s)		3.5	3.5		3.5							5.0
Vehicle Extension (s)		3.0	3.0		3.0							3.0
Lane Grp Cap (vph)		2591	1112		2338							603
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04							0.06
v/c Ratio		0.08	0.01		0.06							0.34
Uniform Delay, d1		3.2	3.1		3.2							27.9
Progression Factor		1.00	1.00		0.30							1.00
Incremental Delay, d2		0.1	0.0		0.0							0.3
Delay (s)		3.3	3.1		1.0							28.3
Level of Service		A	A		A							C
Approach Delay (s)		3.3			1.0			0.0				28.3
Approach LOS		A			A			A				C

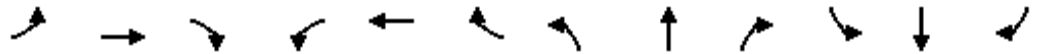
Intersection Summary

HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕	↗		↕↕				
Volume (vph)	23	159	0	0	123	27	7	124	55	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		3506			3539	1520		3376				
Flt Permitted		0.92			1.00	1.00		1.00				
Satd. Flow (perm)		3250			3539	1520		3376				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	173	0	0	134	29	8	135	60	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	8	0	50	0	0	0	0
Lane Group Flow (vph)	0	198	0	0	134	21	0	153	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.9			54.9	54.9		13.1				
Effective Green, g (s)		54.9			54.9	54.9		13.1				
Actuated g/C Ratio		0.72			0.72	0.72		0.17				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2332			2540	1091		578				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.06				0.01		0.05				
v/c Ratio		0.08			0.05	0.02		0.27				
Uniform Delay, d1		3.2			3.2	3.1		27.5				
Progression Factor		0.41			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.2				
Delay (s)		1.4			3.2	3.1		27.8				
Level of Service		A			A	A		C				
Approach Delay (s)		1.4			3.2			27.8			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↵	↵↵	↑	↑↑↑	↵	↵	↵	↵
Volume (vph)	42	122	0	560	108	0	1792	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.95
Satd. Flow (prot)	1584	3127		5187	1172		1681	1686
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.95
Satd. Flow (perm)	1584	3127		5187	1172		1681	1686
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	133	0	609	117	0	1948	13
RTOR Reduction (vph)	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	41	133	0	609	117	0	974	987
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	12%	12%	11%	0%	33%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	11.6	11.6		19.6	19.6		69.8	69.8
Effective Green, g (s)	11.6	11.6		19.6	19.6		69.8	69.8
Actuated g/C Ratio	0.10	0.10		0.17	0.17		0.61	0.61
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	160	315		884	200		1020	1023
v/s Ratio Prot				c0.12			0.58	c0.59
v/s Ratio Perm	0.03	c0.04			0.10			
v/c Ratio	0.25	0.42		0.69	0.58		0.95	0.96
Uniform Delay, d1	47.7	48.6		44.8	44.0		21.1	21.4
Progression Factor	0.82	0.86		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	0.9		2.3	4.3		19.2	20.8
Delay (s)	40.0	42.5		47.1	48.3		40.3	42.3
Level of Service	D	D		D	D		D	D
Approach Delay (s)			41.9	47.3				41.3
Approach LOS			D	D				D

Intersection Summary			
HCM Average Control Delay	42.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	220	214	24	529	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.96	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3030	1470	1552	1539	4617
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3030	1470	1552	1539	4617
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	233	26	575	0
RTOR Reduction (vph)	0	0	17	1	0
Lane Group Flow (vph)	328	144	6	289	288
Heavy Vehicles (%)	13%	0%	0%	0%	3%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	77.3	77.3	28.2	28.2	28.2
Effective Green, g (s)	77.3	77.3	28.2	28.2	28.2
Actuated g/C Ratio	0.67	0.67	0.25	0.25	0.25
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2037	988	381	377	1132
v/s Ratio Prot	c0.11		0.00	c0.19	0.06
v/s Ratio Perm		0.10			
v/c Ratio	0.16	0.15	0.01	0.77	0.25
Uniform Delay, d1	6.9	6.9	32.9	40.3	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.0	9.0	0.1
Delay (s)	7.1	7.2	32.9	49.4	35.1
Level of Service	A	A	C	D	D
Approach Delay (s)	7.1				41.9
Approach LOS	A				D

Intersection Summary

HCM Average Control Delay	26.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	344	20	7	167	0	0	0	0	546	867	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5131			5172					1787	3505	1565
Flt Permitted		1.00			0.92					0.95	1.00	1.00
Satd. Flow (perm)		5131			4743					1787	3505	1565
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	374	22	8	182	0	0	0	0	593	942	291
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	102
Lane Group Flow (vph)	0	388	0	0	190	0	0	0	0	593	942	189
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	3%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		16.0			16.0					52.0	52.0	52.0
Effective Green, g (s)		16.0			16.0					52.0	52.0	52.0
Actuated g/C Ratio		0.20			0.20					0.65	0.65	0.65
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1026			949					1162	2278	1017
v/s Ratio Prot		c0.08									0.27	
v/s Ratio Perm					0.04					c0.33		0.12
v/c Ratio		0.38			0.20					0.51	0.41	0.19
Uniform Delay, d1		27.7			26.7					7.3	6.7	5.6
Progression Factor		1.00			1.13					1.00	1.00	1.00
Incremental Delay, d2		1.1			0.5					1.6	0.6	0.4
Delay (s)		28.8			30.6					8.9	7.3	6.0
Level of Service		C			C					A	A	A
Approach Delay (s)		28.8			30.6			0.0			7.6	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	222	771	0	0	175	212	5	204	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.96		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.94	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4848			4532	1316		4994				
Flt Permitted	0.95	0.94			1.00	1.00		1.00				
Satd. Flow (perm)	1552	4544			4532	1316		4994				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	241	838	0	0	190	230	5	222	22	0	0	0
RTOR Reduction (vph)	0	0	0	0	93	93	0	13	0	0	0	0
Lane Group Flow (vph)	217	862	0	0	212	22	0	236	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	2%	4%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	18.0	36.5			15.0	15.0		32.5				
Effective Green, g (s)	18.0	36.5			15.0	15.0		32.5				
Actuated g/C Ratio	0.22	0.46			0.19	0.19		0.41				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	349	2142			850	247		2029				
v/s Ratio Prot	c0.14	0.09			0.05							
v/s Ratio Perm		c0.09				0.02		0.05				
v/c Ratio	0.62	0.40			0.25	0.09		0.12				
Uniform Delay, d1	27.9	14.5			27.7	26.8		14.8				
Progression Factor	1.00	0.78			1.00	1.00		1.00				
Incremental Delay, d2	7.5	0.5			0.7	0.7		0.1				
Delay (s)	35.5	11.8			28.4	27.5		14.9				
Level of Service	D	B			C	C		B				
Approach Delay (s)		16.6			28.2			14.9			0.0	
Approach LOS		B			C			B			A	

Intersection Summary

















HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	208	1022	6	711	106	52	3	0	12	186	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.88			0.98			1.00			1.00	
Flt Protected		1.00			1.00			0.95			1.00	
Satd. Flow (prot)		3047			3517			3412			3553	
Flt Permitted		1.00			0.94			0.95			1.00	
Satd. Flow (perm)		3047			3323			3412			3553	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	226	1111	7	773	115	57	3	0	13	202	4
RTOR Reduction (vph)	0	531	0	0	18	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	806	0	0	877	0	0	60	0	0	217	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	2%	1%	0%	0%	0%	1%	1%	0%	0%	1%	0%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1547			1687			315			765	
v/s Ratio Prot		c0.26						c0.02			c0.06	
v/s Ratio Perm					0.26							
v/c Ratio		0.52			0.52			0.19			0.28	
Uniform Delay, d1		10.7			10.7			27.3			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			1.1			1.3			0.9	
Delay (s)		12.0			11.9			28.6			22.2	
Level of Service		B			B			C			C	
Approach Delay (s)		12.0			11.9			28.6			22.2	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			13.2									B
HCM Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			65.0							12.0		
Intersection Capacity Utilization			66.9%									C
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	37	198	17	74	279	42	54	211	61	101	222	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.98	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5109	1541	1737	3517		1787	1881	1570	1787	1881	1570
Flt Permitted		0.86	1.00	0.59	1.00		0.50	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)		4416	1541	1074	3517		934	1881	1570	970	1881	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	215	18	80	303	46	59	229	66	110	241	25
RTOR Reduction (vph)	0	0	7	0	14	0	0	0	37	0	0	15
Lane Group Flow (vph)	0	255	11	80	335	0	59	229	29	110	241	10
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	3%	0%	0%	2%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.60	0.60	0.60	0.60		0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2650	925	644	2110		264	531	443	274	531	443
v/s Ratio Prot					c0.10			0.12				c0.13
v/s Ratio Perm		0.06	0.01	0.07			0.06		0.02	0.11		0.01
v/c Ratio		0.10	0.01	0.12	0.16		0.22	0.43	0.07	0.40	0.45	0.02
Uniform Delay, d1		7.2	6.8	7.3	7.5		23.4	24.9	22.3	24.7	25.1	22.0
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	0.4	0.2		2.0	2.5	0.3	4.3	2.8	0.1
Delay (s)		7.3	6.9	7.7	7.7		25.3	27.5	22.6	29.0	27.9	22.1
Level of Service		A	A	A	A		C	C	C	C	C	C
Approach Delay (s)		7.3			7.7			26.2			27.8	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	260	345	0	910	593	0	0	0	685	0	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.96			1.00	0.98				1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.98	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3095			3327	1375				3433		1560
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3095			3327	1375				3433		1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	283	375	0	989	645	0	0	0	745	0	313
RTOR Reduction (vph)	0	173	0	0	15	0	0	0	0	0	0	135
Lane Group Flow (vph)	95	485	0	0	1122	497	0	0	0	745	0	178
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	4%	0%	1%	5%	0%	0%	0%	2%	7%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	3.7	32.1			24.4	59.6				19.5		19.5
Effective Green, g (s)	3.7	32.1			24.4	59.6				19.5		19.5
Actuated g/C Ratio	0.06	0.54			0.41	1.00				0.33		0.33
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	111	1667			1362	1375				1123		510
v/s Ratio Prot	c0.05	0.16			c0.34					c0.22		
v/s Ratio Perm						0.36						0.11
v/c Ratio	0.86	0.29			0.82	0.36				0.66		0.35
Uniform Delay, d1	27.7	7.5			15.7	0.0				17.2		15.2
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	43.7	0.1			4.2	0.7				1.5		0.4
Delay (s)	71.4	7.6			19.9	0.7				18.7		15.7
Level of Service	E	A			B	A				B		B
Approach Delay (s)		15.7			14.1			0.0			17.8	
Approach LOS		B			B			A			B	

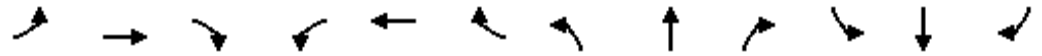
Intersection Summary

HCM Average Control Delay	15.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	69	604	0	0	657	242	456	1	856	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.87	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.99	1.00			
Satd. Flow (prot)	1805	5136			5036	1553	1649	1457	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.99	1.00			
Satd. Flow (perm)	1805	5136			5036	1553	1649	1457	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	657	0	0	714	263	496	1	930	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	185	0	93	93	0	0	0
Lane Group Flow (vph)	75	657	0	0	714	78	446	404	391	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	0%	1%	0%	0%	3%	1%	4%	0%	2%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	2.5	21.5			15.0	15.0	21.2	21.2	21.2			
Effective Green, g (s)	2.5	21.5			15.0	15.0	21.2	21.2	21.2			
Actuated g/C Ratio	0.05	0.42			0.30	0.30	0.42	0.42	0.42			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	89	2178			1490	459	690	609	629			
v/s Ratio Prot	c0.04	0.13			c0.14		0.27	c0.28	0.26			
v/s Ratio Perm						0.05						
v/c Ratio	0.84	0.30			0.48	0.17	0.65	0.66	0.62			
Uniform Delay, d1	23.9	9.6			14.6	13.2	11.8	11.9	11.6			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	48.0	0.1			0.2	0.2	2.1	2.7	1.9			
Delay (s)	71.9	9.7			14.9	13.4	13.9	14.6	13.5			
Level of Service	E	A			B	B	B	B	B			
Approach Delay (s)		16.1			14.5			14.0			0.0	
Approach LOS		B			B			B			A	

Intersection Summary		
HCM Average Control Delay	14.6	HCM Level of Service
HCM Volume to Capacity ratio	0.60	B
Actuated Cycle Length (s)	50.7	Sum of lost time (s)
Intersection Capacity Utilization	53.7%	ICU Level of Service
Analysis Period (min)	15	A
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	335	795	385	71	541	80	287	30	79	72	40	272
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3467	3331	1404	1805	3505	1615	1681	1707	1615		1841	2690
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3467	3331	1404	1805	3505	1615	1681	1707	1615		1841	2690
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	364	864	418	77	588	87	312	33	86	78	43	296
RTOR Reduction (vph)	0	4	223	0	0	60	0	0	77	0	0	241
Lane Group Flow (vph)	364	902	153	77	588	27	172	173	9	0	121	55
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	1%	3%	2%	0%	3%	0%	2%	0%	0%	0%	0%	3%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	14.0	26.9	26.9	3.8	16.7	16.7	7.2	7.2	7.2		12.2	12.2
Effective Green, g (s)	14.0	26.9	26.9	3.8	16.7	16.7	7.2	7.2	7.2		12.2	12.2
Actuated g/C Ratio	0.21	0.41	0.41	0.06	0.25	0.25	0.11	0.11	0.11		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	734	1356	571	104	886	408	183	186	176		340	496
v/s Ratio Prot	c0.10	c0.27		0.04	0.17	0.02	c0.10	0.10	0.01		c0.07	
v/s Ratio Perm			0.11									0.02
v/c Ratio	0.50	0.67	0.27	0.74	0.66	0.07	0.94	0.93	0.05		0.36	0.11
Uniform Delay, d1	22.9	15.9	13.0	30.7	22.2	18.8	29.2	29.2	26.4		23.5	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	1.2	0.3	24.3	1.9	0.1	48.7	46.3	0.1		0.6	0.1
Delay (s)	23.5	17.2	13.3	55.0	24.1	18.8	78.0	75.5	26.5		24.2	22.5
Level of Service	C	B	B	E	C	B	E	E	C		C	C
Approach Delay (s)		17.7			26.6			66.7			23.0	
Approach LOS		B			C			E			C	

Intersection Summary

HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	482	186	65	394	31	141	126	24	22	140	55
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3319		1805	3493		1787	1846		1805	1845	1470
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.65	1.00	1.00
Satd. Flow (perm)	1770	3319		1805	3493		1787	1846		1242	1845	1470
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	524	202	71	428	34	153	137	26	24	152	60
RTOR Reduction (vph)	0	52	0	0	9	0	0	10	0	0	0	41
Lane Group Flow (vph)	182	674	0	71	453	0	153	153	0	24	152	19
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	3%	2%	0%	2%	0%	1%	0%	0%	0%	3%	8%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	7.5	20.8		3.6	16.9		6.4	17.0		11.4	11.4	18.9
Effective Green, g (s)	7.5	20.8		3.6	16.9		6.4	17.0		11.4	11.4	18.9
Actuated g/C Ratio	0.13	0.36		0.06	0.29		0.11	0.29		0.20	0.20	0.32
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	228	1186		112	1014		197	539		251	361	578
v/s Ratio Prot	c0.10	c0.20		0.04	0.13		c0.09	0.08		0.00	c0.08	0.00
v/s Ratio Perm										0.02		0.01
v/c Ratio	0.80	0.57		0.63	0.45		0.78	0.28		0.10	0.42	0.03
Uniform Delay, d1	24.6	15.1		26.7	16.8		25.2	15.9		19.2	20.5	13.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.4	0.6		11.2	0.3		17.3	0.3		0.2	0.8	0.0
Delay (s)	42.1	15.7		37.8	17.2		42.5	16.2		19.4	21.3	13.4
Level of Service	D	B		D	B		D	B		B	C	B
Approach Delay (s)		21.0			19.9			28.9			19.1	
Approach LOS		C			B			C			B	

Intersection Summary

HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	177	157	153	670	29	190	871	63	61	1077	39
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3251		1805	3539	1577	1805	3610	1578	1805	3574	1547
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3251		1805	3539	1577	1805	3610	1578	1805	3574	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	66	192	171	166	728	32	207	947	68	66	1171	42
RTOR Reduction (vph)	0	135	0	0	0	8	0	0	13	0	0	7
Lane Group Flow (vph)	66	228	0	166	728	24	207	947	55	66	1171	35
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	3%	1%	0%	2%	0%	0%	0%	0%	0%	1%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	5.2	20.8		11.2	26.8	26.8	15.2	45.1	45.1	7.9	37.8	37.8
Effective Green, g (s)	5.2	20.8		11.2	26.8	26.8	15.2	45.1	45.1	7.9	37.8	37.8
Actuated g/C Ratio	0.05	0.21		0.11	0.27	0.27	0.15	0.45	0.45	0.08	0.38	0.38
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	91	676		202	948	423	274	1628	712	143	1351	585
v/s Ratio Prot	0.04	0.07		c0.09	c0.21		c0.11	0.26		0.04	c0.33	
v/s Ratio Perm						0.02			0.04			0.02
v/c Ratio	0.73	0.34		0.82	0.77	0.06	0.76	0.58	0.08	0.46	0.87	0.06
Uniform Delay, d1	46.7	33.7		43.4	33.7	27.2	40.6	20.4	15.6	44.0	28.8	19.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.7	0.3		22.8	3.8	0.1	11.2	1.5	0.2	2.4	7.7	0.2
Delay (s)	71.4	34.0		66.2	37.5	27.3	51.9	22.0	15.8	46.4	36.5	20.0
Level of Service	E	C		E	D	C	D	C	B	D	D	B
Approach Delay (s)		39.8			42.3			26.7			36.4	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	35.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	247	2	64	366	16	159	385	13	46	751	13
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3501		1805	3517		1805	3590		1805	3565	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	3501		1805	3517		1805	3590		1805	3565	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	268	2	70	398	17	173	418	14	50	816	14
RTOR Reduction (vph)	0	1	0	0	3	0	0	2	0	0	1	0
Lane Group Flow (vph)	55	269	0	70	412	0	173	430	0	50	829	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	1%	3%	0%	0%	2%	0%	0%	0%	0%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	4.8	15.8		7.0	18.0		12.8	36.1		4.6	27.9	
Effective Green, g (s)	4.8	15.8		7.0	18.0		12.8	36.1		4.6	27.9	
Actuated g/C Ratio	0.06	0.20		0.09	0.23		0.17	0.47		0.06	0.36	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	111	714		163	817		298	1672		107	1283	
v/s Ratio Prot	0.03	0.08		c0.04	c0.12		c0.10	0.12		0.03	c0.23	
v/s Ratio Perm												
v/c Ratio	0.50	0.38		0.43	0.50		0.58	0.26		0.47	0.65	
Uniform Delay, d1	35.2	26.6		33.4	25.9		29.9	12.6		35.3	20.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.3		1.8	0.5		2.9	0.1		3.2	1.1	
Delay (s)	38.6	26.9		35.2	26.4		32.7	12.6		38.5	21.8	
Level of Service	D	C		D	C		C	B		D	C	
Approach Delay (s)		28.9			27.6			18.4			22.8	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	77.5	Sum of lost time (s)	11.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	242	263	243	1696	1141	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	3467	1564		5155	4987	
Flt Permitted	0.95	1.00		0.64	1.00	
Satd. Flow (perm)	3467	1564		3303	4987	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	286	264	1843	1240	225
RTOR Reduction (vph)	0	47	0	0	29	0
Lane Group Flow (vph)	263	239	0	2107	1436	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	2%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	27.0	27.0		55.0	55.0	
Effective Green, g (s)	27.0	27.0		55.0	55.0	
Actuated g/C Ratio	0.30	0.30		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1040	469		2019	3048	
v/s Ratio Prot	0.08				0.29	
v/s Ratio Perm		c0.15		c0.64		
v/c Ratio	0.25	0.51		1.69dl	0.47	
Uniform Delay, d1	23.9	26.0		17.5	9.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.9		32.5	0.5	
Delay (s)	24.4	30.0		50.0	10.1	
Level of Service	C	C		D	B	
Approach Delay (s)	27.3			50.0	10.1	
Approach LOS	C			D	B	

Intersection Summary

HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Volume (vph)	458	796	282	80	584	41	48	149	51	55	267	139
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3355		1805	3502		1805	3432		1805	1900	1468
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3355		1805	3502		1805	3432		1805	1900	1468
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	498	865	307	87	635	45	52	162	55	60	290	151
RTOR Reduction (vph)	0	36	0	0	6	0	0	39	0	0	0	120
Lane Group Flow (vph)	498	1136	0	87	674	0	52	178	0	60	290	31
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	2%	2%	2%	0%	2%	0%	0%	0%	1%	0%	0%	10%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	23.7	39.5		7.0	22.8		2.7	15.9		3.8	17.0	17.0
Effective Green, g (s)	23.7	39.5		7.0	22.8		2.7	15.9		3.8	17.0	17.0
Actuated g/C Ratio	0.29	0.48		0.09	0.28		0.03	0.19		0.05	0.21	0.21
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	510	1612		154	971		59	664		83	393	304
v/s Ratio Prot	c0.28	c0.34		0.05	0.19		0.03	0.05		c0.03	c0.15	
v/s Ratio Perm												0.02
v/c Ratio	0.98	0.70		0.56	0.69		0.88	0.27		0.72	0.74	0.10
Uniform Delay, d1	29.0	16.8		36.1	26.6		39.6	28.2		38.7	30.5	26.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.5	1.4		4.7	2.2		75.7	0.2		26.5	7.1	0.1
Delay (s)	62.5	18.2		40.8	28.8		115.3	28.4		65.2	37.6	26.6
Level of Service	E	B		D	C		F	C		E	D	C
Approach Delay (s)		31.4			30.1			45.2			37.6	
Approach LOS		C			C			D			D	

Intersection Summary

HCM Average Control Delay	33.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	82.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	648	185	44	689	91	137	717	37	137	936	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1746	3399			3239		1805	3610	1555	1787	3574	1548
Flt Permitted	0.22	1.00			0.86		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	404	3399			2801		1805	3610	1555	1787	3574	1548
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	704	201	48	749	99	149	779	40	149	1017	146
RTOR Reduction (vph)	0	39	0	0	14	0	0	0	11	0	0	29
Lane Group Flow (vph)	136	866	0	0	882	0	149	779	29	149	1017	117
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	3%	2%	2%	0%	2%	0%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	30.5	30.5			30.5		5.1	18.5	18.5	7.2		20.6
Effective Green, g (s)	30.5	30.5			30.5		5.1	18.5	18.5	7.2		20.6
Actuated g/C Ratio	0.45	0.45			0.45		0.07	0.27	0.27	0.11		0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)	181	1520			1253		135	979	422	189	1080	468
v/s Ratio Prot		0.25					c0.08	0.22		0.08		c0.28
v/s Ratio Perm	c0.34				0.31				0.02			0.08
v/c Ratio	0.75	0.57			0.70		1.10	0.80	0.07	0.79	0.94	0.25
Uniform Delay, d1	15.7	14.0			15.2		31.6	23.1	18.5	29.8	23.2	18.0
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.0	0.5			1.8		108.0	4.5	0.1	19.2	15.3	0.3
Delay (s)	31.7	14.5			17.0		139.5	27.6	18.5	49.0	38.6	18.2
Level of Service	C	B			B		F	C	B	D	D	B
Approach Delay (s)		16.7			17.0			44.5			37.5	
Approach LOS		B			B			D			D	

Intersection Summary

HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	60	290	957	69	344	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3569		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3569		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	315	1040	75	374	425
RTOR Reduction (vph)	0	281	6	0	0	0
Lane Group Flow (vph)	65	34	1109	0	374	425
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	6.0	6.0	25.7		11.1	33.8
Effective Green, g (s)	6.0	6.0	25.7		11.1	33.8
Actuated g/C Ratio	0.11	0.11	0.47		0.20	0.62
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	198	305	1674		709	2227
v/s Ratio Prot	c0.04	0.01	c0.31		c0.11	0.12
v/s Ratio Perm						
v/c Ratio	0.33	0.11	0.66		0.53	0.19
Uniform Delay, d1	22.5	22.0	11.2		19.5	4.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	0.2	1.0		0.7	0.0
Delay (s)	23.5	22.2	12.2		20.2	4.6
Level of Service	C	C	B		C	A
Approach Delay (s)	22.4		12.2			11.9
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	54.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	379	162	96	24	213	48	116	897	48	60	438	356
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3610	1571	1805	3494		1805	3577		1787	3574	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3610	1571	1805	3494		1805	3577		1787	3574	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	412	176	104	26	232	52	126	975	52	65	476	387
RTOR Reduction (vph)	0	0	74	0	26	0	0	4	0	0	0	251
Lane Group Flow (vph)	412	176	30	26	258	0	126	1023	0	65	476	136
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Effective Green, g (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Actuated g/C Ratio	0.11	0.29	0.29	0.04	0.22		0.08	0.38		0.05	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	383	1047	455	80	786		142	1370		82	1253	546
v/s Ratio Prot	c0.12	0.05		0.01	c0.07		0.07	c0.29		c0.04	0.13	
v/s Ratio Perm			0.02									0.09
v/c Ratio	1.08	0.17	0.07	0.33	0.33		0.89	0.75		0.79	0.38	0.25
Uniform Delay, d1	30.1	17.9	17.4	31.3	21.9		30.9	18.0		31.9	16.4	15.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	67.7	0.1	0.1	2.4	0.2		43.4	2.3		39.3	0.2	0.2
Delay (s)	97.8	18.0	17.4	33.7	22.2		74.3	20.3		71.3	16.6	15.9
Level of Service	F	B	B	C	C		E	C		E	B	B
Approach Delay (s)		65.4			23.1			26.2			20.1	
Approach LOS		E			C			C			C	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖↗	↖↗	↖	↖↗	↖↗	↖
Volume (vph)	76	113	23	30	128	180	96	769	73	179	258	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3471		1805	3210		3502	3610	1580	3502	3610	1578
Flt Permitted	0.55	1.00		0.66	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1039	3471		1250	3210		3502	3610	1580	3502	3610	1578
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	123	25	33	139	196	104	836	79	195	280	52
RTOR Reduction (vph)	0	19	0	0	150	0	0	0	38	0	0	29
Lane Group Flow (vph)	83	129	0	33	185	0	104	836	41	195	280	23
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	1%	1%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	11.5	11.5		11.5	11.5		3.9	18.9	18.9	6.5	21.5	21.5
Effective Green, g (s)	11.5	11.5		11.5	11.5		3.9	18.9	18.9	6.5	21.5	21.5
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.08	0.39	0.39	0.13	0.44	0.44
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	244	816		294	755		279	1395	611	466	1587	694
v/s Ratio Prot		0.04			0.06		0.03	c0.23		c0.06	0.08	
v/s Ratio Perm	c0.08			0.03					0.03			0.01
v/c Ratio	0.34	0.16		0.11	0.25		0.37	0.60	0.07	0.42	0.18	0.03
Uniform Delay, d1	15.5	14.9		14.7	15.2		21.3	12.0	9.4	19.5	8.3	7.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.1		0.2	0.2		0.8	0.7	0.0	0.6	0.1	0.0
Delay (s)	16.4	14.9		14.9	15.3		22.2	12.7	9.5	20.1	8.4	7.8
Level of Service	B	B		B	B		C	B	A	C	A	A
Approach Delay (s)		15.5			15.3			13.4			12.6	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	224	67	57	528	20	305	22	196	32	10	30
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3539	918	1444	3551		1603	1449	895	1805	1686	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1805	3539	918	1444	3551		1603	1449	895	1805	1686	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	243	73	62	574	22	332	24	213	35	11	33
RTOR Reduction (vph)	0	0	52	0	2	0	0	0	156	0	30	0
Lane Group Flow (vph)	7	243	21	62	594	0	176	180	57	35	14	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	0%	2%	72%	25%	1%	0%	7%	100%	77%	0%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	0.9	17.2	17.2	5.0	21.3		16.1	16.1	16.1	5.3	5.3	
Effective Green, g (s)	0.9	17.2	17.2	5.0	21.3		16.1	16.1	16.1	5.3	5.3	
Actuated g/C Ratio	0.01	0.29	0.29	0.08	0.35		0.27	0.27	0.27	0.09	0.09	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	27	1013	263	120	1259		429	388	240	159	149	
v/s Ratio Prot	0.00	0.07		c0.04	c0.17		0.11	c0.12		c0.02	0.01	
v/s Ratio Perm			0.02						0.06			
v/c Ratio	0.26	0.24	0.08	0.52	0.47		0.41	0.46	0.24	0.22	0.09	
Uniform Delay, d1	29.3	16.4	15.7	26.4	15.0		18.1	18.4	17.2	25.5	25.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.1	0.2	0.2	3.7	0.5		0.9	1.2	0.7	0.7	0.3	
Delay (s)	34.3	16.7	15.9	30.1	15.5		19.0	19.6	17.9	26.2	25.5	
Level of Service	C	B	B	C	B		B	B	B	C	C	
Approach Delay (s)		16.9			16.9			18.8			25.8	
Approach LOS		B			B			B			C	

Intersection Summary

HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	115	264	72	156	513	212	63	188	176	86	63	23
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3348		1357	3374	1599	1736	2523		1703	2636	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3348		1357	3374	1599	1736	2523		1703	2636	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	287	78	170	558	230	68	204	191	93	68	25
RTOR Reduction (vph)	0	32	0	0	0	149	0	156	0	0	20	0
Lane Group Flow (vph)	125	333	0	170	558	81	68	239	0	93	73	0
Confl. Peds. (#/hr)			5									
Heavy Vehicles (%)	0%	4%	4%	33%	7%	1%	4%	38%	27%	6%	43%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	7.9	20.1		11.7	23.9	23.9	5.3	12.4		7.4	14.5	
Effective Green, g (s)	7.9	20.1		11.7	23.9	23.9	5.3	12.4		7.4	14.5	
Actuated g/C Ratio	0.12	0.30		0.17	0.35	0.35	0.08	0.18		0.11	0.21	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	209	988		233	1184	561	135	459		185	561	
v/s Ratio Prot	0.07	0.10		c0.13	c0.17		0.04	c0.09		c0.05	0.03	
v/s Ratio Perm						0.05						
v/c Ratio	0.60	0.34		0.73	0.47	0.14	0.50	0.52		0.50	0.13	
Uniform Delay, d1	28.6	18.8		26.7	17.2	15.1	30.1	25.2		28.6	21.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.8	0.4		11.2	0.5	0.2	3.5	1.2		2.5	0.1	
Delay (s)	33.4	19.1		37.9	17.7	15.3	33.6	26.4		31.1	21.8	
Level of Service	C	B		D	B	B	C	C		C	C	
Approach Delay (s)		22.8			20.7			27.4			26.5	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	23.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	11.5
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↖	↑↑						↗	
Volume (vph)	0	459	57	220	711	0	0	0	0	35	132	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.98		1.00	1.00						0.94	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		4872		1797	3312						3262	
Flt Permitted		1.00		0.43	1.00						0.99	
Satd. Flow (perm)		4872		815	3312						3262	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	499	62	239	773	0	0	0	0	38	143	114
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	87	0
Lane Group Flow (vph)	0	548	0	239	773	0	0	0	0	0	208	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	16%	5%	0%	0%	9%	1%	1%	0%	0%	1%	0%	7%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		28.4		28.4	28.4						11.9	
Effective Green, g (s)		28.4		28.4	28.4						11.9	
Actuated g/C Ratio		0.56		0.56	0.56						0.24	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		2751		460	1870						772	
v/s Ratio Prot		0.11			0.23							
v/s Ratio Perm				c0.29							0.06	
v/c Ratio		0.20		0.52	0.41						0.27	
Uniform Delay, d1		5.4		6.7	6.2						15.7	
Progression Factor		1.00		0.49	0.39						1.00	
Incremental Delay, d2		0.0		0.4	0.1						0.1	
Delay (s)		5.4		3.7	2.5						15.7	
Level of Service		A		A	A						B	
Approach Delay (s)		5.4			2.8			0.0			15.7	
Approach LOS		A			A			A			B	
Intersection Summary												
HCM Average Control Delay			5.6		HCM Level of Service					A		
HCM Volume to Capacity ratio			0.45									
Actuated Cycle Length (s)			50.3		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			48.2%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	127	367	0	0	824	25	107	144	127	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.95				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5017			5060			3295				
Flt Permitted		0.69			1.00			0.99				
Satd. Flow (perm)		3526			5060			3295				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	399	0	0	896	27	116	157	138	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	86	0	0	0	0
Lane Group Flow (vph)	0	537	0	0	920	0	0	325	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		28.4			28.4			11.9				
Effective Green, g (s)		28.4			28.4			11.9				
Actuated g/C Ratio		0.56			0.56			0.24				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1991			2857			780				
v/s Ratio Prot					0.18							
v/s Ratio Perm		0.15						0.10				
v/c Ratio		0.27			0.32			0.42				
Uniform Delay, d1		5.6			5.8			16.3				
Progression Factor		0.36			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.1				
Delay (s)		2.1			5.9			16.4				
Level of Service		A			A			B				
Approach Delay (s)		2.1			5.9			16.4			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

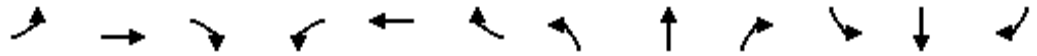
HCM Average Control Delay	7.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	50.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔			↔↕↔			↔↕			↔↕	
Volume (vph)	31	310	101	63	253	62	65	660	72	119	711	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.97			0.98			0.99			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		4835			4769			3539			3539	
Flt Permitted		0.89			0.82			0.55			0.53	
Satd. Flow (perm)		4341			3929			1962			1899	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	337	110	68	275	67	71	717	78	129	773	73
RTOR Reduction (vph)	0	10	0	0	13	0	0	9	0	0	7	0
Lane Group Flow (vph)	0	471		0	397		0	857		0	968	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	0%	7%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5			48.5			23.0			23.0	
Effective Green, g (s)		48.5			48.5			23.0			23.0	
Actuated g/C Ratio		0.61			0.61			0.29			0.29	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2632			2382			564			546	
v/s Ratio Prot												
v/s Ratio Perm		c0.11			0.10			0.44			c0.51	
v/c Ratio		0.18			0.17			1.52			1.77	
Uniform Delay, d1		7.0			6.9			28.5			28.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.2			242.6			355.1	
Delay (s)		7.1			7.0			271.1			383.6	
Level of Service		A			A			F			F	
Approach Delay (s)		7.1			7.0			271.1			383.6	
Approach LOS		A			A			F			F	

Intersection Summary

HCM Average Control Delay	225.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	116.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗		↕↕	↗	↖	↕	↗		↖	↗
Volume (vph)	56	624	65	87	636	54	105	228	82	45	155	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3466	1502		3240	1547	1673	1827	1574		1847	1559
Flt Permitted		0.82	1.00		0.76	1.00	0.38	1.00	1.00		0.61	1.00
Satd. Flow (perm)		2861	1502		2484	1547	677	1827	1574		1143	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	678	71	95	691	59	114	248	89	49	168	37
RTOR Reduction (vph)	0	0	21	0	0	14	0	0	72	0	0	30
Lane Group Flow (vph)	0	739	50	0	786	45	114	248	17	0	217	7
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	3%	30%	8%	0%	7%	4%	0%	0%	2%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		64.0	64.0		64.0	64.0	17.0	17.0	17.0		17.0	17.0
Effective Green, g (s)		64.0	64.0		64.0	64.0	17.0	17.0	17.0		17.0	17.0
Actuated g/C Ratio		0.71	0.71		0.71	0.71	0.19	0.19	0.19		0.19	0.19
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		2034	1068		1766	1100	128	345	297		216	294
v/s Ratio Prot								0.14				
v/s Ratio Perm		0.26	0.03		0.32	0.03	0.17		0.01		0.19	0.00
v/c Ratio		0.36	0.05		0.45	0.04	0.89	0.72	0.06		1.00	0.02
Uniform Delay, d1		5.1	3.9		5.5	3.9	35.6	34.3	29.9		36.5	29.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		0.5	0.1		0.8	0.1	47.0	5.9	0.0		62.4	0.0
Delay (s)		5.6	4.0		6.3	3.9	82.6	40.1	30.0		98.9	29.8
Level of Service		A	A		A	A	F	D	C		F	C
Approach Delay (s)		5.4			6.1			48.8			88.9	
Approach LOS		A			A			D			F	

Intersection Summary		
HCM Average Control Delay	23.0	HCM Level of Service C
HCM Volume to Capacity ratio	0.56	
Actuated Cycle Length (s)	90.0	Sum of lost time (s) 9.0
Intersection Capacity Utilization	80.5%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↘	↕↕	↗	↘	↕↕		↘	↕↕	
Volume (vph)	38	652	34	25	668	69	99	537	30	152	398	144
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3500	1482	1796	3195	1540	1727	3510		1779	3419	
Flt Permitted		0.88	1.00	0.32	1.00	1.00	0.33	1.00		0.31	1.00	
Satd. Flow (perm)		3101	1482	597	3195	1540	606	3510		590	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	709	37	27	726	75	108	584	33	165	433	157
RTOR Reduction (vph)	0	0	16	0	0	30	0	7	0	0	51	0
Lane Group Flow (vph)	0	750	21	27	726	45	108	610	0	165	539	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	3%	6%	0%	13%	2%	4%	2%	0%	1%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2				6
Permitted Phases	4					4	2			6		
Actuated Green, G (s)		47.2	47.2	47.2	47.2	47.2	28.3	28.3		28.3	28.3	
Effective Green, g (s)		47.2	47.2	47.2	47.2	47.2	28.3	28.3		28.3	28.3	
Actuated g/C Ratio		0.56	0.56	0.56	0.56	0.56	0.33	0.33		0.33	0.33	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1722	823	332	1774	855	202	1169		196	1138	
v/s Ratio Prot					0.23			0.17				0.16
v/s Ratio Perm		c0.24	0.01	0.05		0.03	0.18			c0.28		
v/c Ratio		0.44	0.02	0.08	0.41	0.05	0.53	0.52		0.84	0.47	
Uniform Delay, d1		11.1	8.5	8.8	10.9	8.7	23.0	22.9		26.3	22.5	
Progression Factor		1.00	1.00	0.57	0.91	0.44	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8	0.1	0.5	0.7	0.1	4.9	0.8		27.4	0.4	
Delay (s)		11.9	8.6	5.5	10.5	3.9	27.9	23.7		53.7	22.9	
Level of Service		B	A	A	B	A	C	C		D	C	
Approach Delay (s)		11.7			9.8			24.3			29.6	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	84.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	↗
Volume (vph)	69	674	12	23	691	10	37	197	280	37	88	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		0.99	
Satd. Flow (prot)	1799	3505	1579	1763	3406	1579		3578	1350		3289	
Flt Permitted	0.35	1.00	1.00	0.35	1.00	1.00		0.87	1.00		0.87	
Satd. Flow (perm)	657	3505	1579	658	3406	1579		3133	1350		2887	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	733	13	25	751	11	40	214	304	40	96	123
RTOR Reduction (vph)	0	0	3	0	0	3	0	0	103	0	96	0
Lane Group Flow (vph)	75	733	10	25	751	8	0	254	201	0	163	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	2%	6%	0%	0%	0%	17%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	58.0	58.0	58.0	58.0	58.0	58.0		18.5	18.5		18.5	
Effective Green, g (s)	58.0	58.0	58.0	58.0	58.0	58.0		18.5	18.5		18.5	
Actuated g/C Ratio	0.68	0.68	0.68	0.68	0.68	0.68		0.22	0.22		0.22	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	448	2392	1077	449	2324	1077		682	294		628	
v/s Ratio Prot		0.21			c0.22							
v/s Ratio Perm	0.11		0.01	0.04		0.01		0.08	c0.15		0.06	
v/c Ratio	0.17	0.31	0.01	0.06	0.32	0.01		0.37	0.68		0.26	
Uniform Delay, d1	4.8	5.4	4.3	4.5	5.5	4.3		28.3	30.6		27.6	
Progression Factor	0.69	0.66	0.67	0.93	1.27	1.04		1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.3	0.0	0.2	0.3	0.0		0.1	5.1		0.1	
Delay (s)	4.1	3.9	2.9	4.4	7.3	4.5		28.4	35.7		27.6	
Level of Service	A	A	A	A	A	A		C	D		C	
Approach Delay (s)		3.9			7.2			32.4			27.6	
Approach LOS		A			A			C			C	

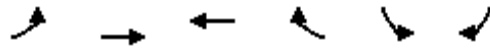
Intersection Summary

HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	456	915	713	431	159	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.98	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1752	3438	3406	1536	3352	1348
Flt Permitted	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (perm)	1752	3438	3406	1536	3352	1348
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	496	995	775	468	173	107
RTOR Reduction (vph)	0	0	0	243	13	75
Lane Group Flow (vph)	496	995	775	225	180	12
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	3%	5%	6%	2%	3%	6%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	31.7	65.7	30.0	30.0	11.3	11.3
Effective Green, g (s)	31.7	65.7	30.0	30.0	11.3	11.3
Actuated g/C Ratio	0.37	0.77	0.35	0.35	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	653	2657	1202	542	446	179
v/s Ratio Prot	c0.28	0.29	c0.23		c0.05	
v/s Ratio Perm				0.15		0.01
v/c Ratio	0.76	0.37	0.64	0.42	0.40	0.06
Uniform Delay, d1	23.3	3.1	23.0	20.9	33.8	32.2
Progression Factor	0.91	0.96	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	0.4	2.7	2.3	0.2	0.1
Delay (s)	25.7	3.4	25.7	23.2	34.0	32.3
Level of Service	C	A	C	C	C	C
Approach Delay (s)		10.8	24.8		33.5	
Approach LOS		B	C		C	

Intersection Summary

HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	164	522	172	311	512	105	8	1618	738	0	614	73
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)	3502	3610	1529	3502	3574	1529		5134	1577		5136	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.94	1.00		1.00	1.00
Satd. Flow (perm)	3502	3610	1529	3502	3574	1529		4804	1577		5136	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	567	187	338	557	114	9	1759	802	0	667	79
RTOR Reduction (vph)	0	0	41	0	0	28	0	0	0	0	0	49
Lane Group Flow (vph)	178	567	146	338	557	86	0	1768	802	0	667	30
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	1%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	10.0	33.1	33.1	12.0	35.1	35.1		34.9	95.0		34.9	34.9
Effective Green, g (s)	10.0	33.1	33.1	12.0	35.1	35.1		34.9	95.0		34.9	34.9
Actuated g/C Ratio	0.11	0.35	0.35	0.13	0.37	0.37		0.37	1.00		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	369	1258	533	442	1320	565		1765	1577		1887	562
v/s Ratio Prot	0.05	0.16		c0.10	0.16						0.13	
v/s Ratio Perm			0.10			0.06		c0.37	c0.51			0.02
v/c Ratio	0.48	0.45	0.27	0.76	0.42	0.15		1.00	0.51		0.35	0.05
Uniform Delay, d1	40.1	23.9	22.3	40.1	22.4	20.0		30.1	0.0		21.8	19.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	1.2	1.3	7.7	1.0	0.6		21.8	1.2		0.1	0.0
Delay (s)	41.1	25.1	23.6	47.8	23.4	20.6		51.9	1.2		22.0	19.4
Level of Service	D	C	C	D	C	C		D	A		C	B
Approach Delay (s)		27.8			31.2			36.1			21.7	
Approach LOS		C			C			D			C	

Intersection Summary

HCM Average Control Delay	31.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷	↷	↶	↷	↷	↶	↷		↶	↷	
Volume (vph)	180	128	17	31	35	79	3	213	126	193	61	8
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1920	794	940	2124	885	902	1797		1049	1909	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	1920	794	940	2124	885	902	1797		1049	1909	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	139	18	34	38	86	3	232	137	210	66	9
RTOR Reduction (vph)	0	0	14	0	0	79	0	50	0	0	4	0
Lane Group Flow (vph)	196	139	4	34	38	7	3	319	0	210	71	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	0%	88%	100%	92%	70%	77%	100%	91%	84%	72%	97%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						
Actuated Green, G (s)	17.6	19.8	19.8	6.1	8.3	8.3	1.0	28.2		28.8	56.0	
Effective Green, g (s)	17.6	19.8	19.8	6.1	8.3	8.3	1.0	28.2		28.8	56.0	
Actuated g/C Ratio	0.18	0.20	0.20	0.06	0.08	0.08	0.01	0.28		0.29	0.56	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	318	381	157	57	176	74	9	507		302	1070	
v/s Ratio Prot	c0.11	c0.07		0.04	0.02		0.00	c0.18		c0.20	0.04	
v/s Ratio Perm			0.00			0.01						
v/c Ratio	0.62	0.36	0.02	0.60	0.22	0.10	0.33	0.63		0.70	0.07	
Uniform Delay, d1	38.0	34.6	32.3	45.7	42.8	42.3	49.1	31.3		31.6	10.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.6	0.1	15.6	0.6	0.6	20.6	2.4		6.8	0.0	
Delay (s)	41.6	35.2	32.3	61.3	43.4	42.9	69.7	33.7		38.4	10.0	
Level of Service	D	D	C	E	D	D	E	C		D	B	
Approach Delay (s)		38.6			47.0			34.0			31.0	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	36.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	99.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	187	231	165	341	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.92		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1824		3400	2006		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1824		3400	2006		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	251	179	371	0	0
RTOR Reduction (vph)	149	0	0	0	0	0
Lane Group Flow (vph)	305	0	179	371	0	0
Heavy Vehicles (%)	81%	82%	3%	80%	2%	2%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	7.7		3.3	19.0		
Effective Green, g (s)	7.7		3.3	19.0		
Actuated g/C Ratio	0.41		0.17	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	739		591	2006		
v/s Ratio Prot	c0.17		0.05	c0.18		
v/s Ratio Perm						
v/c Ratio	0.41		0.30	0.18		
Uniform Delay, d1	4.0		6.8	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.4		0.3	0.0		
Delay (s)	4.4		7.1	0.0		
Level of Service	A		A	A		
Approach Delay (s)	4.4			2.4	0.0	
Approach LOS	A			A	A	

Intersection Summary

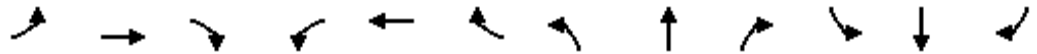
HCM Average Control Delay	3.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	19.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	24.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	92	0	0	97	119	89	207	109	83	0	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.95		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	965	2124			3087		883	2816		1770		1882
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	965	2124			3087		883	2816		1770		1882
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	100	0	0	105	129	97	225	118	90	0	179
RTOR Reduction (vph)	0	0	0	0	105	0	0	65	0	0	0	150
Lane Group Flow (vph)	101	100	0	0	129	0	87	288	0	90	0	29
Heavy Vehicles (%)	87%	70%	0%	0%	15%	1%	86%	22%	0%	2%	0%	51%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	10.2	25.0			10.8		11.4	11.4		9.2		9.2
Effective Green, g (s)	10.2	25.0			10.8		11.4	11.4		9.2		9.2
Actuated g/C Ratio	0.18	0.43			0.19		0.20	0.20		0.16		0.16
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	171	922			579		175	557		283		301
v/s Ratio Prot	c0.10	0.05			c0.04		0.10	c0.10		c0.05		0.02
v/s Ratio Perm												
v/c Ratio	0.59	0.11			0.22		0.50	0.52		0.32		0.09
Uniform Delay, d1	21.8	9.7			19.8		20.6	20.6		21.4		20.6
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	5.4	0.1			0.2		2.2	0.8		0.7		0.1
Delay (s)	27.2	9.7			20.0		22.8	21.5		22.1		20.8
Level of Service	C	A			C		C	C		C		C
Approach Delay (s)		18.5			20.0			21.7			21.2	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	57.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	27	355	15	7	239	25	14	15	10	44	17	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		0.99	
Frt		0.99			0.99			1.00	0.85		0.97	
Flt Protected		1.00			1.00			0.98	1.00		0.97	
Satd. Flow (prot)		3175			3259			1846	1577		1764	
Flt Permitted		0.92			0.95			0.89	1.00		0.85	
Satd. Flow (perm)		2933			3084			1686	1577		1545	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	386	16	8	260	27	15	16	11	48	18	23
RTOR Reduction (vph)	0	3	0	0	8	0	0	0	8	0	14	0
Lane Group Flow (vph)	0	428	0	0	287	0	0	31	3	0	75	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	14%	0%	0%	10%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm		NA
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		59.0			59.0			23.0	23.0			23.0
Effective Green, g (s)		59.0			59.0			23.0	23.0			23.0
Actuated g/C Ratio		0.66			0.66			0.26	0.26			0.26
Clearance Time (s)		4.0			4.0			4.0	4.0			4.0
Lane Grp Cap (vph)		1923			2022			431	403			395
v/s Ratio Prot												
v/s Ratio Perm		c0.15			0.09			0.02	0.00			c0.05
v/c Ratio		0.22			0.14			0.07	0.01			0.19
Uniform Delay, d1		6.3			5.9			25.4	25.0			26.2
Progression Factor		1.00			1.39			1.00	1.00			1.00
Incremental Delay, d2		0.3			0.1			0.3	0.0			1.1
Delay (s)		6.5			8.3			25.7	25.0			27.3
Level of Service		A			A			C	C			C
Approach Delay (s)		6.5			8.3			25.5				27.3
Approach LOS		A			A			C				C

Intersection Summary

HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	425	13	112	252	41	17	54	96	68	75	32
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.98			0.92		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1805	1785		1805	3340			1707		1791	1801	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.35	1.00	
Satd. Flow (perm)	1805	1785		1805	3340			1647		667	1801	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	462	14	122	274	45	18	59	104	74	82	35
RTOR Reduction (vph)	0	1	0	0	8	0	0	72	0	0	23	0
Lane Group Flow (vph)	57	475	0	122	311	0	0	109	0	74	94	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	0%	6%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	55.1		12.6	62.9			11.3		11.3	11.3	
Effective Green, g (s)	4.8	55.1		12.6	62.9			11.3		11.3	11.3	
Actuated g/C Ratio	0.05	0.61		0.14	0.70			0.13		0.13	0.13	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	96	1093		253	2334			207		84	226	
v/s Ratio Prot	c0.03	c0.27		c0.07	0.09							0.05
v/s Ratio Perm								0.07		c0.11		
v/c Ratio	0.59	0.43		0.48	0.13			0.53		0.88	0.42	
Uniform Delay, d1	41.6	9.2		35.7	4.5			36.9		38.7	36.3	
Progression Factor	0.92	0.83		1.37	0.28			1.00		1.00	1.00	
Incremental Delay, d2	6.4	1.3		0.5	0.1			1.1		59.1	0.5	
Delay (s)	44.5	8.9		49.5	1.4			38.0		97.8	36.8	
Level of Service	D	A		D	A			D		F	D	
Approach Delay (s)		12.7			14.7			38.0			60.4	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↖	↗		↕	
Volume (vph)	26	617	10	61	371	21	38	76	147	9	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00			1.00	1.00		0.99	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)	1776	3399		1743	3410			1861	1457		1769	
Flt Permitted	0.47	1.00		0.31	1.00			0.92	1.00		0.91	
Satd. Flow (perm)	873	3399		576	3410			1739	1457		1653	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	671	11	66	403	23	41	83	160	10	5	5
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	81	0	3	0
Lane Group Flow (vph)	28	681	0	66	422	0	0	124	79	0	17	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	3%	5%	0%	0%	0%	8%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	398	1548		262	1553			792	664		753	
v/s Ratio Prot		c0.20			0.12							
v/s Ratio Perm	0.03			0.11				c0.07	0.05		0.01	
v/c Ratio	0.07	0.44		0.25	0.27			0.16	0.12		0.02	
Uniform Delay, d1	13.8	16.7		15.1	15.2			14.4	14.1		13.5	
Progression Factor	1.34	1.28		0.80	0.82			1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.9		2.2	0.4			0.4	0.4		0.1	
Delay (s)	18.8	22.2		14.2	12.9			14.8	14.5		13.5	
Level of Service	B	C		B	B			B	B		B	
Approach Delay (s)		22.1			13.1			14.6			13.5	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	400	52	56	723	64	33	83	29	35	64	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.96			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.99	
Satd. Flow (prot)	1802	3322		1053	3471	1498	1571	2199			3092	
Flt Permitted	0.31	1.00		0.45	1.00	1.00	0.65	1.00			0.87	
Satd. Flow (perm)	588	3322		504	3471	1498	1075	2199			2737	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	435	57	61	786	70	36	90	32	38	70	53
RTOR Reduction (vph)	0	11	0	0	0	28	0	22	0	0	37	0
Lane Group Flow (vph)	77	481	0	61	786	42	36	100	0	0	124	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	11%	71%	4%	6%	14%	50%	76%	0%	20%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Effective Green, g (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.31	0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	353	1993		302	2083	899	334	684			852	
v/s Ratio Prot		0.14			c0.23			0.05				
v/s Ratio Perm	0.13			0.12		0.03	0.03				c0.05	
v/c Ratio	0.22	0.24		0.20	0.38	0.05	0.11	0.15			0.15	
Uniform Delay, d1	8.3	8.4		8.2	9.3	7.4	22.1	22.4			22.4	
Progression Factor	0.29	0.24		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	1.3	0.3		1.5	0.5	0.1	0.6	0.4			0.4	
Delay (s)	3.7	2.3		9.7	9.8	7.5	22.7	22.8			22.7	
Level of Service	A	A		A	A	A	C	C			C	
Approach Delay (s)		2.5			9.6			22.8			22.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	9.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	333	40	109	727	41	48	50	66	126	199	38
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1667	4288		1796	4538		1742	1863	1582	1773	3574	1217
Flt Permitted	0.29	1.00		0.51	1.00		0.62	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	506	4288		955	4538		1130	1863	1582	1347	3574	1217
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	362	43	118	790	45	52	54	72	137	216	41
RTOR Reduction (vph)	0	17	0	0	7	0	0	0	41	0	0	23
Lane Group Flow (vph)	37	388	0	118	828	0	52	54	31	137	216	18
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	8%	21%	0%	0%	14%	0%	3%	2%	0%	1%	1%	30%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Effective Green, g (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Actuated g/C Ratio	0.46	0.46		0.46	0.46		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	232	1967		438	2082		485	800	679	578	1535	523
v/s Ratio Prot		0.09			c0.18			0.03				0.06
v/s Ratio Perm	0.07			0.12			0.05		0.02	c0.10		0.01
v/c Ratio	0.16	0.20		0.27	0.40		0.11	0.07	0.05	0.24	0.14	0.03
Uniform Delay, d1	13.4	13.7		14.2	15.2		14.5	14.2	14.1	15.4	14.7	14.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.2		0.1	0.0		0.4	0.2	0.1	1.0	0.2	0.1
Delay (s)	14.9	13.9		14.3	15.3		14.9	14.4	14.2	16.4	14.9	14.2
Level of Service	B	B		B	B		B	B	B	B	B	B
Approach Delay (s)		14.0			15.2			14.5			15.3	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	226	641	0	0	0	0	0	911	1433	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.93	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4817						4533	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4817						4533	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	697	0	0	0	0	0	990	1558	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	161	96	0	0	0
Lane Group Flow (vph)	0	940	0	0	0	0	0	1608	683	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	6%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						16.0	33.7			
Effective Green, g (s)		34.0						16.0	33.7			
Actuated g/C Ratio		0.57						0.27	0.56			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2730						1209	772			
v/s Ratio Prot								c0.35				
v/s Ratio Perm		0.20							c0.50			
v/c Ratio		0.34						1.38dr	0.88			
Uniform Delay, d1		7.0						22.0	11.5			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.3						154.4	11.8			
Delay (s)		7.3						176.4	23.2			
Level of Service		A						F	C			
Approach Delay (s)		7.3			0.0			129.6			0.0	
Approach LOS		A			A			F			A	

Intersection Summary

HCM Average Control Delay	96.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	50	888	825	0	0	0	0	321	55	29	311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.95	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			1.00	
Satd. Flow (prot)		4486	1355					1833			1840	
Flt Permitted		1.00	1.00					1.00			0.95	
Satd. Flow (perm)		4486	1355					1833			1751	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	965	897	0	0	0	0	349	60	32	338	0
RTOR Reduction (vph)	0	140	0	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	1328	448	0	0	0	0	400	0	0	370	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	8%	4%	1%	0%	0%	0%	0%	1%	2%	0%	3%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)		26.6	60.0					24.4			24.4	
Effective Green, g (s)		26.6	60.0					24.4			24.4	
Actuated g/C Ratio		0.44	1.00					0.41			0.41	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		1989	1355					745			712	
v/s Ratio Prot								c0.22				
v/s Ratio Perm		0.30	0.33								0.21	
v/c Ratio		0.67	0.33					0.54			0.52	
Uniform Delay, d1		13.2	0.0					13.5			13.4	
Progression Factor		0.51	1.00					0.84			1.00	
Incremental Delay, d2		0.3	0.3					2.7			2.7	
Delay (s)		7.1	0.3					14.1			16.1	
Level of Service		A	A					B			B	
Approach Delay (s)		5.5			0.0			14.1			16.1	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	10	362	67	344	330	0	0	220	1197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frft				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1792	1517	1767	1881			1570	1477
Flt Permitted				0.95	1.00	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)				1730	1792	1517	351	1881			1570	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	11	393	73	374	359	0	0	239	1301
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	43	0
Lane Group Flow (vph)	0	0	0	11	393	18	374	359	0	0	742	755
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	6%	0%	2%	1%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	433	367	202	1082			903	1477
v/s Ratio Prot					c0.22			0.19			0.47	
v/s Ratio Perm				0.01		0.01	c1.07					0.51
v/c Ratio				0.03	0.91	0.05	1.85	0.33			0.82	0.51
Uniform Delay, d1				17.4	22.1	17.5	12.8	6.7			10.3	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.95	1.00
Incremental Delay, d2				0.1	25.4	0.2	401.7	0.8			7.9	1.2
Delay (s)				17.5	47.5	17.7	414.4	7.5			17.6	1.2
Level of Service				B	D	B	F	A			B	A
Approach Delay (s)		0.0			42.2			215.1			9.6	
Approach LOS		A			D			F			A	

Intersection Summary

HCM Average Control Delay	70.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘		↗	↕		↗	↕			↕	
Volume (vph)	29	151	26	301	64	19	16	269	590	5	48	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1854		1656	3471		1796	3029			3446	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.90	
Satd. Flow (perm)	1805	1854		1656	3471		1796	3029			3109	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	327	70	21	17	292	641	5	52	7
RTOR Reduction (vph)	0	8	0	0	13	0	0	403	0	0	5	0
Lane Group Flow (vph)	32	184	0	327	78	0	17	530	0	0	59	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	9%	0%	0%	0%	7%	5%	0%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	0.9	12.9		9.6	21.6		0.4	20.4			16.0	
Effective Green, g (s)	0.9	12.9		9.6	21.6		0.4	20.4			16.0	
Actuated g/C Ratio	0.02	0.23		0.17	0.39		0.01	0.37			0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	30	436		290	1366		13	1126			906	
v/s Ratio Prot	0.02	c0.10		c0.20	0.02		0.01	c0.18				
v/s Ratio Perm											0.02	
v/c Ratio	1.07	0.42		1.13	0.06		1.31	0.47			0.07	
Uniform Delay, d1	27.0	17.8		22.6	10.3		27.2	13.1			14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	185.4	0.7		91.7	0.0		363.0	0.3			0.0	
Delay (s)	212.4	18.5		114.4	10.3		390.2	13.5			14.1	
Level of Service	F	B		F	B		F	B			B	
Approach Delay (s)		46.2			91.7			20.2			14.1	
Approach LOS		D			F			C			B	

Intersection Summary

HCM Average Control Delay	41.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	724	62	24	151	13	174	149	174	138	51	33
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1805	3351		1805	3561		1805	1889		1643	2567	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.98	
Satd. Flow (perm)	1805	3351		1805	3561		1805	1889		1643	2567	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	787	67	26	164	14	189	162	189	150	55	36
RTOR Reduction (vph)	0	4	0	0	5	0	0	149	0	0	23	0
Lane Group Flow (vph)	54	850	0	26	173	0	189	202	0	81	137	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	5%	21%	0%	0%	0%	0%	57%	88%	0%	78%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	4.8	27.5		2.5	25.7		15.5	15.5		11.9	11.9	
Effective Green, g (s)	4.8	27.5		2.5	25.7		15.5	15.5		11.9	11.9	
Actuated g/C Ratio	0.07	0.37		0.03	0.35		0.21	0.21		0.16	0.16	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	118	1255		61	1247		381	399		266	416	
v/s Ratio Prot	c0.03	c0.25		0.01	0.05		0.10	c0.11		0.05	c0.05	
v/s Ratio Perm												
v/c Ratio	0.46	0.68		0.43	0.14		0.50	0.51		0.30	0.33	
Uniform Delay, d1	33.0	19.2		34.7	16.3		25.5	25.6		27.1	27.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	1.6		4.7	0.1		1.4	1.4		0.9	0.6	
Delay (s)	35.8	20.8		39.5	16.4		26.9	26.9		28.0	27.9	
Level of Service	D	C		D	B		C	C		C	C	
Approach Delay (s)		21.7			19.3			26.9			27.9	
Approach LOS		C			B			C			C	

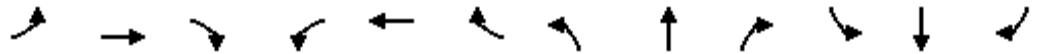
Intersection Summary

HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	11.5
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	30	117	178	56	607	0	0	103	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3566	1581	1788	1111			2865	1579
Flt Permitted					0.99	1.00	0.68	1.00			1.00	1.00
Satd. Flow (perm)					3566	1581	1282	1111			2865	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	127	193	61	660	0	0	112	59
RTOR Reduction (vph)	0	0	0	0	0	156	0	0	0	0	0	15
Lane Group Flow (vph)	0	0	0	0	160	37	61	660	0	0	112	44
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	13%	100%	0%	0%	0%	0%	71%	83%	0%	26%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					12.8	12.8	67.7	67.7			67.7	67.7
Effective Green, g (s)					12.8	12.8	67.7	67.7			67.7	67.7
Actuated g/C Ratio					0.14	0.14	0.75	0.75			0.75	0.75
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					507	225	964	836			2155	1188
v/s Ratio Prot								c0.59			0.04	
v/s Ratio Perm					0.04	0.02	0.05					0.03
v/c Ratio					0.32	0.16	0.06	0.79			0.05	0.04
Uniform Delay, d1					34.7	33.9	2.9	6.8			2.9	2.8
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.4	0.3	0.1	7.5			0.0	0.1
Delay (s)					35.0	34.2	3.0	14.3			2.9	2.9
Level of Service					D	C	A	B			A	A
Approach Delay (s)		0.0			34.6			13.3			2.9	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	782	363	58	299	321	0	567	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.92			1.00	1.00
Flt Protected	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2945	1509	4570			1752	1863
Flt Permitted	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2945	1509	4570			1752	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	850	395	63	325	349	0	616	435
RTOR Reduction (vph)	0	0	17	0	0	0	0	0
Lane Group Flow (vph)	425	820	46	674	0	0	616	435
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	30%	7%	2%	1%	3%	3%	2%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	30.1	30.1	30.1	24.9			21.5	49.9
Effective Green, g (s)	30.1	30.1	30.1	24.9			21.5	49.9
Actuated g/C Ratio	0.33	0.33	0.33	0.28			0.24	0.55
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	549	985	505	1264			419	1033
v/s Ratio Prot				c0.15			c0.35	0.23
v/s Ratio Perm	0.26	0.28	0.03					
v/c Ratio	0.77	0.83	0.09	0.53			1.47	0.42
Uniform Delay, d1	26.9	27.6	20.6	27.6			34.2	11.7
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	6.1	5.8	0.0	1.6			224.2	0.1
Delay (s)	33.0	33.5	20.6	29.2			258.5	11.8
Level of Service	C	C	C	C			F	B
Approach Delay (s)		32.7		29.2				156.4
Approach LOS		C		C				F

Intersection Summary

HCM Average Control Delay	74.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↔↔			↔↔	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	84	12	36	143	105	60	215	155	36	55	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	91	13	39	155	114	65	234	168	39	60	36

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	140	13	195	114	182	285	69	66
Volume Left (vph)	49	0	39	0	65	0	39	0
Volume Right (vph)	0	13	0	114	0	168	0	36
Hadj (s)	0.17	-0.70	0.35	-0.65	1.06	0.90	0.88	0.24
Departure Headway (s)	7.0	6.1	6.9	5.9	7.2	7.0	7.5	6.9
Degree Utilization, x	0.27	0.02	0.37	0.19	0.36	0.56	0.14	0.13
Capacity (veh/h)	485	548	496	575	487	491	450	489
Control Delay (s)	11.4	8.0	12.8	9.1	13.0	17.3	10.6	9.7
Approach Delay (s)	11.1		11.4		15.6		10.2	
Approach LOS	B		B		C		B	

Intersection Summary

Delay	13.1
HCM Level of Service	B
Intersection Capacity Utilization	49.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕		↗	↕	↗
Volume (veh/h)	13	367	12	11	147	14	43	8	39	34	14	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	399	13	12	160	15	47	9	42	37	15	58
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	180			417			686	636	409	668	634	170
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	180			417			686	636	409	668	634	170
tC, single (s)	4.1			4.7			8.0	7.4	6.2	7.1	7.4	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			4.3	4.8	3.3	3.5	4.8	3.3
p0 queue free %	99			99			80	97	93	89	95	93
cM capacity (veh/h)	1402			893			233	292	641	331	293	867

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	413	13	172	15	98	37	10	63
Volume Left	14	0	12	0	47	37	0	0
Volume Right	0	13	0	15	42	0	0	58
cSH	1402	1700	893	1700	330	331	293	748
Volume to Capacity	0.01	0.01	0.01	0.01	0.30	0.11	0.03	0.08
Queue Length 95th (ft)	1	0	1	0	30	9	3	7
Control Delay (s)	0.4	0.0	0.8	0.0	20.4	17.2	17.7	10.3
Lane LOS	A		A		C	C	C	B
Approach Delay (s)	0.3		0.7		20.4	13.3		
Approach LOS					C	B		

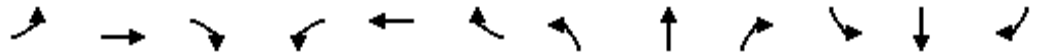
Intersection Summary

Average Delay		4.6						
Intersection Capacity Utilization		48.8%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012

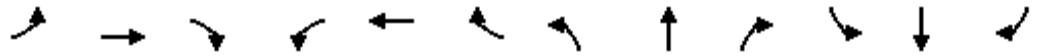


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	154	12	12	125	0	0	0	0	25	109	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.97	
Flt Protected		1.00	1.00		1.00						0.99	
Satd. Flow (prot)		3610	1550		3587						3454	
Flt Permitted		1.00	1.00		0.94						0.99	
Satd. Flow (perm)		3610	1550		3372						3454	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	167	13	13	136	0	0	0	0	27	118	34
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	28	0
Lane Group Flow (vph)	0	167	9	0	149	0	0	0	0	0	151	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		55.5	55.5		55.5						12.5	
Effective Green, g (s)		55.5	55.5		55.5						12.5	
Actuated g/C Ratio		0.73	0.73		0.73						0.16	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2619	1125		2446						564	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.04	
v/c Ratio		0.06	0.01		0.06						0.27	
Uniform Delay, d1		3.0	2.9		3.0						28.0	
Progression Factor		1.00	1.00		0.24						1.00	
Incremental Delay, d2		0.0	0.0		0.0						0.3	
Delay (s)		3.1	2.9		0.8						28.2	
Level of Service		A	A		A						C	
Approach Delay (s)		3.1			0.8			0.0			28.2	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM Average Control Delay			11.3		HCM Level of Service					B		
HCM Volume to Capacity ratio			0.10									
Actuated Cycle Length (s)			76.5		Sum of lost time (s)				8.5			
Intersection Capacity Utilization			42.3%		ICU Level of Service				A			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕	↗		↕↕				
Volume (vph)	13	141	0	0	137	39	5	146	49	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		3518			3539	1520		3406				
Flt Permitted		0.94			1.00	1.00		1.00				
Satd. Flow (perm)		3309			3539	1520		3406				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	153	0	0	149	42	5	159	53	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	12	0	44	0	0	0	0
Lane Group Flow (vph)	0	167	0	0	149	30	0	173	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		55.5			55.5	55.5		12.5				
Effective Green, g (s)		55.5			55.5	55.5		12.5				
Actuated g/C Ratio		0.73			0.73	0.73		0.16				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2401			2568	1103		557				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.05				0.02		0.05				
v/c Ratio		0.07			0.06	0.03		0.31				
Uniform Delay, d1		3.0			3.0	2.9		28.2				
Progression Factor		0.53			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.3				
Delay (s)		1.7			3.1	3.0		28.5				
Level of Service		A			A	A		C				
Approach Delay (s)		1.7			3.0			28.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↵	↵↵	↑	↑↑↑	↵	↵	↵	↵
Volume (vph)	91	120	0	293	35	0	1040	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1697	3127		5187	1216		1681	1691
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1697	3127		5187	1216		1681	1691
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	130	0	318	38	0	1130	38
RTOR Reduction (vph)	39	0	0	0	0	0	0	0
Lane Group Flow (vph)	60	130	0	318	38	0	588	580
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	5%	12%	12%	0%	29%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	10.6	10.6		10.9	10.9		49.5	49.5
Effective Green, g (s)	10.6	10.6		10.9	10.9		49.5	49.5
Actuated g/C Ratio	0.12	0.12		0.13	0.13		0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	212	390		665	156		979	985
v/s Ratio Prot				c0.06			c0.35	0.34
v/s Ratio Perm	0.04	c0.04			0.03			
v/c Ratio	0.28	0.33		0.48	0.24		0.60	0.59
Uniform Delay, d1	33.7	34.0		34.4	33.3		11.4	11.3
Progression Factor	0.54	0.68		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.5		0.5	0.8		2.7	2.6
Delay (s)	18.7	23.6		35.0	34.2		14.1	13.9
Level of Service	B	C		C	C		B	B
Approach Delay (s)			21.5	34.9				14.0
Approach LOS			C	C				B

Intersection Summary			
HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	281	895	27	1455	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.91	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3027	1455	1552	1539	4617
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3027	1455	1552	1539	4617
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	305	973	29	1582	0
RTOR Reduction (vph)	0	0	15	0	0
Lane Group Flow (vph)	792	486	11	794	791
Heavy Vehicles (%)	8%	1%	0%	0%	3%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	47.0	47.0	28.5	28.5	28.5
Effective Green, g (s)	47.0	47.0	28.5	28.5	28.5
Actuated g/C Ratio	0.55	0.55	0.34	0.34	0.34
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1674	805	520	516	1548
v/s Ratio Prot	0.26		0.01	c0.52	0.17
v/s Ratio Perm		c0.33			
v/c Ratio	0.47	0.60	0.02	1.54	1.36dl
Uniform Delay, d1	11.5	12.8	18.9	28.2	22.7
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	3.3	0.0	252.0	0.3
Delay (s)	12.5	16.1	18.9	280.3	22.9
Level of Service	B	B	B	F	C
Approach Delay (s)	13.8				149.7
Approach LOS	B				F

Intersection Summary

HCM Average Control Delay	89.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	561	23	9	205	0	0	0	0	294	244	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5147			5124					1805	3539	1570
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5147			4672					1805	3539	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	610	25	10	223	0	0	0	0	320	265	222
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	117
Lane Group Flow (vph)	0	629	0	0	233	0	0	0	0	320	265	105
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	2%	0%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		30.0			30.0					38.0	38.0	38.0
Effective Green, g (s)		30.0			30.0					38.0	38.0	38.0
Actuated g/C Ratio		0.38			0.38					0.48	0.48	0.48
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1930			1752					857	1681	746
v/s Ratio Prot		c0.12									0.07	
v/s Ratio Perm					0.05					c0.18		0.07
v/c Ratio		0.33			0.13					0.37	0.16	0.14
Uniform Delay, d1		17.8			16.4					13.4	11.9	11.8
Progression Factor		1.00			0.20					1.00	1.00	1.00
Incremental Delay, d2		0.5			0.1					1.2	0.2	0.4
Delay (s)		18.3			3.4					14.6	12.1	12.2
Level of Service		B			A					B	B	B
Approach Delay (s)		18.3			3.4			0.0			13.1	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	408	464	0	0	214	852	11	884	46	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.97		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.90	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4830			4297	1334		5022				
Flt Permitted	0.95	0.67			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3284			4297	1334		5022				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	443	504	0	0	233	926	12	961	50	0	0	0
RTOR Reduction (vph)	0	0	0	0	18	18	0	7	0	0	0	0
Lane Group Flow (vph)	230	717	0	0	678	445	0	1016	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	9%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	12.0	42.0			26.5	26.5		27.0				
Effective Green, g (s)	12.0	42.0			26.5	26.5		27.0				
Actuated g/C Ratio	0.15	0.52			0.33	0.33		0.34				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	233	1956			1423	442		1695				
v/s Ratio Prot	c0.15	0.05			0.16							
v/s Ratio Perm		0.14				c0.33		0.20				
v/c Ratio	0.99	1.00dl			0.91dr	1.01		0.60				
Uniform Delay, d1	33.9	11.2			21.2	26.8		22.0				
Progression Factor	1.03	1.95			1.00	1.00		1.00				
Incremental Delay, d2	54.5	0.5			1.1	44.5		1.6				
Delay (s)	89.4	22.3			22.4	71.2		23.6				
Level of Service	F	C			C	E		C				
Approach Delay (s)		38.6			41.9			23.6			0.0	
Approach LOS		D			D			C			A	

Intersection Summary

HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012

														
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR		
Lane Configurations														
Volume (vph)	0	302	1077	8	989	173	99	9	0	21	162	9		
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost time (s)		4.0			4.0			4.0			4.0			
Lane Util. Factor		0.95			0.95			0.95			0.95			
Frbp, ped/bikes		0.98			0.99			1.00			1.00			
Flpb, ped/bikes		1.00			1.00			1.00			1.00			
Frt		0.88			0.98			1.00			0.99			
Flt Protected		1.00			1.00			0.96			0.99			
Satd. Flow (prot)		3076			3503			3415			3526			
Flt Permitted		1.00			0.94			0.96			0.99			
Satd. Flow (perm)		3076			3301			3415			3526			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	0	328	1171	9	1075	188	108	10	0	23	176	10		
RTOR Reduction (vph)	0	516	0	0	22	0	0	0	0	0	5	0		
Lane Group Flow (vph)	0	983	0	0	1250	0	0	118	0	0	204	0		
Confl. Peds. (#/hr)			30			30						30		
Heavy Vehicles (%)	2%	2%	1%	0%	0%	0%	1%	2%	0%	0%	1%	0%		
Turn Type		NA		Perm	NA		Split	NA		Split	NA			
Protected Phases		8			4		2	2		1	1			
Permitted Phases				4										
Actuated Green, G (s)		33.0			33.0			6.0			14.0			
Effective Green, g (s)		33.0			33.0			6.0			14.0			
Actuated g/C Ratio		0.51			0.51			0.09			0.22			
Clearance Time (s)		4.0			4.0			4.0			4.0			
Lane Grp Cap (vph)		1562			1676			315			759			
v/s Ratio Prot		0.32						c0.03			c0.06			
v/s Ratio Perm					c0.38									
v/c Ratio		0.88dr			0.75			0.37			0.27			
Uniform Delay, d1		11.6			12.7			27.7			21.2			
Progression Factor		1.00			1.00			1.00			1.00			
Incremental Delay, d2		1.9			3.1			3.4			0.9			
Delay (s)		13.5			15.8			31.1			22.1			
Level of Service		B			B			C			C			
Approach Delay (s)		13.5			15.8			31.1			22.1			
Approach LOS		B			B			C			C			
Intersection Summary														
HCM Average Control Delay			15.7									HCM Level of Service	B	
HCM Volume to Capacity ratio			0.58											
Actuated Cycle Length (s)			65.0								12.0		Sum of lost time (s)	
Intersection Capacity Utilization			72.4%										ICU Level of Service	C
Analysis Period (min)			15											
dr Defacto Right Lane. Recode with 1 though lane as a right lane.														
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	63	606	22	112	333	150	16	318	85	190	236	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5148	1513	1737	3394		1771	1881	1556	1793	1881	1572
Flt Permitted		0.84	1.00	0.36	1.00		0.49	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)		4363	1513	652	3394		917	1881	1556	682	1881	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	659	24	122	362	163	17	346	92	207	257	39
RTOR Reduction (vph)	0	0	10	0	65	0	0	0	36	0	0	23
Lane Group Flow (vph)	0	727	14	122	460	0	17	346	56	207	257	16
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	0%	2%	3%	0%	0%	1%	1%	1%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.58	0.58	0.58	0.58		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2509	870	375	1952		275	564	467	205	564	472
v/s Ratio Prot					0.14			0.18			0.14	
v/s Ratio Perm		0.17	0.01	c0.19			0.02		0.04	c0.30		0.01
v/c Ratio		0.29	0.02	0.33	0.24		0.06	0.61	0.12	1.01	0.46	0.03
Uniform Delay, d1		8.7	7.3	8.9	8.4		20.0	24.0	20.3	28.0	22.7	19.8
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	2.3	0.3		0.4	4.9	0.5	65.4	2.6	0.1
Delay (s)		9.0	7.3	11.2	8.6		20.4	28.9	20.9	93.4	25.3	19.9
Level of Service		A	A	B	A		C	C	C	F	C	B
Approach Delay (s)		8.9			9.1			27.0			52.9	
Approach LOS		A			A			C			D	

Intersection Summary

HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	408	592	0	613	1589	0	0	0	553	0	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.95			0.98	0.98				1.00		0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.92	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3098			3021	1388				3433		1552
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3098			3021	1388				3433		1552
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	443	643	0	666	1727	0	0	0	601	0	295
RTOR Reduction (vph)	0	222	0	0	244	0	0	0	0	0	0	222
Lane Group Flow (vph)	263	864	0	0	1286	863	0	0	0	601	0	73
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	1%	0%	1%	4%	0%	0%	0%	2%	12%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	14.1	54.2			36.1	82.7				20.5		20.5
Effective Green, g (s)	14.1	54.2			36.1	82.7				20.5		20.5
Actuated g/C Ratio	0.17	0.66			0.44	1.00				0.25		0.25
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	305	2030			1319	1388				851		385
v/s Ratio Prot	c0.15	0.28			c0.43					0.18		
v/s Ratio Perm						c0.62						0.05
v/c Ratio	0.86	0.43			0.97	0.62				0.71		0.19
Uniform Delay, d1	33.4	6.8			22.9	0.0				28.4		24.5
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	21.3	0.1			18.9	2.1				2.7		0.2
Delay (s)	54.7	7.0			41.8	2.1				31.0		24.8
Level of Service	D	A			D	A				C		C
Approach Delay (s)		16.3			27.5		0.0				29.0	
Approach LOS		B			C		A				C	

Intersection Summary		
HCM Average Control Delay	24.5	HCM Level of Service C
HCM Volume to Capacity ratio	0.84	
Actuated Cycle Length (s)	82.7	Sum of lost time (s) 8.0
Intersection Capacity Utilization	74.0%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	134	707	0	0	1424	343	361	79	705	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.89	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5136	1550	1649	1489	1490			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5136	1550	1649	1489	1490			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	768	0	0	1548	373	392	86	766	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	222	0	131	131	0	0	0
Lane Group Flow (vph)	146	768	0	0	1548	151	353	323	306	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	4%	3%	3%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	5.2	32.3			23.1	23.1	16.7	16.7	16.7			
Effective Green, g (s)	5.2	32.3			23.1	23.1	16.7	16.7	16.7			
Actuated g/C Ratio	0.09	0.57			0.41	0.41	0.29	0.29	0.29			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	163	2910			2081	628	483	436	437			
v/s Ratio Prot	c0.08	0.15			c0.30		0.21	c0.22	0.21			
v/s Ratio Perm						0.10						
v/c Ratio	0.90	0.26			0.74	0.24	0.73	0.74	0.70			
Uniform Delay, d1	25.6	6.3			14.4	11.2	18.1	18.2	17.9			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	41.5	0.0			1.5	0.2	5.6	6.7	5.0			
Delay (s)	67.1	6.3			15.9	11.4	23.8	24.9	22.9			
Level of Service	E	A			B	B	C	C	C			
Approach Delay (s)		16.0			15.0			23.9			0.0	
Approach LOS		B			B			C			A	

Intersection Summary

HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	383	667	570	150	998	125	402	42	147	127	67	613
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.97	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3400	3212	1411	1805	3574	1615	1698	1721	1615		1840	2731
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3400	3212	1411	1805	3574	1615	1698	1721	1615		1840	2731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	416	725	620	163	1085	136	437	46	160	138	73	666
RTOR Reduction (vph)	0	26	271	0	0	43	0	0	137	0	0	256
Lane Group Flow (vph)	416	910	138	163	1085	93	240	243	23	0	211	410
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	3%	4%	1%	0%	1%	0%	1%	0%	0%	0%	0%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	10.1	28.9	28.9	9.4	28.2	28.2	12.1	12.1	12.1		19.5	19.5
Effective Green, g (s)	10.1	28.9	28.9	9.4	28.2	28.2	12.1	12.1	12.1		19.5	19.5
Actuated g/C Ratio	0.12	0.34	0.34	0.11	0.33	0.33	0.14	0.14	0.14		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	400	1081	475	198	1173	530	239	242	227		418	620
v/s Ratio Prot	c0.12	0.28		0.09	c0.30	0.06	c0.14	0.14	0.01		0.11	
v/s Ratio Perm			0.10									c0.15
v/c Ratio	1.04	0.84	0.29	0.82	0.92	0.18	1.00	1.00	0.10		0.50	0.66
Uniform Delay, d1	37.9	26.4	21.0	37.4	27.8	20.6	36.9	36.9	32.2		29.0	30.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	55.8	6.1	0.3	23.3	12.1	0.2	59.3	58.9	0.2		1.0	2.7
Delay (s)	93.7	32.5	21.3	60.7	40.0	20.7	96.2	95.8	32.3		29.9	32.9
Level of Service	F	C	C	E	D	C	F	F	C		C	C
Approach Delay (s)		44.3			40.5			80.2			32.2	
Approach LOS		D			D			F			C	

Intersection Summary

HCM Average Control Delay	45.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	85.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



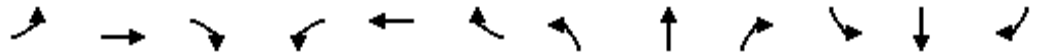
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	610	139	58	517	63	423	412	47	77	252	231
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1736	3377		1805	3496		1787	1813		1805	1845	1545
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1736	3377		1805	3496		1787	1813		913	1845	1545
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	663	151	63	562	68	460	448	51	84	274	251
RTOR Reduction (vph)	0	21	0	0	10	0	0	5	0	0	0	51
Lane Group Flow (vph)	157	793	0	63	620	0	460	494	0	84	274	200
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	4%	3%	1%	0%	1%	0%	1%	3%	1%	0%	3%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	9.1	24.9		3.9	19.7		23.7	33.4		18.0	18.0	27.1
Effective Green, g (s)	9.1	24.9		3.9	19.7		23.7	33.4		18.0	18.0	27.1
Actuated g/C Ratio	0.11	0.29		0.05	0.23		0.27	0.39		0.21	0.21	0.31
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	183	972		81	796		490	700		276	384	555
v/s Ratio Prot	c0.09	c0.23		0.03	0.18		c0.26	c0.27		0.03	c0.15	0.04
v/s Ratio Perm										0.03		0.09
v/c Ratio	0.86	0.82		0.78	0.78		0.94	0.71		0.30	0.71	0.36
Uniform Delay, d1	38.1	28.7		40.9	31.4		30.7	22.4		29.9	31.9	23.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.5	5.4		36.4	4.8		25.8	3.3		0.6	6.2	0.4
Delay (s)	68.6	34.0		77.3	36.2		56.5	25.7		30.5	38.0	23.4
Level of Service	E	C		E	D		E	C		C	D	C
Approach Delay (s)		39.6			39.9			40.5			31.0	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	38.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖
Volume (vph)	164	618	152	100	315	44	158	802	107	168	810	75
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	3426		1805	3610	1579	1787	3539	1580	1805	3574	1580
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	3426		1805	3610	1579	1787	3539	1580	1805	3574	1580
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	672	165	109	342	48	172	872	116	183	880	82
RTOR Reduction (vph)	0	24	0	0	0	29	0	0	29	0	0	20
Lane Group Flow (vph)	178	813	0	109	342	19	172	872	87	183	880	62
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	5%	2%	1%	0%	0%	0%	1%	2%	0%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	25.2		7.5	23.2	23.2	11.7	32.0	32.0	10.3	30.6	30.6
Effective Green, g (s)	9.5	25.2		7.5	23.2	23.2	11.7	32.0	32.0	10.3	30.6	30.6
Actuated g/C Ratio	0.11	0.28		0.08	0.26	0.26	0.13	0.36	0.36	0.11	0.34	0.34
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	181	959		150	931	407	232	1258	562	207	1215	537
v/s Ratio Prot	c0.10	c0.24		0.06	0.09		0.10	c0.25		c0.10	0.25	
v/s Ratio Perm						0.01			0.06			0.04
v/c Ratio	0.98	0.85		0.73	0.37	0.05	0.74	0.69	0.15	0.88	0.72	0.12
Uniform Delay, d1	40.2	30.6		40.2	27.4	25.1	37.7	24.8	19.8	39.3	26.0	20.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	61.6	7.0		16.0	0.2	0.0	12.0	3.2	0.6	32.9	3.8	0.4
Delay (s)	101.8	37.6		56.3	27.6	25.1	49.7	28.0	20.4	72.1	29.8	20.8
Level of Service	F	D		E	C	C	D	C	C	E	C	C
Approach Delay (s)		48.9			33.6			30.4			35.9	
Approach LOS		D			C			C			D	

Intersection Summary		
HCM Average Control Delay	37.4	HCM Level of Service D
HCM Volume to Capacity ratio	0.72	
Actuated Cycle Length (s)	90.0	Sum of lost time (s) 6.0
Intersection Capacity Utilization	73.7%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	539	4	112	274	25	140	829	22	63	648	22
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3501		1805	3558		1805	3594		1805	3590	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	3501		1805	3558		1805	3594		1805	3590	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	586	4	122	298	27	152	901	24	68	704	24
RTOR Reduction (vph)	0	1	0	0	6	0	0	1	0	0	2	0
Lane Group Flow (vph)	126	589	0	122	319	0	152	924	0	68	726	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	1%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	11.3	21.5		11.1	21.3		12.2	32.4		7.3	27.5	
Effective Green, g (s)	11.3	21.5		11.1	21.3		12.2	32.4		7.3	27.5	
Actuated g/C Ratio	0.13	0.25		0.13	0.25		0.14	0.38		0.08	0.32	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	234	872		232	878		255	1349		153	1144	
v/s Ratio Prot	c0.07	c0.17		0.07	0.09		c0.08	c0.26		0.04	0.20	
v/s Ratio Perm												
v/c Ratio	0.54	0.68		0.53	0.36		0.60	0.68		0.44	0.63	
Uniform Delay, d1	35.1	29.3		35.1	26.9		34.7	22.7		37.6	25.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	2.1		2.1	0.3		3.7	1.5		2.1	1.2	
Delay (s)	37.4	31.3		37.3	27.1		38.5	24.1		39.6	26.3	
Level of Service	D	C		D	C		D	C		D	C	
Approach Delay (s)		32.4			29.9			26.1			27.4	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	28.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	468	516	195	2108	1482	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	1553		5118	5000	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	3433	1553		3232	5000	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	509	561	212	2291	1611	286
RTOR Reduction (vph)	0	21	0	0	21	0
Lane Group Flow (vph)	509	540	0	2503	1876	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	2%	0%	0%	1%	1%	0%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	37.0	37.0		75.0	75.0	
Effective Green, g (s)	37.0	37.0		75.0	75.0	
Actuated g/C Ratio	0.31	0.31		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1059	479		2020	3125	
v/s Ratio Prot	0.15				0.38	
v/s Ratio Perm		c0.35		c0.77		
v/c Ratio	0.48	1.13		2.47dl	0.60	
Uniform Delay, d1	33.7	41.5		22.5	13.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	80.5		112.0	0.9	
Delay (s)	35.3	122.0		134.5	14.4	
Level of Service	D	F		F	B	
Approach Delay (s)	80.8			134.5	14.4	
Approach LOS	F			F	B	

Intersection Summary

HCM Average Control Delay	82.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.0%	ICU Level of Service	H
Analysis Period (min)	15		
dl Defacto Left Lane. Recode with 1 though lane as a left lane.			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↗↘		↗	↗	↗
Volume (vph)	265	655	98	85	684	46	134	357	70	120	175	488
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3410		1787	3470		1719	3444		1805	1900	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1752	3410		1787	3470		1719	3444		1805	1900	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	288	712	107	92	743	50	146	388	76	130	190	530
RTOR Reduction (vph)	0	14	0	0	6	0	0	21	0	0	0	220
Lane Group Flow (vph)	288	805	0	92	787	0	146	443	0	130	190	310
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	3%	3%	4%	1%	3%	1%	5%	2%	0%	0%	0%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	29.0		6.7	23.6		7.1	18.2		6.1	17.2	17.2
Effective Green, g (s)	12.1	29.0		6.7	23.6		7.1	18.2		6.1	17.2	17.2
Actuated g/C Ratio	0.16	0.38		0.09	0.31		0.09	0.24		0.08	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	279	1301		158	1078		161	825		145	430	355
v/s Ratio Prot	c0.16	0.24		0.05	c0.23		c0.08	0.13		0.07	0.10	
v/s Ratio Perm												c0.20
v/c Ratio	1.03	0.62		0.58	0.73		0.91	0.54		0.90	0.44	0.87
Uniform Delay, d1	31.9	19.0		33.3	23.4		34.1	25.2		34.6	25.3	28.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	62.5	0.9		5.4	2.5		44.4	0.7		45.1	0.7	20.5
Delay (s)	94.4	19.9		38.7	25.9		78.5	25.9		79.7	26.0	48.8
Level of Service	F	B		D	C		E	C		E	C	D
Approach Delay (s)		39.3			27.2			38.5			48.4	
Approach LOS		D			C			D			D	

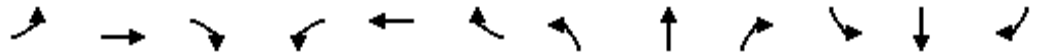
Intersection Summary

HCM Average Control Delay	38.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	662	248	80	573	110	173	941	92	216	807	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1728	3401			3193		1787	3539	1555	1805	3574	1533
Flt Permitted	0.25	1.00			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	454	3401			2219		1787	3539	1555	1805	3574	1533
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	720	270	87	623	120	188	1023	100	235	877	117
RTOR Reduction (vph)	0	58	0	0	20	0	0	0	18	0	0	24
Lane Group Flow (vph)	137	932	0	0	810	0	188	1023	82	235	877	93
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	4%	1%	1%	0%	3%	0%	1%	2%	0%	0%	1%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	30.3	30.3			30.3		5.1	17.3	17.3	8.1	20.3	20.3
Effective Green, g (s)	30.3	30.3			30.3		5.1	17.3	17.3	8.1	20.3	20.3
Actuated g/C Ratio	0.45	0.45			0.45		0.08	0.26	0.26	0.12	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	1522			993		135	904	397	216	1072	460
v/s Ratio Prot		0.27					0.11	c0.29		c0.13	0.25	
v/s Ratio Perm	0.30				c0.36				0.05			0.06
v/c Ratio	0.67	0.61			0.82		1.39	1.13	0.21	1.09	0.82	0.20
Uniform Delay, d1	14.8	14.2			16.3		31.3	25.2	19.8	29.8	22.0	17.7
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.6	0.7			5.2		215.4	73.1	0.3	86.7	5.0	0.2
Delay (s)	23.4	15.0			21.5		246.7	98.3	20.1	116.5	26.9	17.9
Level of Service	C	B			C		F	F	C	F	C	B
Approach Delay (s)		16.0			21.5			113.6			43.2	
Approach LOS		B			C			F			D	

Intersection Summary

HCM Average Control Delay	52.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	67.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↵	↵↵	↵↵		↵↵	↵↵
Volume (vph)	258	473	448	162	279	894
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3425		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3425		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	514	487	176	303	972
RTOR Reduction (vph)	0	402	44	0	0	0
Lane Group Flow (vph)	280	112	619	0	303	972
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	11.7	11.7	19.8		10.4	28.5
Effective Green, g (s)	11.7	11.7	19.8		10.4	28.5
Actuated g/C Ratio	0.22	0.22	0.37		0.19	0.53
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	392	605	1258		676	1909
v/s Ratio Prot	c0.16	0.04	0.18		c0.09	c0.27
v/s Ratio Perm						
v/c Ratio	0.71	0.18	0.49		0.45	0.51
Uniform Delay, d1	19.6	17.2	13.2		19.2	8.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.1	0.1	0.3		0.5	0.2
Delay (s)	25.6	17.4	13.5		19.7	8.4
Level of Service	C	B	B		B	A
Approach Delay (s)	20.3		13.5			11.1
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↗	↖	↑↑		↖	↑↑		↖	↑↑	↗
Volume (vph)	224	178	83	66	272	43	149	462	69	107	747	372
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3574	1571	1805	3518		1805	3495		1787	3610	1573
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3574	1571	1805	3518		1805	3495		1787	3610	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	243	193	90	72	296	47	162	502	75	116	812	404
RTOR Reduction (vph)	0	0	68	0	17	0	0	12	0	0	0	228
Lane Group Flow (vph)	243	193	22	72	326	0	162	565	0	116	812	176
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	1%	0%	0%	0%	1%	0%	1%	0%	1%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	5.1	16.6	16.6	3.8	15.3		7.2	24.1		7.7	24.6	24.6
Effective Green, g (s)	5.1	16.6	16.6	3.8	15.3		7.2	24.1		7.7	24.6	24.6
Actuated g/C Ratio	0.07	0.24	0.24	0.06	0.22		0.11	0.35		0.11	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	259	870	382	101	789		191	1235		202	1302	567
v/s Ratio Prot	c0.07	0.05		0.04	c0.09		c0.09	0.16		0.06	c0.22	
v/s Ratio Perm			0.01									0.11
v/c Ratio	0.94	0.22	0.06	0.71	0.41		0.85	0.46		0.57	0.62	0.31
Uniform Delay, d1	31.4	20.6	19.8	31.7	22.6		30.0	17.0		28.7	18.0	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	39.0	0.1	0.1	21.1	0.4		27.8	0.3		3.9	0.9	0.3
Delay (s)	70.4	20.8	19.9	52.7	23.0		57.8	17.3		32.6	18.9	16.0
Level of Service	E	C	B	D	C		E	B		C	B	B
Approach Delay (s)		43.5			28.1			26.2			19.2	
Approach LOS		D			C			C			B	

Intersection Summary		
HCM Average Control Delay	26.4	HCM Level of Service C
HCM Volume to Capacity ratio	0.58	
Actuated Cycle Length (s)	68.2	Sum of lost time (s) 12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	118	45	68	101	186	65	370	38	200	943	26
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3414		1805	3212		3467	3574	1580	3502	3610	1578
Flt Permitted	0.56	1.00		0.64	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1068	3414		1216	3212		3467	3574	1580	3502	3610	1578
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	128	49	74	110	202	71	402	41	217	1025	28
RTOR Reduction (vph)	0	38	0	0	155	0	0	0	24	0	0	8
Lane Group Flow (vph)	76	139	0	74	157	0	71	402	17	217	1025	20
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	11.4	11.4		11.4	11.4		2.5	20.2	20.2	5.6	23.3	23.3
Effective Green, g (s)	11.4	11.4		11.4	11.4		2.5	20.2	20.2	5.6	23.3	23.3
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.05	0.41	0.41	0.11	0.47	0.47
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	791		282	744		176	1467	649	399	1710	747
v/s Ratio Prot		0.04			0.05		0.02	0.11		c0.06	c0.28	
v/s Ratio Perm	c0.07			0.06					0.01			0.01
v/c Ratio	0.31	0.18		0.26	0.21		0.40	0.27	0.03	0.54	0.60	0.03
Uniform Delay, d1	15.6	15.1		15.5	15.3		22.6	9.6	8.6	20.6	9.5	6.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1		0.5	0.1		1.5	0.1	0.0	1.5	0.6	0.0
Delay (s)	16.3	15.2		16.0	15.4		24.1	9.7	8.7	22.1	10.1	6.9
Level of Service	B	B		B	B		C	A	A	C	B	A
Approach Delay (s)		15.6			15.5			11.6			12.1	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	231	336	503	494	62	113	20	230	23	18	13
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3343	1211	1612	3473		917	913	1317	1504	1644	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00	0.95	1.00	
Satd. Flow (perm)	1687	3343	1211	1612	3473		917	913	1317	1504	1644	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	251	365	547	537	67	123	22	250	25	20	14
RTOR Reduction (vph)	0	0	282	0	6	0	0	0	206	0	13	0
Lane Group Flow (vph)	37	251	83	547	598	0	73	72	44	25	21	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	7%	8%	30%	12%	1%	9%	87%	100%	20%	20%	0%	13%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	4.4	18.1	18.1	27.1	40.8		13.9	13.9	13.9	4.1	4.1	
Effective Green, g (s)	4.4	18.1	18.1	27.1	40.8		13.9	13.9	13.9	4.1	4.1	
Actuated g/C Ratio	0.06	0.23	0.23	0.34	0.51		0.17	0.17	0.17	0.05	0.05	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	93	759	275	548	1778		160	159	230	77	85	
v/s Ratio Prot	0.02	0.08		c0.34	c0.17		c0.08	0.08		c0.02	0.01	
v/s Ratio Perm			0.07						0.03			
v/c Ratio	0.40	0.33	0.30	1.00	0.34		0.46	0.45	0.19	0.32	0.24	
Uniform Delay, d1	36.4	25.7	25.6	26.3	11.5		29.5	29.5	28.1	36.5	36.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	0.4	1.1	37.7	0.2		2.8	2.8	0.5	2.5	1.5	
Delay (s)	39.2	26.2	26.6	64.0	11.7		32.3	32.3	28.6	38.9	37.8	
Level of Service	D	C	C	E	B		C	C	C	D	D	
Approach Delay (s)		27.2			36.5			30.0			38.3	
Approach LOS		C			D			C			D	

Intersection Summary

HCM Average Control Delay	32.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	79.7	Sum of lost time (s)	11.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	101	217	180	119	719	221	165	152	178	148	258	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	2791		1656	3505	1553	1641	2693		1752	2724	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	2791		1656	3505	1553	1641	2693		1752	2724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	236	196	129	782	240	179	165	193	161	280	165
RTOR Reduction (vph)	0	125	0	0	0	148	0	164	0	0	131	0
Lane Group Flow (vph)	110	307	0	129	782	92	179	194	0	161	314	0
Confl. Peds. (#/hr)			10									
Heavy Vehicles (%)	2%	5%	37%	9%	3%	4%	10%	34%	14%	3%	40%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	4.4	21.8		5.6	23.0	23.0	7.2	9.1		7.2	9.1	
Effective Green, g (s)	4.4	21.8		5.6	23.0	23.0	7.2	9.1		7.2	9.1	
Actuated g/C Ratio	0.07	0.36		0.09	0.38	0.38	0.12	0.15		0.12	0.15	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	129	1011		154	1339	593	196	407		210	412	
v/s Ratio Prot	0.06	0.11		c0.08	c0.22		c0.11	0.07		0.09	c0.12	
v/s Ratio Perm						0.06						
v/c Ratio	0.85	0.30		0.84	0.58	0.15	0.91	0.48		0.77	0.76	
Uniform Delay, d1	27.6	13.8		26.9	14.8	12.2	26.2	23.4		25.7	24.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	39.5	0.3		31.5	0.9	0.2	41.1	1.0		15.8	8.4	
Delay (s)	67.1	14.1		58.4	15.7	12.4	67.3	24.4		41.5	32.9	
Level of Service	E	B		E	B	B	E	C		D	C	
Approach Delay (s)		24.8			19.8			38.7			35.2	
Approach LOS		C			B			D			D	

Intersection Summary

HCM Average Control Delay	27.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	11.5
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↖	↑↑						↖	
Volume (vph)	0	497	72	171	754	0	0	0	0	16	146	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.98		1.00	1.00						0.92	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		4851		1797	3471						3100	
Flt Permitted		1.00		0.41	1.00						1.00	
Satd. Flow (perm)		4851		770	3471						3100	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	540	78	186	820	0	0	0	0	17	159	225
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	89	0
Lane Group Flow (vph)	0	601	0	186	820	0	0	0	0	0	312	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	7%	5%	2%	0%	4%	1%	1%	0%	0%	2%	2%	8%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		28.2		28.2	28.2						11.8	
Effective Green, g (s)		28.2		28.2	28.2						11.8	
Actuated g/C Ratio		0.56		0.56	0.56						0.24	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		2736		434	1958						732	
v/s Ratio Prot		0.12			0.24							
v/s Ratio Perm				c0.24							0.10	
v/c Ratio		0.22		0.43	0.42						0.43	
Uniform Delay, d1		5.4		6.3	6.2						16.2	
Progression Factor		1.00		0.36	0.32						1.00	
Incremental Delay, d2		0.0		0.2	0.1						0.1	
Delay (s)		5.4		2.5	2.0						16.4	
Level of Service		A		A	A						B	
Approach Delay (s)		5.4			2.1			0.0			16.4	
Approach LOS		A			A			A			B	

Intersection Summary

HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	121	392	0	0	860	31	65	91	83	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.95				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5023			5055			3290				
Flt Permitted		0.70			1.00			0.99				
Satd. Flow (perm)		3545			5055			3290				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	426	0	0	935	34	71	99	90	0	0	0
RTOR Reduction (vph)	0	0	0	0	3	0	0	69	0	0	0	0
Lane Group Flow (vph)	0	558	0	0	966	0	0	191	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		28.2			28.2			11.8				
Effective Green, g (s)		28.2			28.2			11.8				
Actuated g/C Ratio		0.56			0.56			0.24				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1999			2851			776				
v/s Ratio Prot					c0.19							
v/s Ratio Perm		0.16						0.06				
v/c Ratio		0.28			0.34			0.25				
Uniform Delay, d1		5.6			5.9			15.5				
Progression Factor		0.31			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.1				
Delay (s)		1.8			5.9			15.6				
Level of Service		A			A			B				
Approach Delay (s)		1.8			5.9			15.6			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕			↕↕↕			↕↕			↕↕	
Volume (vph)	52	267	42	34	458	31	194	630	34	42	147	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		4863			4981			3540			3498	
Flt Permitted		0.82			0.90			0.81			0.62	
Satd. Flow (perm)		4029			4481			2892			2183	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	290	46	37	498	34	211	685	37	46	160	29
RTOR Reduction (vph)	0	19	0	0	9	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	374		0	560		0	930		0	221	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		47.5			47.5			24.0			24.0	
Effective Green, g (s)		47.5			47.5			24.0			24.0	
Actuated g/C Ratio		0.59			0.59			0.30			0.30	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2392			2661			868			655	
v/s Ratio Prot												
v/s Ratio Perm		0.09			c0.12			c0.32			0.10	
v/c Ratio		0.16			0.21			1.07			0.34	
Uniform Delay, d1		7.3			7.5			28.0			21.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.2			51.3			1.4	
Delay (s)		7.4			7.7			79.3			23.2	
Level of Service		A			A			E			C	
Approach Delay (s)		7.4			7.7			79.3			23.2	
Approach LOS		A			A			E			C	

Intersection Summary

HCM Average Control Delay	40.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕↕	↗
Volume (vph)	25	464	60	89	843	39	92	199	82	13	224	118
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)		3437	1446		3398	1547	1723	1845	1574		1808	1543
Flt Permitted		0.87	1.00		0.83	1.00	0.31	1.00	1.00		0.98	1.00
Satd. Flow (perm)		3014	1446		2828	1547	567	1845	1574		1775	1543
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	504	65	97	916	42	100	216	89	14	243	128
RTOR Reduction (vph)	0	0	19	0	0	8	0	0	71	0	0	81
Lane Group Flow (vph)	0	531	46	0	1013	34	100	216	18	0	257	47
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	7%	21%	4%	0%	4%	3%	0%	0%	5%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		63.2	63.2		63.2	63.2	17.8	17.8	17.8		17.8	17.8
Effective Green, g (s)		63.2	63.2		63.2	63.2	17.8	17.8	17.8		17.8	17.8
Actuated g/C Ratio		0.70	0.70		0.70	0.70	0.20	0.20	0.20		0.20	0.20
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		2116	1015		1986	1086	112	365	311		351	305
v/s Ratio Prot								0.12				
v/s Ratio Perm		0.18	0.03		0.36	0.02	0.18		0.01		0.14	0.03
v/c Ratio		0.25	0.04		0.51	0.03	0.89	0.59	0.06		0.73	0.15
Uniform Delay, d1		4.8	4.1		6.2	4.1	35.2	32.8	29.3		33.9	29.9
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		0.3	0.1		0.9	0.1	51.8	1.7	0.0		6.6	0.1
Delay (s)		5.1	4.2		7.2	4.1	87.0	34.5	29.3		40.5	30.0
Level of Service		A	A		A	A	F	C	C		D	C
Approach Delay (s)		5.0			7.0			46.3			37.0	
Approach LOS		A			A			D			D	

Intersection Summary

HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	14	496	52	13	734	59	51	382	28	214	462	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	0.99	1.00	1.00	1.00	1.00		0.99	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3470	1510	1793	3438	1555	1744	3502		1741	3470	
Flt Permitted		0.93	1.00	0.41	1.00	1.00	0.36	1.00		0.45	1.00	
Satd. Flow (perm)		3229	1510	771	3438	1555	652	3502		825	3470	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	539	57	14	798	64	55	415	30	233	502	73
RTOR Reduction (vph)	0	0	27	0	0	24	0	8	0	0	17	0
Lane Group Flow (vph)	0	554	30	14	798	40	55	437	0	233	558	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	4%	4%	0%	5%	1%	3%	2%	0%	3%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4					4	2			6		
Actuated Green, G (s)		45.3	45.3	45.3	45.3	45.3	30.2	30.2		30.2	30.2	
Effective Green, g (s)		45.3	45.3	45.3	45.3	45.3	30.2	30.2		30.2	30.2	
Actuated g/C Ratio		0.53	0.53	0.53	0.53	0.53	0.36	0.36		0.36	0.36	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1721	805	411	1832	829	232	1244		293	1233	
v/s Ratio Prot					c0.23			0.12				0.16
v/s Ratio Perm		0.17	0.02	0.02		0.03	0.08			c0.28		
v/c Ratio		0.32	0.04	0.03	0.44	0.05	0.24	0.35		0.80	0.45	
Uniform Delay, d1		11.2	9.5	9.4	12.1	9.5	19.3	20.2		24.6	21.0	
Progression Factor		1.00	1.00	1.11	0.79	1.36	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.1	0.2	0.7	0.1	1.1	0.4		14.5	0.4	
Delay (s)		11.7	9.5	10.6	10.3	13.0	20.4	20.5		39.2	21.4	
Level of Service		B	A	B	B	B	C	C		D	C	
Approach Delay (s)		11.5			10.5			20.5			26.5	
Approach LOS		B			B			C			C	

Intersection Summary

HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	↗
Volume (vph)	52	710	35	12	570	35	36	85	83	27	135	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	1797	3471	1579	1799	3505	1579		3551	1410		3287	
Flt Permitted	0.42	1.00	1.00	0.35	1.00	1.00		0.69	1.00		0.92	
Satd. Flow (perm)	788	3471	1579	664	3505	1579		2501	1410		3034	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	772	38	13	620	38	39	92	90	29	147	175
RTOR Reduction (vph)	0	0	9	0	0	9	0	0	77	0	150	0
Lane Group Flow (vph)	57	772	29	13	620	29	0	131	13	0	201	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	12%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	64.5	64.5	64.5	64.5	64.5	64.5		12.0	12.0		12.0	
Effective Green, g (s)	64.5	64.5	64.5	64.5	64.5	64.5		12.0	12.0		12.0	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76		0.14	0.14		0.14	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	598	2634	1198	504	2660	1198		353	199		428	
v/s Ratio Prot		c0.22			0.18							
v/s Ratio Perm	0.07		0.02	0.02		0.02		0.05	0.01		c0.07	
v/c Ratio	0.10	0.29	0.02	0.03	0.23	0.02		0.37	0.06		0.47	
Uniform Delay, d1	2.7	3.2	2.5	2.5	3.0	2.5		33.1	31.6		33.6	
Progression Factor	0.97	1.20	0.85	2.00	2.54	3.41		1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3	0.0	0.1	0.2	0.0		0.2	0.0		0.3	
Delay (s)	2.9	4.1	2.2	5.1	7.8	8.6		33.3	31.7		33.9	
Level of Service	A	A	A	A	A	A		C	C		C	
Approach Delay (s)		3.9			7.8			32.7			33.9	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑↑	↑↑	↑	↘↘	↘
Volume (vph)	191	537	711	60	645	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3406	3505	1521	3396	1429
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3406	3505	1521	3396	1429
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	208	584	773	65	701	255
RTOR Reduction (vph)	0	0	0	28	4	167
Lane Group Flow (vph)	208	584	773	37	723	62
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	6%	3%	3%	3%	0%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	14.1	54.0	35.9	35.9	23.0	23.0
Effective Green, g (s)	14.1	54.0	35.9	35.9	23.0	23.0
Actuated g/C Ratio	0.17	0.64	0.42	0.42	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	294	2164	1480	642	919	387
v/s Ratio Prot	c0.12	0.17	c0.22		c0.21	
v/s Ratio Perm				0.02		0.04
v/c Ratio	0.71	0.27	0.52	0.06	0.79	0.16
Uniform Delay, d1	33.5	6.8	18.2	14.5	28.7	23.6
Progression Factor	0.92	1.59	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.1	0.3	1.3	0.2	4.2	0.1
Delay (s)	36.9	11.2	19.5	14.7	32.9	23.7
Level of Service	D	B	B	B	C	C
Approach Delay (s)		17.9	19.1		30.7	
Approach LOS		B	B		C	
Intersection Summary						
HCM Average Control Delay			23.0		HCM Level of Service	C
HCM Volume to Capacity ratio			0.64			
Actuated Cycle Length (s)			85.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			61.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↗	↔↔	↑↑	↗		↔↔↔	↗		↔↔↔	↗
Volume (vph)	57	239	128	484	724	124	66	718	244	8	1131	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)	3502	3539	1459	3502	3610	1532		5112	1517		5134	1532
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.93	1.00
Satd. Flow (perm)	3502	3539	1459	3502	3610	1532		3522	1517		4783	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	260	139	526	787	135	72	780	265	9	1229	88
RTOR Reduction (vph)	0	0	5	0	0	58	0	0	173	0	0	32
Lane Group Flow (vph)	62	260	134	526	787	77	0	852	92	0	1238	56
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	2%	5%	0%	0%	0%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		2	6		6
Actuated Green, G (s)	5.9	31.8	31.8	11.8	37.7	37.7		31.4	31.4		31.4	31.4
Effective Green, g (s)	5.9	31.8	31.8	11.8	37.7	37.7		31.4	31.4		31.4	31.4
Actuated g/C Ratio	0.07	0.35	0.35	0.13	0.42	0.42		0.35	0.35		0.35	0.35
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	1250	516	459	1512	642		1229	529		1669	534
v/s Ratio Prot	0.02	0.07		c0.15	c0.22							
v/s Ratio Perm			c0.09			0.05		0.24	0.06		c0.26	0.04
v/c Ratio	0.27	0.21	0.26	1.15	0.52	0.12		0.87dl	0.17		0.74	0.11
Uniform Delay, d1	40.0	20.3	20.7	39.1	19.4	16.0		25.2	20.3		25.7	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.4	1.2	88.5	1.3	0.4		1.7	0.2		1.8	0.1
Delay (s)	40.6	20.7	22.0	127.6	20.7	16.4		26.9	20.5		27.6	19.9
Level of Service	D	C	C	F	C	B		C	C		C	B
Approach Delay (s)		23.8			59.2			25.4			27.0	
Approach LOS		C			E			C			C	

Intersection Summary

HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑		↑	↑↑			↑↑	
Volume (vph)	5	297	59	172	673	12	85	2	110	6	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes		1.00	0.98	1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.95	
Satd. Flow (prot)		1951	806	1020	2295		926	1639			2286	
Flt Permitted		0.94	1.00	0.95	1.00		0.95	1.00			0.80	
Satd. Flow (perm)		1845	806	1020	2295		926	1639			1925	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	323	64	187	732	13	92	2	120	7	0	0
RTOR Reduction (vph)	0	0	40	0	0	0	0	93	0	0	0	0
Lane Group Flow (vph)	0	328	24	187	745	0	92	29	0	0	7	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	80%	85%	97%	77%	57%	50%	95%	50%	85%	50%	100%	100%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Actuated Green, G (s)		39.1	39.1	26.5	69.6		15.1	24.1			5.0	
Effective Green, g (s)		39.1	39.1	26.5	69.6		15.1	24.1			5.0	
Actuated g/C Ratio		0.38	0.38	0.26	0.68		0.15	0.23			0.05	
Clearance Time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		702	307	263	1555		136	385			94	
v/s Ratio Prot				c0.18	c0.32		c0.10	c0.02				
v/s Ratio Perm		0.18	0.03								0.00	
v/c Ratio		0.47	0.08	0.71	0.48		0.68	0.07			0.07	
Uniform Delay, d1		24.0	20.3	34.6	7.9		41.5	30.6			46.6	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.5	0.1	8.7	0.2		12.5	0.1			0.3	
Delay (s)		24.4	20.4	43.4	8.1		54.0	30.7			47.0	
Level of Service		C	C	D	A		D	C			D	
Approach Delay (s)		23.8			15.2			40.7			47.0	
Approach LOS		C			B			D			D	

Intersection Summary

HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	102.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	147	148	208	1129	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.92		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1819		2537	2242		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1819		2537	2242		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	161	226	1227	0	0
RTOR Reduction (vph)	95	0	0	0	0	0
Lane Group Flow (vph)	226	0	226	1227	0	0
Heavy Vehicles (%)	74%	93%	38%	61%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	11.6		8.7	28.3		
Effective Green, g (s)	11.6		8.7	28.3		
Actuated g/C Ratio	0.41		0.31	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	746		780	2242		
v/s Ratio Prot	0.12		0.09	c0.55		
v/s Ratio Perm						
v/c Ratio	0.30		0.29	0.55		
Uniform Delay, d1	5.6		7.5	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.2		0.2	0.3		
Delay (s)	5.9		7.7	0.3		
Level of Service	A		A	A		
Approach Delay (s)	5.9			1.4	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	2.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	28.3	Sum of lost time (s)	0.0
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	41	0	0	197	130	504	226	91	88	0	481
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.94		1.00	0.98		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98		0.95		1.00
Satd. Flow (prot)	1008	2299			2956		1020	2503		1770		1733
Flt Permitted	0.95	1.00			1.00		0.95	0.98		0.95		1.00
Satd. Flow (perm)	1008	2299			2956		1020	2503		1770		1733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	45	0	0	214	141	548	246	99	96	0	523
RTOR Reduction (vph)	0	0	0	0	113	0	0	19	0	0	0	453
Lane Group Flow (vph)	97	45	0	0	242	0	296	578	0	96	0	70
Heavy Vehicles (%)	79%	57%	0%	0%	24%	1%	61%	15%	0%	2%	0%	64%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	8.1	24.2			12.1		16.2	16.2		8.1		8.1
Effective Green, g (s)	8.1	24.2			12.1		16.2	16.2		8.1		8.1
Actuated g/C Ratio	0.13	0.40			0.20		0.27	0.27		0.13		0.13
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	135	920			591		273	670		237		232
v/s Ratio Prot	c0.10	0.02			c0.08		c0.29	0.23		c0.05		0.04
v/s Ratio Perm												
v/c Ratio	0.72	0.05			0.41		1.08	0.86		0.41		0.30
Uniform Delay, d1	25.1	11.1			21.1		22.1	21.1		24.0		23.6
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	16.7	0.0			0.5		78.8	11.1		1.1		0.7
Delay (s)	41.8	11.1			21.6		100.9	32.2		25.1		24.4
Level of Service	D	B			C		F	C		C		C
Approach Delay (s)		32.1			21.6		55.0			24.5		
Approach LOS		C			C		D			C		

Intersection Summary

HCM Average Control Delay	38.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	19	347	14	4	347	27	45	10	5	28	14	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			0.99	1.00		0.99	
Frt		0.99			0.99			1.00	0.85		0.95	
Flt Protected		1.00			1.00			0.96	1.00		0.98	
Satd. Flow (prot)		3146			3291			1809	1575		1748	
Flt Permitted		0.93			0.95			0.77	1.00		0.88	
Satd. Flow (perm)		2918			3136			1446	1575		1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	377	15	4	377	29	49	11	5	30	15	24
RTOR Reduction (vph)	0	3	0	0	6	0	0	0	4	0	18	0
Lane Group Flow (vph)	0	410	0	0	404	0	0	60	1	0	51	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	15%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		69.0			69.0			23.0	23.0			23.0
Effective Green, g (s)		69.0			69.0			23.0	23.0			23.0
Actuated g/C Ratio		0.69			0.69			0.23	0.23			0.23
Clearance Time (s)		4.0			4.0			4.0	4.0			4.0
Lane Grp Cap (vph)		2013			2164			333	362			362
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.13			c0.04	0.00			0.03
v/c Ratio		0.20			0.19			0.18	0.00			0.14
Uniform Delay, d1		5.6			5.5			30.9	29.7			30.6
Progression Factor		1.00			0.87			1.00	1.00			1.00
Incremental Delay, d2		0.2			0.2			1.2	0.0			0.8
Delay (s)		5.8			5.0			32.1	29.7			31.4
Level of Service		A			A			C	C			C
Approach Delay (s)		5.8			5.0			31.9				31.4
Approach LOS		A			A			C				C

Intersection Summary

HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↕			↕		↖	↗	
Volume (vph)	36	334	21	172	349	43	12	47	59	74	89	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1762		1805	3350			1729		1685	1815	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.46	1.00	
Satd. Flow (perm)	1805	1762		1805	3350			1671		812	1815	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	363	23	187	379	47	13	51	64	80	97	33
RTOR Reduction (vph)	0	2	0	0	6	0	0	42	0	0	14	0
Lane Group Flow (vph)	39	384	0	187	420	0	0	86	0	80	116	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	7%	0%	0%	6%	3%	0%	0%	0%	6%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	3.6	62.0		14.8	73.2			12.2		12.2	12.2	
Effective Green, g (s)	3.6	62.0		14.8	73.2			12.2		12.2	12.2	
Actuated g/C Ratio	0.04	0.62		0.15	0.73			0.12		0.12	0.12	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	65	1092		267	2452			204		99	221	
v/s Ratio Prot	c0.02	c0.22		c0.10	0.13							0.06
v/s Ratio Perm								0.05		c0.10		
v/c Ratio	0.60	0.35		0.70	0.17			0.42		0.81	0.52	
Uniform Delay, d1	47.5	9.2		40.5	4.1			40.6		42.8	41.2	
Progression Factor	0.88	0.93		0.64	3.25			1.00		1.00	1.00	
Incremental Delay, d2	9.5	0.9		6.1	0.1			0.5		34.9	1.0	
Delay (s)	51.4	9.5		31.9	13.5			41.1		77.7	42.2	
Level of Service	D	A		C	B			D		E	D	
Approach Delay (s)		13.3			19.1			41.1			55.7	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	24.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	434	8	226	602	21	14	41	112	11	46	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1798	3367		1781	3420			1874	1524		1827	
Flt Permitted	0.31	1.00		0.43	1.00			0.95	1.00		0.97	
Satd. Flow (perm)	595	3367		801	3420			1798	1524		1787	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	472	9	246	654	23	15	45	122	12	50	15
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	66	0	8	0
Lane Group Flow (vph)	17	480	0	246	674	0	0	60	56	0	69	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	7%	0%	1%	5%	2%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2		2	2		2
Actuated Green, G (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	274	1549		368	1573			827	701		822	
v/s Ratio Prot		0.14			0.20							
v/s Ratio Perm	0.03			c0.31				0.03	0.04		c0.04	
v/c Ratio	0.06	0.31		0.67	0.43			0.07	0.08		0.08	
Uniform Delay, d1	15.0	17.0		21.1	18.2			15.1	15.1		15.2	
Progression Factor	0.83	0.91		0.84	0.87			1.00	1.00		1.00	
Incremental Delay, d2	0.4	0.5		9.2	0.9			0.2	0.2		0.2	
Delay (s)	12.8	16.0		26.9	16.7			15.3	15.4		15.4	
Level of Service	B	B		C	B			B	B		B	
Approach Delay (s)		15.9			19.4			15.3			15.4	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	100	692	63	95	484	110	29	181	63	22	25	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1801	3302		1163	3438	1527	1490	2221			3071	
Flt Permitted	0.44	1.00		0.30	1.00	1.00	0.70	1.00			0.84	
Satd. Flow (perm)	832	3302		371	3438	1527	1103	2221			2629	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	752	68	103	526	120	32	197	68	24	27	27
RTOR Reduction (vph)	0	7	0	0	0	43	0	35	0	0	19	0
Lane Group Flow (vph)	109	813	0	103	526	77	32	230	0	0	59	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	28%	55%	5%	4%	20%	50%	71%	0%	25%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Effective Green, g (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.28	0.28			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	532	2113		237	2200	977	309	622			736	
v/s Ratio Prot		0.25			0.15			c0.10				
v/s Ratio Perm	0.13			c0.28		0.05	0.03				0.02	
v/c Ratio	0.20	0.38		0.43	0.24	0.08	0.10	0.37			0.08	
Uniform Delay, d1	7.5	8.6		9.0	7.7	6.8	26.7	28.9			26.5	
Progression Factor	0.45	0.41		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	0.9	0.5		5.7	0.3	0.2	0.7	1.7			0.2	
Delay (s)	4.2	4.1		14.7	7.9	7.0	27.4	30.6			26.7	
Level of Service	A	A		B	A	A	C	C			C	
Approach Delay (s)		4.1			8.7			30.3			26.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	703	18	50	402	27	55	71	96	118	163	88
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1712	4392		1801	4733		1742	1845	1584	1758	3438	1298
Flt Permitted	0.47	1.00		0.28	1.00		0.64	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	843	4392		522	4733		1174	1845	1584	1308	3438	1298
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	764	20	54	437	29	60	77	104	128	177	96
RTOR Reduction (vph)	0	5	0	0	12	0	0	0	46	0	0	43
Lane Group Flow (vph)	187	779	0	54	454	0	60	77	58	128	177	53
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	5%	18%	2%	0%	9%	0%	3%	3%	0%	2%	5%	22%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	23.9	23.9		23.9	23.9		41.6	41.6	41.6	41.6	41.6	41.6
Effective Green, g (s)	23.9	23.9		23.9	23.9		41.6	41.6	41.6	41.6	41.6	41.6
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.55	0.55	0.55	0.55	0.55	0.55
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	269	1400		166	1508		651	1023	879	726	1907	720
v/s Ratio Prot		0.18			0.10			0.04				0.05
v/s Ratio Perm	c0.22			0.10			0.05		0.04	c0.10		0.04
v/c Ratio	0.70	0.56		0.33	0.30		0.09	0.08	0.07	0.18	0.09	0.07
Uniform Delay, d1	22.4	21.2		19.4	19.3		7.8	7.8	7.7	8.2	7.8	7.8
Progression Factor	1.00	1.00		1.00	1.00		1.18	1.17	1.58	1.00	1.00	1.00
Incremental Delay, d2	6.2	0.3		0.4	0.0		0.3	0.1	0.1	0.5	0.1	0.2
Delay (s)	28.5	21.4		19.8	19.3		9.5	9.2	12.3	8.8	7.9	8.0
Level of Service	C	C		B	B		A	A	B	A	A	A
Approach Delay (s)		22.8			19.4			10.6			8.2	
Approach LOS		C			B			B			A	

Intersection Summary

HCM Average Control Delay	17.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↑↑↑						↑↑↑	↑				
Volume (vph)	100	374	0	0	0	0	0	1075	1363	0	0	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0						5.0	5.0				
Lane Util. Factor		0.91						0.86	0.86				
Frbp, ped/bikes		1.00						1.00	1.00				
Flpb, ped/bikes		1.00						1.00	1.00				
Frt		1.00						0.94	0.85				
Flt Protected		0.99						1.00	1.00				
Satd. Flow (prot)		4449						4599	1375				
Flt Permitted		0.99						1.00	1.00				
Satd. Flow (perm)		4449						4599	1375				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	109	407	0	0	0	0	0	1168	1482	0	0	0	
RTOR Reduction (vph)	0	9	0	0	0	0	0	191	174	0	0	0	
Lane Group Flow (vph)	0	507	0	0	0	0	0	1718	567	0	0	0	
Confl. Peds. (#/hr)	20												
Heavy Vehicles (%)	4%	18%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	
Turn Type	Perm	NA						NA	custom				
Protected Phases		2						1					
Permitted Phases	2								5				
Actuated Green, G (s)		27.0						23.0	29.2				
Effective Green, g (s)		27.0						23.0	29.2				
Actuated g/C Ratio		0.45						0.38	0.49				
Clearance Time (s)		5.0						5.0	5.0				
Vehicle Extension (s)		3.0						3.0	3.0				
Lane Grp Cap (vph)		2002						1763	669				
v/s Ratio Prot								c0.37					
v/s Ratio Perm		0.11							c0.41				
v/c Ratio		0.25						0.97	0.85				
Uniform Delay, d1		10.2						18.2	13.5				
Progression Factor		1.00						1.00	1.00				
Incremental Delay, d2		0.3						15.7	9.8				
Delay (s)		10.5						33.9	23.3				
Level of Service		B						C	C				
Approach Delay (s)		10.5			0.0			31.0			0.0		
Approach LOS		B			A			C			A		
Intersection Summary													
HCM Average Control Delay			27.6		HCM Level of Service					C			
HCM Volume to Capacity ratio			0.57										
Actuated Cycle Length (s)			60.0		Sum of lost time (s)					5.0			
Intersection Capacity Utilization			73.9%		ICU Level of Service					D			
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	26	613	957	0	0	0	0	307	60	20	143	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.94	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			0.99	
Satd. Flow (prot)		4321	1355					1824			1792	
Flt Permitted		1.00	1.00					1.00			0.94	
Satd. Flow (perm)		4321	1355					1824			1698	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	666	1040	0	0	0	0	334	65	22	155	0
RTOR Reduction (vph)	0	340	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	874	520	0	0	0	0	391	0	0	177	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	5%	8%	1%	0%	0%	0%	0%	1%	3%	0%	6%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free							4		
Actuated Green, G (s)		19.4	60.0					31.6			31.6	
Effective Green, g (s)		19.4	60.0					31.6			31.6	
Actuated g/C Ratio		0.32	1.00					0.53			0.53	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		1397	1355					961			894	
v/s Ratio Prot								0.21				
v/s Ratio Perm		0.20	0.38								0.10	
v/c Ratio		0.63	0.38					0.41			0.20	
Uniform Delay, d1		17.2	0.0					8.6			7.5	
Progression Factor		0.97	1.00					0.71			1.00	
Incremental Delay, d2		0.4	0.5					1.3			0.5	
Delay (s)		17.1	0.5					7.4			8.0	
Level of Service		B	A					A			A	
Approach Delay (s)		12.2			0.0			7.4			8.0	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	23	387	32	213	301	0	0	235	1114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.99	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1810	1517	1767	1863			1581	1477
Flt Permitted				0.95	1.00	1.00	0.21	1.00			1.00	1.00
Satd. Flow (perm)				1730	1810	1517	395	1863			1581	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	25	421	35	232	327	0	0	255	1211
RTOR Reduction (vph)	0	0	0	0	0	27	0	0	0	0	37	0
Lane Group Flow (vph)	0	0	0	25	421	8	232	327	0	0	715	714
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	5%	0%	2%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	437	367	227	1071			909	1477
v/s Ratio Prot					c0.23			0.18			0.45	
v/s Ratio Perm				0.01		0.01	c0.59					0.48
v/c Ratio				0.06	0.96	0.02	1.02	0.31			0.79	0.48
Uniform Delay, d1				17.5	22.5	17.3	12.8	6.6			9.9	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.69	1.00
Incremental Delay, d2				0.3	34.8	0.1	65.5	0.7			6.6	1.1
Delay (s)				17.8	57.3	17.5	78.3	7.3			13.4	1.1
Level of Service				B	E	B	E	A			B	A
Approach Delay (s)		0.0			52.3			36.8			7.4	
Approach LOS		A			D			D			A	

Intersection Summary

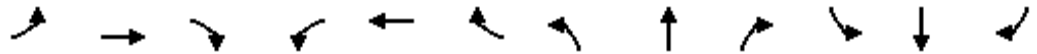
HCM Average Control Delay	22.6	HCM Level of Service	C
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	102	29	495	157	25	38	163	829	3	228	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.87			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1828		1556	3526		1805	2826			3501	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.76	
Satd. Flow (perm)	1805	1828		1556	3526		1805	2826			2679	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	111	32	538	171	27	41	177	901	3	248	36
RTOR Reduction (vph)	0	10	0	0	10	0	0	601	0	0	11	0
Lane Group Flow (vph)	3	133	0	538	188	0	41	477	0	0	276	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	16%	0%	0%	0%	4%	11%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	1.1	17.1		29.5	45.5		2.2	21.5			15.3	
Effective Green, g (s)	1.1	17.1		29.5	45.5		2.2	21.5			15.3	
Actuated g/C Ratio	0.01	0.21		0.37	0.57		0.03	0.27			0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	25	390		573	2003		50	759			512	
v/s Ratio Prot	0.00	c0.07		c0.35	0.05		0.02	c0.17				
v/s Ratio Perm												0.10
v/c Ratio	0.12	0.34		0.94	0.09		0.82	0.92dr			0.54	
Uniform Delay, d1	39.0	26.7		24.4	7.9		38.8	25.8			29.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.1	0.5		23.2	0.0		63.8	1.6			1.1	
Delay (s)	41.2	27.2		47.7	7.9		102.6	27.4			30.3	
Level of Service	D	C		D	A		F	C			C	
Approach Delay (s)		27.5			37.0			30.2			30.3	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	32.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	22	594	216	131	452	30	74	31	123	73	397	175
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.88		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	2955		1805	3570		1805	1664		1643	2193	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	2955		1805	3570		1805	1664		1643	2193	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	646	235	142	491	33	80	34	134	79	432	190
RTOR Reduction (vph)	0	29	0	0	3	0	0	117	0	0	36	0
Lane Group Flow (vph)	24	852	0	142	521	0	80	51	0	71	594	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	5%	48%	0%	0%	0%	0%	65%	93%	0%	72%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	3.0	32.5		12.7	42.7		12.1	12.1		23.2	23.2	
Effective Green, g (s)	3.0	32.5		12.7	42.7		12.1	12.1		23.2	23.2	
Actuated g/C Ratio	0.03	0.34		0.13	0.44		0.13	0.13		0.24	0.24	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	56	995		238	1580		226	209		395	527	
v/s Ratio Prot	0.01	c0.29		c0.08	0.15		c0.04	0.03		0.04	c0.27	
v/s Ratio Perm												
v/c Ratio	0.43	0.86		0.60	0.33		0.35	0.24		0.18	1.13	
Uniform Delay, d1	45.9	29.8		39.5	17.6		38.6	38.1		29.1	36.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	7.6		4.0	0.2		1.3	0.8		0.3	79.3	
Delay (s)	51.1	37.5		43.5	17.7		39.9	38.9		29.4	116.0	
Level of Service	D	D		D	B		D	D		C	F	
Approach Delay (s)		37.8			23.2			39.2			107.2	
Approach LOS		D			C			D			F	

Intersection Summary

HCM Average Control Delay	53.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	101	222	200	36	362	0	0	165	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3546	1583	1792	1056			2798	1581
Flt Permitted					0.98	1.00	0.64	1.00			1.00	1.00
Satd. Flow (perm)					3546	1583	1205	1056			2798	1581
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	110	241	217	39	393	0	0	179	286
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	97
Lane Group Flow (vph)	0	0	0	0	351	46	39	393	0	0	179	189
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	20%	79%	0%	0%	0%	0%	80%	78%	1%	29%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					15.9	15.9	49.6	49.6			49.6	49.6
Effective Green, g (s)					15.9	15.9	49.6	49.6			49.6	49.6
Actuated g/C Ratio					0.21	0.21	0.66	0.66			0.66	0.66
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					752	336	797	698			1850	1046
v/s Ratio Prot								c0.37			0.06	
v/s Ratio Perm					0.10	0.03	0.03					0.12
v/c Ratio					0.47	0.14	0.05	0.56			0.10	0.18
Uniform Delay, d1					25.8	24.0	4.4	6.9			4.6	4.9
Progression Factor					1.00	1.00	1.00	1.00			0.85	0.90
Incremental Delay, d2					0.5	0.2	0.1	3.3			0.1	0.4
Delay (s)					26.3	24.2	4.6	10.1			4.0	4.8
Level of Service					C	C	A	B			A	A
Approach Delay (s)		0.0			25.5			9.6			4.5	
Approach LOS		A			C			A			A	

Intersection Summary

HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↑	↔	↑↑↑		↔	↔	↑
Volume (vph)	687	187	64	142	233	0	368	348
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.91			1.00	1.00
Flt Protected	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2614	1568	4481			1752	1881
Flt Permitted	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2614	1568	4481			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	747	203	70	154	253	0	400	378
RTOR Reduction (vph)	0	0	33	0	0	0	0	0
Lane Group Flow (vph)	373	577	37	407	0	0	400	378
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	80%	3%	2%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	20.5	20.5	20.5	23.5			17.5	44.5
Effective Green, g (s)	20.5	20.5	20.5	23.5			17.5	44.5
Actuated g/C Ratio	0.27	0.27	0.27	0.31			0.23	0.59
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	449	714	429	1404			409	1116
v/s Ratio Prot				0.09			c0.23	c0.20
v/s Ratio Perm	c0.23	0.22	0.02					
v/c Ratio	0.83	0.81	0.09	0.29			0.98	0.34
Uniform Delay, d1	25.6	25.4	20.3	19.4			28.6	7.8
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	11.8	6.3	0.0	0.5			38.1	0.1
Delay (s)	37.4	31.7	20.3	20.0			66.7	7.8
Level of Service	D	C	C	B			E	A
Approach Delay (s)		33.0		20.0				38.1
Approach LOS		C		B				D





















Intersection Summary

HCM Average Control Delay	32.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street





















4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	56	28	85	89	49	20	184	33	91	413	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	61	30	92	97	53	22	200	36	99	449	35
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	88	30	189	53	122	136	323	259				
Volume Left (vph)	27	0	92	0	22	0	99	0				
Volume Right (vph)	0	30	0	53	0	36	0	35				
Hadj (s)	0.15	-0.70	1.02	-0.70	1.25	1.25	1.04	1.01				
Departure Headway (s)	7.6	6.7	8.1	6.4	8.0	8.0	7.3	7.3				
Degree Utilization, x	0.19	0.06	0.43	0.09	0.27	0.30	0.65	0.52				
Capacity (veh/h)	445	496	423	528	435	434	485	477				
Control Delay (s)	11.1	8.9	15.9	8.9	12.7	13.2	21.8	16.7				
Approach Delay (s)	10.5		14.3		12.9		19.5					
Approach LOS	B		B		B		C					
Intersection Summary												
Delay			16.2									
HCM Level of Service			C									
Intersection Capacity Utilization			49.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	100	33	16	218	5	31	6	9	12	69	91
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	109	36	17	237	5	34	7	10	13	75	99
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	247			150			551	420	119	427	450	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	247			150			551	420	119	427	450	247
tC, single (s)	4.1			4.6			8.0	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.6			4.3	4.7	3.3	3.5	4.7	3.3
p0 queue free %	99			99			86	98	99	97	81	87
cM capacity (veh/h)	1325			1193			245	407	931	512	392	788
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3				
Volume Total	121	36	254	5	50	13	50	124				
Volume Left	12	0	17	0	34	13	0	0				
Volume Right	0	36	0	5	10	0	0	99				
cSH	1325	1700	1193	1700	304	512	392	655				
Volume to Capacity	0.01	0.02	0.01	0.00	0.16	0.03	0.13	0.19				
Queue Length 95th (ft)	1	0	1	0	14	2	11	17				
Control Delay (s)	0.8	0.0	0.7	0.0	19.1	12.2	15.5	11.8				
Lane LOS	A		A		C	B	C	B				
Approach Delay (s)	0.6		0.7		19.1	12.8						
Approach LOS					C	B						
Intersection Summary												
Average Delay			5.5									
Intersection Capacity Utilization			40.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	182	13	21	102	0	0	0	0	18	169	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.98	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		3610	1550		3566						3441	
Flt Permitted		1.00	1.00		0.91						1.00	
Satd. Flow (perm)		3610	1550		3258						3441	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	198	14	23	111	0	0	0	0	20	184	23
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	18	0
Lane Group Flow (vph)	0	198	10	0	134	0	0	0	0	0	209	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.8	54.8		54.8						13.2	
Effective Green, g (s)		54.8	54.8		54.8						13.2	
Actuated g/C Ratio		0.72	0.72		0.72						0.17	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2586	1110		2334						594	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.06	
v/c Ratio		0.08	0.01		0.06						0.35	
Uniform Delay, d1		3.3	3.1		3.2						27.9	
Progression Factor		1.00	1.00		0.30						1.00	
Incremental Delay, d2		0.1	0.0		0.0						0.4	
Delay (s)		3.3	3.1		1.0						28.2	
Level of Service		A	A		A						C	
Approach Delay (s)		3.3			1.0			0.0			28.2	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕	↗		↕↕				
Volume (vph)	23	159	0	0	123	27	7	123	55	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		3506			3539	1520		3375				
Flt Permitted		0.92			1.00	1.00		1.00				
Satd. Flow (perm)		3250			3539	1520		3375				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	173	0	0	134	29	8	134	60	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	8	0	50	0	0	0	0
Lane Group Flow (vph)	0	198	0	0	134	21	0	152	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.8			54.8	54.8		13.2				
Effective Green, g (s)		54.8			54.8	54.8		13.2				
Actuated g/C Ratio		0.72			0.72	0.72		0.17				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2328			2535	1089		582				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.06				0.01		0.05				
v/c Ratio		0.09			0.05	0.02		0.26				
Uniform Delay, d1		3.3			3.2	3.1		27.4				
Progression Factor		0.41			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.2				
Delay (s)		1.4			3.2	3.2		27.7				
Level of Service		A			A	A		C				
Approach Delay (s)		1.4			3.2			27.7			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↰	↰↰	↑	↑↑↑	↻	↻	↰	↻
Volume (vph)	42	135	0	560	109	0	1792	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1570	3099		5187	1278		1715	1725
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1570	3099		5187	1278		1715	1725
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	147	0	609	118	0	1948	68
RTOR Reduction (vph)	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	41	147	0	609	118	0	1013	1003
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	13%	13%	7%	0%	22%	2%	0%	0%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	12.0	12.0		19.6	19.6		69.4	69.4
Effective Green, g (s)	12.0	12.0		19.6	19.6		69.4	69.4
Actuated g/C Ratio	0.10	0.10		0.17	0.17		0.60	0.60
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	164	323		884	218		1035	1041
v/s Ratio Prot				c0.12			c0.59	0.58
v/s Ratio Perm	0.03	c0.05			0.09			
v/c Ratio	0.25	0.46		0.69	0.54		0.98	0.96
Uniform Delay, d1	47.4	48.4		44.8	43.6		22.1	21.6
Progression Factor	0.82	0.86		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.8	1.0		2.3	2.7		23.3	20.4
Delay (s)	39.4	42.7		47.1	46.3		45.4	42.0
Level of Service	D	D		D	D		D	D
Approach Delay (s)			41.9	47.0				43.7
Approach LOS			D	D				D

Intersection Summary

HCM Average Control Delay	44.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↔	↔	↔	↑↑↑
Volume (vph)	231	214	28	520	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.96	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3118	1470	1522	1509	4526
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3118	1470	1522	1509	4526
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	251	233	30	565	0
RTOR Reduction (vph)	0	0	20	1	0
Lane Group Flow (vph)	335	149	7	284	283
Heavy Vehicles (%)	9%	0%	2%	2%	1%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	77.3	77.3	28.2	28.2	28.2
Effective Green, g (s)	77.3	77.3	28.2	28.2	28.2
Actuated g/C Ratio	0.67	0.67	0.25	0.25	0.25
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2096	988	373	370	1110
v/s Ratio Prot	c0.11		0.00	c0.19	0.06
v/s Ratio Perm		0.10			
v/c Ratio	0.16	0.15	0.02	0.77	0.25
Uniform Delay, d1	6.9	6.9	32.9	40.4	34.9
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.3	0.0	9.2	0.1
Delay (s)	7.1	7.2	32.9	49.6	35.1
Level of Service	A	A	C	D	D
Approach Delay (s)	7.1				41.9
Approach LOS	A				D

Intersection Summary

HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	31.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↑	↑↑	↑
Volume (vph)	0	346	20	7	167	0	0	0	0	546	867	339
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5131			5172					1787	3539	1565
Flt Permitted		1.00			0.92					0.95	1.00	1.00
Satd. Flow (perm)		5131			4743					1787	3539	1565
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	376	22	8	182	0	0	0	0	593	942	368
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	118
Lane Group Flow (vph)	0	390	0	0	190	0	0	0	0	593	942	250
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		16.0			16.0					52.0	52.0	52.0
Effective Green, g (s)		16.0			16.0					52.0	52.0	52.0
Actuated g/C Ratio		0.20			0.20					0.65	0.65	0.65
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1026			949					1162	2300	1017
v/s Ratio Prot		c0.08									0.27	
v/s Ratio Perm					0.04					c0.33		0.16
v/c Ratio		0.38			0.20					0.51	0.41	0.25
Uniform Delay, d1		27.7			26.7					7.3	6.7	5.8
Progression Factor		1.00			1.13					1.00	1.00	1.00
Incremental Delay, d2		1.1			0.5					1.6	0.5	0.6
Delay (s)		28.8			30.5					8.9	7.2	6.4
Level of Service		C			C					A	A	A
Approach Delay (s)		28.8			30.5			0.0			7.6	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	224	771	0	0	175	221	5	206	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.96		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.94	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4848			4522	1316		5030				
Flt Permitted	0.95	0.94			1.00	1.00		1.00				
Satd. Flow (perm)	1552	4544			4522	1316		5030				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	243	838	0	0	190	240	5	224	22	0	0	0
RTOR Reduction (vph)	0	0	0	0	98	98	0	13	0	0	0	0
Lane Group Flow (vph)	219	862	0	0	213	23	0	238	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	6%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	18.0	36.5			15.0	15.0		32.5				
Effective Green, g (s)	18.0	36.5			15.0	15.0		32.5				
Actuated g/C Ratio	0.22	0.46			0.19	0.19		0.41				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	349	2142			848	247		2043				
v/s Ratio Prot	c0.14	0.09			0.05							
v/s Ratio Perm		c0.09				0.02		0.05				
v/c Ratio	0.63	0.40			0.25	0.09		0.12				
Uniform Delay, d1	28.0	14.5			27.7	26.9		14.8				
Progression Factor	1.00	0.78			1.00	1.00		1.00				
Incremental Delay, d2	7.7	0.5			0.7	0.7		0.1				
Delay (s)	35.7	11.8			28.4	27.6		14.9				
Level of Service	D	B			C	C		B				
Approach Delay (s)		16.7			28.2			14.9			0.0	
Approach LOS		B			C			B			A	

Intersection Summary

















HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	209	1022	0	721	106	54	4	1	13	186	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.88			0.98			1.00			1.00	
Flt Protected		1.00			1.00			0.96			1.00	
Satd. Flow (prot)		3053			3519			3409			3485	
Flt Permitted		1.00			1.00			0.96			1.00	
Satd. Flow (perm)		3053			3519			3409			3485	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	227	1111	0	784	115	59	4	1	14	202	4
RTOR Reduction (vph)	0	529	0	0	18	0	0	1	0	0	2	0
Lane Group Flow (vph)	0	809	0	0	881	0	0	63	0	0	218	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	1%	1%	2%	0%	0%	1%	1%	1%	0%	3%	7%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1550			1787			315			751	
v/s Ratio Prot		c0.27			0.25			c0.02			c0.06	
v/s Ratio Perm												
v/c Ratio		0.52			0.49			0.20			0.29	
Uniform Delay, d1		10.7			10.5			27.3			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			1.0			1.4			1.0	
Delay (s)		12.0			11.5			28.7			22.3	
Level of Service		B			B			C			C	
Approach Delay (s)		12.0			11.5			28.7			22.3	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			13.1				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			65.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			66.9%				ICU Level of Service				C	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	39	198	17	77	279	42	54	212	61	101	225	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.98	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5114	1541	1754	3517		1787	1881	1570	1787	1881	1570
Flt Permitted		0.85	1.00	0.59	1.00		0.49	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)		4401	1541	1083	3517		922	1881	1570	967	1881	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	215	18	84	303	46	59	230	66	110	245	25
RTOR Reduction (vph)	0	0	7	0	14	0	0	0	37	0	0	14
Lane Group Flow (vph)	0	257	11	84	335	0	59	230	29	110	245	11
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.60	0.60	0.60	0.60		0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2641	925	650	2110		260	531	443	273	531	443
v/s Ratio Prot					c0.10			0.12			c0.13	
v/s Ratio Perm		0.06	0.01	0.08			0.06		0.02	0.11		0.01
v/c Ratio		0.10	0.01	0.13	0.16		0.23	0.43	0.07	0.40	0.46	0.02
Uniform Delay, d1		7.2	6.8	7.4	7.5		23.4	24.9	22.3	24.7	25.2	22.0
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	0.4	0.2		2.0	2.6	0.3	4.4	2.9	0.1
Delay (s)		7.3	6.9	7.8	7.7		25.4	27.5	22.6	29.1	28.0	22.1
Level of Service		A	A	A	A		C	C	C	C	C	C
Approach Delay (s)		7.3			7.7			26.2			27.9	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	260	349	0	914	601	0	0	0	685	0	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.96			1.00	0.98				1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.98	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3128			3309	1336				3467		1560
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3128			3309	1336				3467		1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	283	379	0	993	653	0	0	0	745	0	313
RTOR Reduction (vph)	0	174	0	0	15	0	0	0	0	0	0	135
Lane Group Flow (vph)	95	488	0	0	1135	496	0	0	0	745	0	178
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	2%	3%	1%	8%	0%	0%	0%	1%	7%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	3.7	32.3			24.6	59.6				19.3		19.3
Effective Green, g (s)	3.7	32.3			24.6	59.6				19.3		19.3
Actuated g/C Ratio	0.06	0.54			0.41	1.00				0.32		0.32
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	111	1695			1366	1336				1123		505
v/s Ratio Prot	c0.05	0.16			c0.34					c0.21		
v/s Ratio Perm						0.37						0.11
v/c Ratio	0.86	0.29			0.83	0.37				0.66		0.35
Uniform Delay, d1	27.7	7.4			15.6	0.0				17.4		15.4
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	43.7	0.1			4.4	0.8				1.5		0.4
Delay (s)	71.4	7.5			20.1	0.8				18.8		15.8
Level of Service	E	A			C	A				B		B
Approach Delay (s)		15.5			14.3			0.0			17.9	
Approach LOS		B			B			A			B	

Intersection Summary

HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	69	604	0	0	659	242	464	1	881	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.86	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1805	5136			5085	1553	1618	1454	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1805	5136			5085	1553	1618	1454	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	657	0	0	716	263	504	1	958	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	186	0	93	93	0	0	0
Lane Group Flow (vph)	75	657	0	0	716	77	454	418	405	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	0%	1%	0%	0%	2%	1%	6%	0%	2%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	2.5	21.5			15.0	15.0	21.5	21.5	21.5			
Effective Green, g (s)	2.5	21.5			15.0	15.0	21.5	21.5	21.5			
Actuated g/C Ratio	0.05	0.42			0.29	0.29	0.42	0.42	0.42			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	88	2165			1496	457	682	613	634			
v/s Ratio Prot	c0.04	0.13			c0.14		0.28	c0.29	0.27			
v/s Ratio Perm						0.05						
v/c Ratio	0.85	0.30			0.48	0.17	0.67	0.68	0.64			
Uniform Delay, d1	24.1	9.8			14.8	13.4	11.9	12.0	11.7			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	50.8	0.1			0.2	0.2	2.5	3.1	2.1			
Delay (s)	74.9	9.9			15.0	13.5	14.3	15.1	13.8			
Level of Service	E	A			B	B	B	B	B			
Approach Delay (s)		16.5			14.6			14.4			0.0	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	51.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	342	813	389	71	542	80	287	30	79	72	40	274
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3467	3365	1417	1805	3539	1615	1681	1707	1615		1841	2716
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3467	3365	1417	1805	3539	1615	1681	1707	1615		1841	2716
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	372	884	423	77	589	87	312	33	86	78	43	298
RTOR Reduction (vph)	0	4	226	0	0	60	0	0	77	0	0	243
Lane Group Flow (vph)	372	922	155	77	589	27	172	173	9	0	121	55
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	0%	0%	0%	0%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	14.1	27.0	27.0	3.8	16.7	16.7	7.2	7.2	7.2		12.2	12.2
Effective Green, g (s)	14.1	27.0	27.0	3.8	16.7	16.7	7.2	7.2	7.2		12.2	12.2
Actuated g/C Ratio	0.21	0.41	0.41	0.06	0.25	0.25	0.11	0.11	0.11		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	738	1372	578	104	893	407	183	186	176		339	501
v/s Ratio Prot	c0.11	c0.27		0.04	0.17	0.02	c0.10	0.10	0.01		c0.07	
v/s Ratio Perm			0.11									0.02
v/c Ratio	0.50	0.67	0.27	0.74	0.66	0.07	0.94	0.93	0.05		0.36	0.11
Uniform Delay, d1	23.0	16.0	13.0	30.7	22.2	18.8	29.3	29.3	26.4		23.6	22.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	1.3	0.3	24.3	1.8	0.1	48.7	46.3	0.1		0.6	0.1
Delay (s)	23.5	17.3	13.3	55.1	24.0	18.9	78.0	75.5	26.6		24.2	22.6
Level of Service	C	B	B	E	C	B	E	E	C		C	C
Approach Delay (s)		17.8			26.6			66.8			23.1	
Approach LOS		B			C			E			C	

Intersection Summary

HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	496	187	67	395	31	141	127	24	22	141	55
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3355		1787	3493		1787	1831		1805	1863	1572
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.65	1.00	1.00
Satd. Flow (perm)	1770	3355		1787	3493		1787	1831		1241	1863	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	539	203	73	429	34	153	138	26	24	153	60
RTOR Reduction (vph)	0	50	0	0	9	0	0	10	0	0	0	40
Lane Group Flow (vph)	184	692	0	73	454	0	153	154	0	24	153	20
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	2%	1%	1%	2%	0%	1%	1%	0%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	7.5	20.9		3.6	17.0		6.4	17.1		11.5	11.5	19.0
Effective Green, g (s)	7.5	20.9		3.6	17.0		6.4	17.1		11.5	11.5	19.0
Actuated g/C Ratio	0.13	0.36		0.06	0.29		0.11	0.29		0.20	0.20	0.33
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	227	1201		110	1017		196	536		252	367	619
v/s Ratio Prot	c0.10	c0.21		0.04	0.13		c0.09	0.08		0.00	c0.08	0.00
v/s Ratio Perm										0.02		0.01
v/c Ratio	0.81	0.58		0.66	0.45		0.78	0.29		0.10	0.42	0.03
Uniform Delay, d1	24.8	15.2		26.8	16.9		25.3	15.9		19.2	20.5	13.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	19.3	0.7		14.1	0.3		18.0	0.3		0.2	0.8	0.0
Delay (s)	44.0	15.8		40.9	17.2		43.3	16.2		19.4	21.3	13.4
Level of Service	D	B		D	B		D	B		B	C	B
Approach Delay (s)		21.4			20.4			29.3			19.1	
Approach LOS		C			C			C			B	

Intersection Summary

HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	57.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	190	157	152	672	29	191	873	63	61	1097	41
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3279		1805	3574	1577	1787	3574	1578	1805	3471	1517
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3279		1805	3574	1577	1787	3574	1578	1805	3471	1517
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	66	207	171	165	730	32	208	949	68	66	1192	45
RTOR Reduction (vph)	0	136	0	0	0	8	0	0	13	0	0	7
Lane Group Flow (vph)	66	242	0	165	730	24	208	949	55	66	1192	38
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	2%	1%	0%	1%	0%	1%	1%	0%	0%	4%	4%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	5.2	20.7		11.2	26.7	26.7	15.4	45.2	45.2	7.9	37.7	37.7
Effective Green, g (s)	5.2	20.7		11.2	26.7	26.7	15.4	45.2	45.2	7.9	37.7	37.7
Actuated g/C Ratio	0.05	0.21		0.11	0.27	0.27	0.15	0.45	0.45	0.08	0.38	0.38
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	679		202	954	421	275	1615	713	143	1309	572
v/s Ratio Prot	0.04	0.07		c0.09	c0.20		c0.12	0.27		0.04	c0.34	
v/s Ratio Perm						0.02			0.04			0.03
v/c Ratio	0.72	0.36		0.82	0.77	0.06	0.76	0.59	0.08	0.46	0.91	0.07
Uniform Delay, d1	46.7	34.0		43.4	33.8	27.3	40.5	20.4	15.6	44.0	29.6	19.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.3	0.3		21.9	3.7	0.1	11.2	1.6	0.2	2.4	11.0	0.2
Delay (s)	69.9	34.3		65.3	37.5	27.3	51.7	22.0	15.8	46.4	40.6	20.1
Level of Service	E	C		E	D	C	D	C	B	D	D	C
Approach Delay (s)		39.6			42.1			26.7			40.1	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	257	2	64	368	16	159	385	13	46	766	12
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3535		1805	3551		1805	3590		1805	3530	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3535		1805	3551		1805	3590		1805	3530	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	279	2	70	400	17	173	418	14	50	833	13
RTOR Reduction (vph)	0	1	0	0	3	0	0	2	0	0	1	0
Lane Group Flow (vph)	60	280	0	70	414	0	173	430	0	50	845	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	2%	0%	0%	1%	0%	0%	0%	0%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	6.6	15.7		7.0	16.1		12.8	36.7		4.7	28.6	
Effective Green, g (s)	6.6	15.7		7.0	16.1		12.8	36.7		4.7	28.6	
Actuated g/C Ratio	0.08	0.20		0.09	0.21		0.16	0.47		0.06	0.37	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	711		162	732		296	1687		109	1293	
v/s Ratio Prot	0.03	0.08		c0.04	c0.12		c0.10	0.12		0.03	c0.24	
v/s Ratio Perm												
v/c Ratio	0.40	0.39		0.43	0.57		0.58	0.26		0.46	0.65	
Uniform Delay, d1	33.9	27.1		33.7	27.9		30.2	12.5		35.5	20.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.4		1.8	1.0		2.9	0.1		3.0	1.2	
Delay (s)	35.6	27.4		35.5	28.9		33.1	12.5		38.5	21.8	
Level of Service	D	C		D	C		C	B		D	C	
Approach Delay (s)		28.9			29.8			18.4			22.8	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	78.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	254	263	243	1696	1141	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	3467	1564		5155	4974	
Flt Permitted	0.95	1.00		0.64	1.00	
Satd. Flow (perm)	3467	1564		3299	4974	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	286	264	1843	1240	248
RTOR Reduction (vph)	0	47	0	0	33	0
Lane Group Flow (vph)	276	239	0	2107	1455	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	2%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	27.0	27.0		55.0	55.0	
Effective Green, g (s)	27.0	27.0		55.0	55.0	
Actuated g/C Ratio	0.30	0.30		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1040	469		2016	3040	
v/s Ratio Prot	0.08				0.29	
v/s Ratio Perm		c0.15		c0.64		
v/c Ratio	0.27	0.51		1.74dl	0.48	
Uniform Delay, d1	24.0	26.0		17.5	9.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.9		33.0	0.5	
Delay (s)	24.6	30.0		50.5	10.2	
Level of Service	C	C		D	B	
Approach Delay (s)	27.3			50.5	10.2	
Approach LOS	C			D	B	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	461	805	282	80	593	41	48	149	51	55	266	150
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3332		1787	3500		1805	3407		1770	1863	1495
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3332		1787	3500		1805	3407		1770	1863	1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	501	875	307	87	645	45	52	162	55	60	289	163
RTOR Reduction (vph)	0	36	0	0	6	0	0	39	0	0	0	129
Lane Group Flow (vph)	501	1146	0	87	684	0	52	178	0	60	289	34
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	2%	3%	2%	1%	2%	1%	0%	1%	1%	2%	2%	8%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	23.6	39.6		7.1	23.1		2.7	16.0		3.8	17.1	17.1
Effective Green, g (s)	23.6	39.6		7.1	23.1		2.7	16.0		3.8	17.1	17.1
Actuated g/C Ratio	0.29	0.48		0.09	0.28		0.03	0.19		0.05	0.21	0.21
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	506	1599		154	980		59	661		82	386	310
v/s Ratio Prot	c0.28	c0.34		0.05	0.20		0.03	0.05		c0.03	c0.16	
v/s Ratio Perm												0.02
v/c Ratio	0.99	0.72		0.56	0.70		0.88	0.27		0.73	0.75	0.11
Uniform Delay, d1	29.3	17.0		36.2	26.6		39.7	28.3		38.8	30.7	26.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	37.3	1.6		4.7	2.2		75.7	0.2		28.2	7.7	0.2
Delay (s)	66.7	18.6		40.9	28.8		115.5	28.5		67.1	38.4	26.7
Level of Service	E	B		D	C		F	C		E	D	C
Approach Delay (s)		32.9			30.1			45.3			38.0	
Approach LOS		C			C			D			D	

Intersection Summary

HCM Average Control Delay	34.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	82.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖		↖	↗	↗	↖	↗	↖
Volume (vph)	124	658	185	44	696	91	137	719	37	137	955	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1746	3394			3267		1805	3574	1555	1787	3471	1518
Flt Permitted	0.22	1.00			0.86		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	399	3394			2815		1805	3574	1555	1787	3471	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	715	201	48	757	99	149	782	40	149	1038	148
RTOR Reduction (vph)	0	39	0	0	14	0	0	0	11	0	0	29
Lane Group Flow (vph)	135	877	0	0	890	0	149	782	29	149	1038	119
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	3%	2%	3%	0%	1%	0%	0%	1%	0%	1%	4%	3%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	30.6	30.6			30.6		5.1	18.5	18.5	7.2	20.6	20.6
Effective Green, g (s)	30.6	30.6			30.6		5.1	18.5	18.5	7.2	20.6	20.6
Actuated g/C Ratio	0.45	0.45			0.45		0.07	0.27	0.27	0.11	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	1521			1261		135	968	421	188	1047	458
v/s Ratio Prot		0.26					c0.08	0.22		0.08	c0.30	
v/s Ratio Perm	c0.34				0.32				0.02			0.08
v/c Ratio	0.75	0.58			0.71		1.10	0.81	0.07	0.79	0.99	0.26
Uniform Delay, d1	15.7	14.0			15.2		31.6	23.2	18.5	29.8	23.8	18.1
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.4	0.5			1.8		108.0	5.0	0.1	20.1	25.6	0.3
Delay (s)	32.1	14.6			17.0		139.6	28.3	18.6	49.9	49.4	18.4
Level of Service	C	B			B		F	C	B	D	D	B
Approach Delay (s)		16.8			17.0			44.9			46.0	
Approach LOS		B			B			D			D	

Intersection Summary

HCM Average Control Delay	32.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	68.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	60	291	966	69	344	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3570		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3570		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	316	1050	75	374	425
RTOR Reduction (vph)	0	282	6	0	0	0
Lane Group Flow (vph)	65	34	1119	0	374	425
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	6.0	6.0	26.1		11.1	34.2
Effective Green, g (s)	6.0	6.0	26.1		11.1	34.2
Actuated g/C Ratio	0.11	0.11	0.47		0.20	0.62
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	196	303	1688		704	2237
v/s Ratio Prot	c0.04	0.01	c0.31		c0.11	0.12
v/s Ratio Perm						
v/c Ratio	0.33	0.11	0.66		0.53	0.19
Uniform Delay, d1	22.7	22.2	11.2		19.7	4.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	0.2	1.0		0.8	0.0
Delay (s)	23.7	22.4	12.2		20.5	4.6
Level of Service	C	C	B		C	A
Approach Delay (s)	22.6		12.2			12.0
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↗	↖	↑↑		↖	↑↑		↖	↑↑	↗
Volume (vph)	380	164	96	24	213	50	116	900	48	59	439	357
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3610	1571	1805	3490		1805	3575		1787	3574	1573
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3610	1571	1805	3490		1805	3575		1787	3574	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	413	178	104	26	232	54	126	978	52	64	477	388
RTOR Reduction (vph)	0	0	74	0	27	0	0	4	0	0	0	252
Lane Group Flow (vph)	413	178	30	26	259	0	126	1026	0	64	477	136
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Effective Green, g (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Actuated g/C Ratio	0.11	0.29	0.29	0.04	0.22		0.08	0.38		0.05	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	383	1047	455	80	785		142	1370		82	1253	551
v/s Ratio Prot	c0.12	0.05		0.01	c0.07		0.07	c0.29		c0.04	0.13	
v/s Ratio Perm			0.02									0.09
v/c Ratio	1.08	0.17	0.07	0.33	0.33		0.89	0.75		0.78	0.38	0.25
Uniform Delay, d1	30.1	17.9	17.4	31.3	21.9		30.9	18.0		31.9	16.5	15.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	68.5	0.1	0.1	2.4	0.2		43.4	2.3		37.0	0.2	0.2
Delay (s)	98.6	18.0	17.4	33.7	22.2		74.3	20.3		68.9	16.6	15.8
Level of Service	F	B	B	C	C		E	C		E	B	B
Approach Delay (s)		65.8			23.1			26.2			19.9	
Approach LOS		E			C			C			B	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	113	22	30	128	180	99	776	73	179	258	48
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3446		1805	3237		3502	3610	1580	3502	3610	1578
Flt Permitted	0.55	1.00		0.66	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1038	3446		1252	3237		3502	3610	1580	3502	3610	1578
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	123	24	33	139	196	108	843	79	195	280	52
RTOR Reduction (vph)	0	18	0	0	149	0	0	0	37	0	0	29
Lane Group Flow (vph)	87	129	0	33	186	0	108	843	42	195	280	23
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	11.7	11.7		11.7	11.7		3.9	19.0	19.0	6.5	21.6	21.6
Effective Green, g (s)	11.7	11.7		11.7	11.7		3.9	19.0	19.0	6.5	21.6	21.6
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.08	0.39	0.39	0.13	0.44	0.44
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	819		298	770		278	1394	610	463	1585	693
v/s Ratio Prot		0.04			0.06		0.03	c0.23		c0.06	0.08	
v/s Ratio Perm	c0.08			0.03					0.03			0.01
v/c Ratio	0.35	0.16		0.11	0.24		0.39	0.60	0.07	0.42	0.18	0.03
Uniform Delay, d1	15.6	14.8		14.7	15.2		21.5	12.1	9.5	19.6	8.4	7.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1		0.2	0.2		0.9	0.7	0.0	0.6	0.1	0.0
Delay (s)	16.5	14.9		14.8	15.3		22.4	12.8	9.6	20.2	8.4	7.9
Level of Service	B	B		B	B		C	B	A	C	A	A
Approach Delay (s)		15.5			15.3			13.6			12.8	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

46: Maritime Street & Burma Road

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Volume (vph)	115	1	15	54	10	134	70	1	28	134	64	244
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.86		1.00	0.86		1.00	0.85		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1504	824		912	1016		1211	2294		1719	2736	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1504	824		912	1016		1211	2294		1719	2736	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	1	16	59	11	146	76	1	30	146	70	265
RTOR Reduction (vph)	0	13	0	0	121	0	0	27	0	0	206	0
Lane Group Flow (vph)	125	4	0	59	36	0	76	4	0	146	129	0
Heavy Vehicles (%)	20%	100%	98%	98%	100%	58%	49%	50%	34%	5%	40%	10%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	7.2	10.1		5.2	8.1		4.7	6.0		9.1	10.4	
Effective Green, g (s)	7.2	10.1		5.2	8.1		4.7	6.0		9.1	10.4	
Actuated g/C Ratio	0.16	0.22		0.11	0.17		0.10	0.13		0.20	0.22	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	233	179		102	177		123	297		337	613	
v/s Ratio Prot	c0.08	0.01		0.06	c0.04		c0.06	0.00		c0.08	c0.05	
v/s Ratio Perm												
v/c Ratio	0.54	0.03		0.58	0.21		0.62	0.01		0.43	0.21	
Uniform Delay, d1	18.1	14.3		19.6	16.4		20.0	17.6		16.4	14.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	0.1		7.7	0.6		8.9	0.0		0.9	0.2	
Delay (s)	20.4	14.3		27.3	17.0		28.9	17.6		17.3	14.8	
Level of Service	C	B		C	B		C	B		B	B	
Approach Delay (s)		19.7			19.8			25.6			15.6	
Approach LOS		B			B			C			B	

Intersection Summary

HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	46.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

47: 14th Street & Maritime Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕↔		↗	↕↔	
Volume (vph)	0	0	0	4	0	25	2	89	48	59	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0		4.0		
Lane Util. Factor					1.00		1.00	0.95		1.00		
Flt					0.88		1.00	0.95		1.00		
Flt Protected					0.99		0.95	1.00		0.95		
Satd. Flow (prot)					1409		1805	2351		1736		
Flt Permitted					1.00		0.95	1.00		0.95		
Satd. Flow (perm)					1419		1805	2351		1736		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	4	0	27	2	97	52	64	0	0
RTOR Reduction (vph)	0	0	0	0	26	0	0	38	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	5	0	2	111	0	64	0	0
Heavy Vehicles (%)	0%	0%	0%	60%	0%	12%	0%	64%	11%	4%	78%	0%
Turn Type	Perm			Perm	NA		Prot	NA		Prot		
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6								
Actuated Green, G (s)					0.8		2.1	4.9		0.6		
Effective Green, g (s)					0.8		2.1	4.9		0.6		
Actuated g/C Ratio					0.04		0.11	0.27		0.03		
Clearance Time (s)					4.0		4.0	4.0		4.0		
Vehicle Extension (s)					3.0		3.0	3.0		3.0		
Lane Grp Cap (vph)					62		207	630		57		
v/s Ratio Prot							0.00	c0.05		c0.04		
v/s Ratio Perm					c0.00							
v/c Ratio					0.08		0.01	0.18		1.12		
Uniform Delay, d1					8.4		7.2	5.1		8.8		
Progression Factor					1.00		1.00	1.00		1.00		
Incremental Delay, d2					0.6		0.0	0.1		156.9		
Delay (s)					9.0		7.2	5.3		165.8		
Level of Service					A		A	A		F		
Approach Delay (s)		0.0			9.0			5.3			165.8	
Approach LOS		A			A			A			F	

Intersection Summary

HCM Average Control Delay	47.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	18.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	20.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway/Maritime Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	↵
Volume (vph)	31	85	150	6	100	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1973	864	965	1920	1014	1056
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1973	864	965	1920	1014	1056
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	92	163	7	109	554
RTOR Reduction (vph)	0	80	0	0	0	365
Lane Group Flow (vph)	34	12	163	7	109	189
Heavy Vehicles (%)	83%	87%	87%	88%	78%	53%
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	5.6	5.6	10.7	20.3	14.6	14.6
Effective Green, g (s)	5.6	5.6	10.7	20.3	14.6	14.6
Actuated g/C Ratio	0.13	0.13	0.25	0.47	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	258	113	241	909	345	359
v/s Ratio Prot	c0.02		c0.17	0.00	0.11	
v/s Ratio Perm		0.01				c0.18
v/c Ratio	0.13	0.11	0.68	0.01	0.32	0.53
Uniform Delay, d1	16.5	16.4	14.5	6.0	10.5	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.4	7.3	0.0	0.5	1.4
Delay (s)	16.7	16.9	21.8	6.0	11.0	12.8
Level of Service	B	B	C	A	B	B
Approach Delay (s)	16.8			21.2	12.5	
Approach LOS	B			C	B	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	42.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	31	85	100	510	150	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	986	1930	2028	1056	1873	859
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	986	1930	2028	1056	1873	859
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	92	109	554	163	7
RTOR Reduction (vph)	0	0	0	0	0	5
Lane Group Flow (vph)	34	92	109	554	163	2
Heavy Vehicles (%)	83%	87%	78%	53%	87%	88%
Turn Type	Prot	NA	NA	Free	NA	Perm
Protected Phases	5	2	6		7	
Permitted Phases				Free		7
Actuated Green, G (s)	1.0	7.5	2.5	20.7	5.2	5.2
Effective Green, g (s)	1.0	7.5	2.5	20.7	5.2	5.2
Actuated g/C Ratio	0.05	0.36	0.12	1.00	0.25	0.25
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	48	699	245	1056	471	216
v/s Ratio Prot	0.03	0.05	0.05		0.09	
v/s Ratio Perm				c0.52		0.00
v/c Ratio	0.71	0.13	0.44	0.52	0.35	0.01
Uniform Delay, d1	9.7	4.4	8.5	0.0	6.4	5.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.1	0.1	1.3	1.9	0.4	0.0
Delay (s)	47.8	4.5	9.7	1.9	6.8	5.8
Level of Service	D	A	A	A	A	A
Approach Delay (s)		16.2	3.2		6.8	
Approach LOS		B	A		A	

Intersection Summary

HCM Average Control Delay	5.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	20.7	Sum of lost time (s)	0.0
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

49: W. Truck Services & Burma Road

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑			↑↓		↑	↑↓	
Volume (veh/h)	0	39	0	107	159	81	0	0	24	69	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	42	0	116	173	88	0	0	26	75	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					788							
pX, platoon unblocked												
vC, conflicting volume	261			42			492	536	21	497	492	217
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	261			42			492	536	21	497	492	217
tC, single (s)	4.1			4.2			7.5	6.5	7.0	8.6	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.0	4.0	3.3
p0 queue free %	100			92			100	100	97	77	100	100
cM capacity (veh/h)	1315			1550			438	420	1041	325	445	794

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2
Volume Total	28	14	377	26	50	25
Volume Left	0	0	116	0	50	25
Volume Right	0	0	88	26	0	0
cSH	1700	1700	1550	1041	325	325
Volume to Capacity	0.02	0.01	0.08	0.03	0.15	0.08
Queue Length 95th (ft)	0	0	6	2	13	6
Control Delay (s)	0.0	0.0	2.8	8.5	18.1	17.0
Lane LOS			A	A	C	C
Approach Delay (s)	0.0		2.8	8.5	17.7	
Approach LOS				A	C	

Intersection Summary

Average Delay		5.0				
Intersection Capacity Utilization		41.1%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	232	231	208	564	24	654	22	421	55	11	43
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3574	1048	1480	3429		1406	1430	1349	1687	1486	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3574	1048	1480	3429		1406	1430	1349	1687	1486	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	252	251	226	613	26	711	24	458	60	12	47
RTOR Reduction (vph)	0	0	200	0	2	0	0	0	311	0	43	0
Lane Group Flow (vph)	14	252	51	226	637	0	370	365	147	60	16	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	14%	1%	50%	22%	4%	16%	22%	0%	17%	7%	50%	3%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	1.3	18.4	18.4	19.1	36.2		28.9	28.9	28.9	7.1	7.1	
Effective Green, g (s)	1.3	18.4	18.4	19.1	36.2		28.9	28.9	28.9	7.1	7.1	
Actuated g/C Ratio	0.01	0.20	0.20	0.21	0.40		0.32	0.32	0.32	0.08	0.08	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	23	731	214	314	1379		451	459	433	133	117	
v/s Ratio Prot	0.01	0.07		c0.15	c0.19		c0.26	0.26		c0.04	0.01	
v/s Ratio Perm			0.05						0.11			
v/c Ratio	0.61	0.34	0.24	0.72	0.46		0.82	0.80	0.34	0.45	0.13	
Uniform Delay, d1	44.1	30.6	29.9	33.0	19.7		28.2	27.9	23.3	39.6	38.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	38.0	0.5	1.0	7.7	0.4		11.9	9.7	0.6	2.4	0.5	
Delay (s)	82.1	31.1	31.0	40.6	20.2		40.0	37.6	23.9	42.0	39.1	
Level of Service	F	C	C	D	C		D	D	C	D	D	
Approach Delay (s)		32.4			25.5			33.1			40.6	
Approach LOS		C			C			C			D	

Intersection Summary

HCM Average Control Delay	30.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	126	415	162	160	612	212	135	277	225	63	143	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	3282		1626	3374	1583	1626	2629		1703	2799	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1597	3282		1626	3374	1583	1626	2629		1703	2799	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	451	176	174	665	230	147	301	245	68	155	49
RTOR Reduction (vph)	0	51	0	0	0	148	0	185	0	0	37	0
Lane Group Flow (vph)	137	576	0	174	665	82	147	361	0	68	167	0
Heavy Vehicles (%)	13%	2%	14%	11%	7%	2%	11%	42%	11%	6%	32%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	8.3	22.7		10.9	25.3	25.3	9.7	13.8		6.9	11.0	
Effective Green, g (s)	8.3	22.7		10.9	25.3	25.3	9.7	13.8		6.9	11.0	
Actuated g/C Ratio	0.12	0.32		0.15	0.36	0.36	0.14	0.19		0.10	0.16	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	187	1052		250	1206	566	223	512		166	435	
v/s Ratio Prot	0.09	0.18		c0.11	c0.20		c0.09	c0.14		0.04	0.06	
v/s Ratio Perm						0.05						
v/c Ratio	0.73	0.55		0.70	0.55	0.15	0.66	0.70		0.41	0.38	
Uniform Delay, d1	30.2	19.8		28.4	18.2	15.4	29.0	26.6		30.0	26.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.2	0.9		8.4	0.8	0.2	7.2	4.5		1.9	0.7	
Delay (s)	44.4	20.7		36.8	19.0	15.6	36.1	31.1		32.0	27.5	
Level of Service	D	C		D	B	B	D	C		C	C	
Approach Delay (s)		24.9			21.2			32.2			28.6	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	25.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	16.5
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑	↑↑						↑↑	
Volume (vph)	0	653	59	220	772	0	0	0	0	35	132	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.93	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		4924		1798	3374						3200	
Flt Permitted		1.00		0.35	1.00						0.99	
Satd. Flow (perm)		4924		656	3374						3200	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	710	64	239	839	0	0	0	0	38	143	158
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	87	0
Lane Group Flow (vph)	0	766	0	239	839	0	0	0	0	0	252	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	9%	4%	2%	0%	7%	1%	1%	3%	0%	1%	0%	7%
Turn Type		NA		Perm	NA						Perm	NA
Protected Phases		4			8							6
Permitted Phases				8						6		
Actuated Green, G (s)		37.6		37.6	37.6						12.7	
Effective Green, g (s)		37.6		37.6	37.6						12.7	
Actuated g/C Ratio		0.62		0.62	0.62						0.21	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		3070		409	2104						674	
v/s Ratio Prot		0.16			0.25							
v/s Ratio Perm				c0.36							0.08	
v/c Ratio		0.25		0.58	0.40						0.37	
Uniform Delay, d1		5.1		6.7	5.7						20.4	
Progression Factor		1.00		0.58	0.40						1.00	
Incremental Delay, d2		0.0		1.3	0.0						0.1	
Delay (s)		5.1		5.2	2.3						20.5	
Level of Service		A		A	A						C	
Approach Delay (s)		5.1			3.0			0.0			20.5	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM Average Control Delay			6.4		HCM Level of Service					A		
HCM Volume to Capacity ratio			0.53									
Actuated Cycle Length (s)			60.3		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			52.3%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	166	522	0	0	881	25	111	146	127	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.95				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5021			5061			3295				
Flt Permitted		0.67			1.00			0.99				
Satd. Flow (perm)		3390			5061			3295				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	180	567	0	0	958	27	121	159	138	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	84	0	0	0	0
Lane Group Flow (vph)	0	747	0	0	983	0	0	334	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		37.6			37.6			12.7				
Effective Green, g (s)		37.6			37.6			12.7				
Actuated g/C Ratio		0.62			0.62			0.21				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		2114			3156			694				
v/s Ratio Prot					0.19							
v/s Ratio Perm		c0.22						0.10				
v/c Ratio		0.35			0.31			0.48				
Uniform Delay, d1		5.5			5.3			20.9				
Progression Factor		0.33			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.2				
Delay (s)		1.8			5.3			21.1				
Level of Service		A			A			C				
Approach Delay (s)		1.8			5.3			21.1			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	7.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↑↔				↔↑↔				↔↑↔		
Volume (vph)	31	462	101	63	310	62	66	660	72	119	711	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5				3.5				5.0		
Lane Util. Factor		0.91				0.91				0.95		
Frbp, ped/bikes		1.00				1.00				1.00		
Flpb, ped/bikes		1.00				1.00				1.00		
Frt		0.97				0.98				0.99		
Flt Protected		1.00				0.99				1.00		
Satd. Flow (prot)		4911				4813				3539		
Flt Permitted		0.90				0.80				0.55		
Satd. Flow (perm)		4431				3894				1953		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	502	110	68	337	67	72	717	78	129	773	73
RTOR Reduction (vph)	0	10	0	0	13	0	0	9	0	0	7	0
Lane Group Flow (vph)	0	636		0	0	459		0	0	858		0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA			Perm	NA			Perm	NA		
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5				48.5				23.0		
Effective Green, g (s)		48.5				48.5				23.0		
Actuated g/C Ratio		0.61				0.61				0.29		
Clearance Time (s)		3.5				3.5				5.0		
Lane Grp Cap (vph)		2686				2361				561		
v/s Ratio Prot												
v/s Ratio Perm		c0.14				0.12				0.44		
v/c Ratio		0.24				0.19				1.53		
Uniform Delay, d1		7.2				7.0				28.5		
Progression Factor		1.00				1.00				1.00		
Incremental Delay, d2		0.2				0.2				247.0		
Delay (s)		7.4				7.2				275.5		
Level of Service		A				A				F		
Approach Delay (s)		7.4				7.2				275.5		
Approach LOS		A				A				F		

Intersection Summary

HCM Average Control Delay	209.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	116.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗		↕↕	↗	↖	↕	↗		↖↖	↗
Volume (vph)	65	750	79	84	665	54	126	234	84	45	155	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3494	1517		3322	1547	1689	1810	1431		1847	1559
Flt Permitted		0.81	1.00		0.74	1.00	0.41	1.00	1.00		0.65	1.00
Satd. Flow (perm)		2842	1517		2483	1547	724	1810	1431		1213	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	815	86	91	723	59	137	254	91	49	168	40
RTOR Reduction (vph)	0	0	26	0	0	15	0	0	72	0	0	32
Lane Group Flow (vph)	0	886	60	0	814	44	137	254	19	0	217	8
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	3%	2%	16%	7%	0%	6%	5%	10%	0%	2%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		62.7	62.7		62.7	62.7	18.3	18.3	18.3		18.3	18.3
Effective Green, g (s)		62.7	62.7		62.7	62.7	18.3	18.3	18.3		18.3	18.3
Actuated g/C Ratio		0.70	0.70		0.70	0.70	0.20	0.20	0.20		0.20	0.20
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1980	1057		1730	1078	147	368	291		247	317
v/s Ratio Prot								0.14				
v/s Ratio Perm		0.31	0.04		0.33	0.03	0.19		0.01		0.18	0.01
v/c Ratio		0.45	0.06		0.47	0.04	0.93	0.69	0.06		0.88	0.03
Uniform Delay, d1		6.0	4.3		6.2	4.3	35.2	33.2	28.9		34.8	28.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		0.7	0.1		0.9	0.1	53.4	4.5	0.0		27.0	0.0
Delay (s)		6.7	4.4		7.1	4.3	88.7	37.7	29.0		61.8	28.7
Level of Service		A	A		A	A	F	D	C		E	C
Approach Delay (s)		6.5			6.9			50.5			56.6	
Approach LOS		A			A			D			E	

Intersection Summary

HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	39	756	60	25	688	69	102	537	30	152	398	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3500	1510	1798	3343	1540	1744	3446		1761	3419	
Flt Permitted		0.89	1.00	0.27	1.00	1.00	0.34	1.00		0.32	1.00	
Satd. Flow (perm)		3113	1510	503	3343	1540	616	3446		588	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	822	65	27	748	75	111	584	33	165	433	157
RTOR Reduction (vph)	0	0	29	0	0	29	0	7	0	0	46	0
Lane Group Flow (vph)	0	864	36	27	748	46	111	610	0	165	544	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	3%	4%	0%	8%	2%	3%	4%	0%	2%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2				6
Permitted Phases	4					4	2			6		
Actuated Green, G (s)		46.9	46.9	46.9	46.9	46.9	28.6	28.6		28.6	28.6	
Effective Green, g (s)		46.9	46.9	46.9	46.9	46.9	28.6	28.6		28.6	28.6	
Actuated g/C Ratio		0.55	0.55	0.55	0.55	0.55	0.34	0.34		0.34	0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1718	833	278	1845	850	207	1159		198	1150	
v/s Ratio Prot					0.22			0.18				0.16
v/s Ratio Perm		c0.28	0.02	0.05		0.03	0.18			c0.28		
v/c Ratio		0.50	0.04	0.10	0.41	0.05	0.54	0.53		0.83	0.47	
Uniform Delay, d1		11.8	8.7	9.0	11.0	8.8	22.8	22.7		26.0	22.3	
Progression Factor		1.00	1.00	0.58	0.88	0.43	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1	0.1	0.7	0.6	0.1	4.8	0.8		25.8	0.4	
Delay (s)		12.9	8.8	5.9	10.3	3.9	27.6	23.6		51.8	22.7	
Level of Service		B	A	A	B	A	C	C		D	C	
Approach Delay (s)		12.6			9.6			24.2			29.0	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	778	12	23	711	10	37	197	280	37	88	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		0.99	
Satd. Flow (prot)	1799	3505	1579	1765	3438	1579		3578	1490		3289	
Flt Permitted	0.34	1.00	1.00	0.31	1.00	1.00		0.87	1.00		0.87	
Satd. Flow (perm)	638	3505	1579	571	3438	1579		3135	1490		2888	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	846	13	25	773	11	40	214	304	40	96	123
RTOR Reduction (vph)	0	0	3	0	0	3	0	0	74	0	92	0
Lane Group Flow (vph)	75	846	10	25	773	8	0	254	230	0	167	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	2%	5%	0%	0%	0%	6%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	57.5	57.5	57.5	57.5	57.5	57.5		19.0	19.0		19.0	
Effective Green, g (s)	57.5	57.5	57.5	57.5	57.5	57.5		19.0	19.0		19.0	
Actuated g/C Ratio	0.68	0.68	0.68	0.68	0.68	0.68		0.22	0.22		0.22	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	432	2371	1068	386	2326	1068		701	333		646	
v/s Ratio Prot		c0.24			0.22							
v/s Ratio Perm	0.12		0.01	0.04		0.01		0.08	c0.15		0.06	
v/c Ratio	0.17	0.36	0.01	0.06	0.33	0.01		0.36	0.69		0.26	
Uniform Delay, d1	5.0	5.9	4.5	4.7	5.7	4.5		27.9	30.3		27.2	
Progression Factor	0.84	0.76	0.94	0.96	1.29	1.03		1.00	1.00		1.00	
Incremental Delay, d2	0.8	0.4	0.0	0.3	0.3	0.0		0.1	4.9		0.1	
Delay (s)	5.0	4.9	4.2	4.7	7.7	4.6		28.0	35.2		27.3	
Level of Service	A	A	A	A	A	A		C	D		C	
Approach Delay (s)		4.9			7.6			31.9			27.3	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	13.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	517	959	732	431	159	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.98	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1770	3505	3438	1524	3388	1369
Flt Permitted	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (perm)	1770	3505	3438	1524	3388	1369
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	562	1042	796	468	173	107
RTOR Reduction (vph)	0	0	0	237	13	75
Lane Group Flow (vph)	562	1042	796	231	180	12
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	3%	5%	2%	2%	4%
Bus Blockages (#/hr)	0	0	0	2	0	1
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	31.7	65.7	30.0	30.0	11.3	11.3
Effective Green, g (s)	31.7	65.7	30.0	30.0	11.3	11.3
Actuated g/C Ratio	0.37	0.77	0.35	0.35	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	660	2709	1213	538	450	182
v/s Ratio Prot	c0.32	0.30	c0.23		c0.05	
v/s Ratio Perm				0.15		0.01
v/c Ratio	0.85	0.38	0.66	0.43	0.40	0.06
Uniform Delay, d1	24.5	3.1	23.2	21.0	33.7	32.2
Progression Factor	0.90	1.01	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.7	0.4	2.8	2.5	0.2	0.1
Delay (s)	31.8	3.5	25.9	23.5	34.0	32.3
Level of Service	C	A	C	C	C	C
Approach Delay (s)		13.5	25.0		33.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	173	539	172	311	514	105	9	1618	738	0	614	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)	3502	3610	1514	3502	3610	1529		5133	1577		5136	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.93	1.00		1.00	1.00
Satd. Flow (perm)	3502	3610	1514	3502	3610	1529		4800	1577		5136	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	188	586	187	338	559	114	10	1759	802	0	667	79
RTOR Reduction (vph)	0	0	41	0	0	25	0	0	0	0	0	49
Lane Group Flow (vph)	188	586	146	338	559	89	0	1769	802	0	667	30
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	10.2	33.1	33.1	12.0	34.9	34.9		34.9	95.0		34.9	34.9
Effective Green, g (s)	10.2	33.1	33.1	12.0	34.9	34.9		34.9	95.0		34.9	34.9
Actuated g/C Ratio	0.11	0.35	0.35	0.13	0.37	0.37		0.37	1.00		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	376	1258	528	442	1326	562		1763	1577		1887	562
v/s Ratio Prot	0.05	0.16		c0.10	0.15						0.13	
v/s Ratio Perm			0.10			0.06		c0.37	c0.51			0.02
v/c Ratio	0.50	0.47	0.28	0.76	0.42	0.16		1.00	0.51		0.35	0.05
Uniform Delay, d1	40.0	24.1	22.3	40.1	22.5	20.2		30.1	0.0		21.8	19.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	1.2	1.3	7.7	1.0	0.6		22.3	1.2		0.1	0.0
Delay (s)	41.0	25.3	23.6	47.8	23.5	20.8		52.3	1.2		22.0	19.4
Level of Service	D	C	C	D	C	C		D	A		C	B
Approach Delay (s)		28.1			31.3			36.4			21.7	
Approach LOS		C			C			D			C	

Intersection Summary

HCM Average Control Delay	31.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑		↑	↑↑			↑↑	
Volume (vph)	1	573	45	141	345	7	32	0	179	6	2	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			1.00	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.96	
Satd. Flow (prot)		2214	837	970	2072		945	1754			2375	
Flt Permitted		0.95	1.00	0.95	1.00		0.95	1.00			0.93	
Satd. Flow (perm)		2114	837	970	2072		945	1754			2287	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	623	49	153	375	8	35	0	195	7	2	0
RTOR Reduction (vph)	0	0	27	0	0	0	0	161	0	0	0	0
Lane Group Flow (vph)	0	624	22	153	383	0	35	34	0	0	9	0
Confl. Peds. (#/hr)						5			5			
Heavy Vehicles (%)	100%	63%	93%	86%	74%	57%	91%	0%	72%	31%	100%	50%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Actuated Green, G (s)		38.0	38.0	19.4	61.4		5.9	14.8			4.9	
Effective Green, g (s)		38.0	38.0	19.4	61.4		5.9	14.8			4.9	
Actuated g/C Ratio		0.45	0.45	0.23	0.72		0.07	0.17			0.06	
Clearance Time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		943	373	221	1493		65	305			132	
v/s Ratio Prot				c0.16	0.18		c0.04	c0.02				
v/s Ratio Perm		c0.30	0.03								0.00	
v/c Ratio		0.66	0.06	0.69	0.26		0.54	0.11			0.07	
Uniform Delay, d1		18.5	13.4	30.2	4.1		38.3	29.7			38.0	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.8	0.1	9.0	0.1		8.3	0.2			0.2	
Delay (s)		20.3	13.5	39.2	4.2		46.7	29.8			38.2	
Level of Service		C	B	D	A		D	C			D	
Approach Delay (s)		19.8			14.2			32.4			38.2	
Approach LOS		B			B			C			D	

Intersection Summary

HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	85.2	Sum of lost time (s)	13.0
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	413	346	215	572	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	2037		2968	2051		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	2037		2968	2051		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	449	376	234	622	0	0
RTOR Reduction (vph)	127	0	0	0	0	0
Lane Group Flow (vph)	698	0	234	622	0	0
Heavy Vehicles (%)	61%	70%	18%	76%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	16.7		5.7	30.4		
Effective Green, g (s)	16.7		5.7	30.4		
Actuated g/C Ratio	0.55		0.19	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	1119		557	2051		
v/s Ratio Prot	c0.34		0.08	c0.30		
v/s Ratio Perm						
v/c Ratio	0.62		0.42	0.30		
Uniform Delay, d1	4.7		10.9	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	1.1		0.5	0.1		
Delay (s)	5.8		11.4	0.1		
Level of Service	A		B	A		
Approach Delay (s)	5.8			3.2	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	30.4	Sum of lost time (s)	4.0
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	266	146	0	0	122	124	204	232	109	110	0	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1037	2735			2943		893	3022		1770		1921
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1037	2735			2943		893	3022		1770		1921
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	289	159	0	0	133	135	222	252	118	120	0	334
RTOR Reduction (vph)	0	0	0	0	112	0	0	47	0	0	0	281
Lane Group Flow (vph)	289	159	0	0	156	0	198	347	0	120	0	53
Heavy Vehicles (%)	74%	32%	0%	0%	26%	1%	84%	6%	0%	2%	0%	48%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	10.2	25.2			11.0		16.3	16.3		10.0		10.0
Effective Green, g (s)	10.2	25.2			11.0		16.3	16.3		10.0		10.0
Actuated g/C Ratio	0.16	0.40			0.17		0.26	0.26		0.16		0.16
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	167	1085			510		229	776		279		303
v/s Ratio Prot	c0.28	0.06			c0.05		c0.22	0.11		c0.07		0.03
v/s Ratio Perm												
v/c Ratio	1.73	0.15			0.31		0.86	0.45		0.43		0.17
Uniform Delay, d1	26.6	12.3			22.9		22.5	19.8		24.2		23.2
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	352.6	0.1			0.3		27.0	0.4		1.1		0.3
Delay (s)	379.2	12.3			23.3		49.5	20.2		25.2		23.4
Level of Service	F	B			C		D	C		C		C
Approach Delay (s)		249.0			23.3		30.0				23.9	
Approach LOS		F			C		C				C	

Intersection Summary

HCM Average Control Delay	83.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	63.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	31	424	15	7	264	25	14	15	10	44	17	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		0.99	
Frt		1.00			0.99			1.00	0.85		0.96	
Flt Protected		1.00			1.00			0.98	1.00		0.97	
Satd. Flow (prot)		3271			3183			1846	1577		1762	
Flt Permitted		0.92			0.94			0.89	1.00		0.85	
Satd. Flow (perm)		3006			3010			1686	1577		1546	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	461	16	8	287	27	15	16	11	48	18	24
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	8	0	15	0
Lane Group Flow (vph)	0	509	0	0	314	0	0	31	3	0	75	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	5%	10%	0%	0%	13%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		59.0			59.0			23.0	23.0		23.0	
Effective Green, g (s)		59.0			59.0			23.0	23.0		23.0	
Actuated g/C Ratio		0.66			0.66			0.26	0.26		0.26	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		1971			1973			431	403		395	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.10			0.02	0.00		c0.05	
v/c Ratio		0.26			0.16			0.07	0.01		0.19	
Uniform Delay, d1		6.4			6.0			25.4	25.0		26.2	
Progression Factor		1.00			1.39			1.00	1.00		1.00	
Incremental Delay, d2		0.3			0.2			0.3	0.0		1.1	
Delay (s)		6.7			8.5			25.7	25.0		27.3	
Level of Service		A			A			C	C		C	
Approach Delay (s)		6.7			8.5			25.5			27.3	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	488	13	112	270	42	17	54	96	67	75	33
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.98			0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1805	1786		1805	3334			1706		1791	1799	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.36	1.00	
Satd. Flow (perm)	1805	1786		1805	3334			1646		673	1799	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	530	14	122	293	46	18	59	104	73	82	36
RTOR Reduction (vph)	0	1	0	0	8	0	0	72	0	0	24	0
Lane Group Flow (vph)	57	543	0	122	331	0	0	109	0	73	94	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	0%	6%	4%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	55.2		12.6	63.0			11.2		11.2	11.2	
Effective Green, g (s)	4.8	55.2		12.6	63.0			11.2		11.2	11.2	
Actuated g/C Ratio	0.05	0.61		0.14	0.70			0.12		0.12	0.12	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	96	1095		253	2334			205		84	224	
v/s Ratio Prot	0.03	c0.30		c0.07	0.10							0.05
v/s Ratio Perm								0.07		c0.11		
v/c Ratio	0.59	0.50		0.48	0.14			0.53		0.87	0.42	
Uniform Delay, d1	41.6	9.7		35.7	4.5			36.9		38.7	36.4	
Progression Factor	0.91	0.82		1.38	0.26			1.00		1.00	1.00	
Incremental Delay, d2	6.3	1.6		0.5	0.1			1.3		55.0	0.5	
Delay (s)	44.0	9.5		49.9	1.3			38.3		93.7	36.9	
Level of Service	D	A		D	A			D		F	D	
Approach Delay (s)		12.7			14.2			38.3			58.6	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	680	10	61	393	21	38	76	156	9	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	0.98	1.00		1.00	1.00			1.00	1.00		0.99	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)	1778	3399		1762	3377			1861	1484		1769	
Flt Permitted	0.45	1.00		0.28	1.00			0.92	1.00		0.91	
Satd. Flow (perm)	844	3399		518	3377			1739	1484		1653	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	739	11	66	427	23	41	83	170	10	5	5
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	66	0	3	0
Lane Group Flow (vph)	28	749	0	66	446	0	0	124	104	0	17	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	2%	6%	2%	0%	0%	6%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2		2		2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	384	1548		236	1538			792	676		753	
v/s Ratio Prot		c0.22			0.13							
v/s Ratio Perm	0.03			0.13				c0.07	0.07		0.01	
v/c Ratio	0.07	0.48		0.28	0.29			0.16	0.15		0.02	
Uniform Delay, d1	13.8	17.1		15.3	15.4			14.4	14.3		13.5	
Progression Factor	1.34	1.31		0.79	0.81			1.00	1.00		1.00	
Incremental Delay, d2	0.3	1.0		2.8	0.5			0.4	0.5		0.1	
Delay (s)	18.8	23.5		14.8	13.0			14.8	14.8		13.5	
Level of Service	B	C		B	B			B	B		B	
Approach Delay (s)		23.3			13.2			14.8			13.5	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	472	52	42	741	64	36	83	53	35	64	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.94			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.99	
Satd. Flow (prot)	1802	3371		1133	3438	1484	1456	2321			3093	
Flt Permitted	0.30	1.00		0.41	1.00	1.00	0.65	1.00			0.87	
Satd. Flow (perm)	573	3371		491	3438	1484	996	2321			2721	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	513	57	46	805	70	39	90	58	38	70	53
RTOR Reduction (vph)	0	9	0	0	0	28	0	40	0	0	37	0
Lane Group Flow (vph)	78	561	0	46	805	42	39	108	0	0	124	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	8%	59%	5%	7%	23%	33%	64%	0%	20%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Effective Green, g (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.31	0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	344	2023		295	2063	890	310	722			847	
v/s Ratio Prot		0.17			c0.23			c0.05				
v/s Ratio Perm	0.14			0.09		0.03	0.04				0.05	
v/c Ratio	0.23	0.28		0.16	0.39	0.05	0.13	0.15			0.15	
Uniform Delay, d1	8.3	8.6		7.9	9.4	7.4	22.2	22.4			22.4	
Progression Factor	0.33	0.28		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	1.4	0.3		1.1	0.6	0.1	0.8	0.4			0.4	
Delay (s)	4.2	2.7		9.1	10.0	7.5	23.1	22.8			22.7	
Level of Service	A	A		A	A	A	C	C			C	
Approach Delay (s)		2.9			9.7			22.9			22.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	406	53	109	739	41	48	54	66	125	196	30
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1526	4511		1797	4538		1742	1845	1582	1773	3574	1352
Flt Permitted	0.28	1.00		0.46	1.00		0.62	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	455	4511		864	4538		1134	1845	1582	1341	3574	1352
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	441	58	118	803	45	52	59	72	136	213	33
RTOR Reduction (vph)	0	19	0	0	7	0	0	0	41	0	0	19
Lane Group Flow (vph)	45	480	0	118	841	0	52	59	31	136	213	14
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	18%	14%	3%	0%	14%	0%	3%	3%	0%	1%	1%	17%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Effective Green, g (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Actuated g/C Ratio	0.46	0.46		0.46	0.46		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	209	2070		396	2082		487	792	679	576	1535	581
v/s Ratio Prot		0.11			c0.19			0.03				0.06
v/s Ratio Perm	0.10			0.14			0.05		0.02	c0.10		0.01
v/c Ratio	0.22	0.23		0.30	0.40		0.11	0.07	0.05	0.24	0.14	0.02
Uniform Delay, d1	13.8	13.9		14.4	15.3		14.5	14.3	14.1	15.4	14.7	14.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.3		0.2	0.0		0.4	0.2	0.1	1.0	0.2	0.1
Delay (s)	16.2	14.2		14.6	15.3		14.9	14.5	14.2	16.4	14.9	14.1
Level of Service	B	B		B	B		B	B	B	B	B	B
Approach Delay (s)		14.4			15.2			14.5			15.3	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	226	675	0	0	0	0	0	912	1434	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.93	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4820						4533	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4820						4533	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	734	0	0	0	0	0	991	1559	0	0	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	147	86	0	0	0
Lane Group Flow (vph)	0	977	0	0	0	0	0	1624	693	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	6%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						16.0	34.1			
Effective Green, g (s)		34.0						16.0	34.1			
Actuated g/C Ratio		0.57						0.27	0.57			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2731						1209	781			
v/s Ratio Prot								c0.36				
v/s Ratio Perm		0.20							c0.50			
v/c Ratio		0.36						1.41dr	0.89			
Uniform Delay, d1		7.1						22.0	11.3			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.4						160.2	11.8			
Delay (s)		7.4						182.2	23.1			
Level of Service		A						F	C			
Approach Delay (s)		7.4			0.0			133.6			0.0	
Approach LOS		A			A			F			A	

Intersection Summary

HCM Average Control Delay	98.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	51	922	826	0	0	0	0	321	56	29	311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.96	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			1.00	
Satd. Flow (prot)		4467	1355					1835			1840	
Flt Permitted		1.00	1.00					1.00			0.95	
Satd. Flow (perm)		4467	1355					1835			1750	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	1002	898	0	0	0	0	349	61	32	338	0
RTOR Reduction (vph)	0	137	0	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	1369	449	0	0	0	0	401	0	0	370	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	5%	5%	1%	0%	0%	0%	0%	1%	1%	0%	3%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)			27.2	60.0				23.8			23.8	
Effective Green, g (s)			27.2	60.0				23.8			23.8	
Actuated g/C Ratio			0.45	1.00				0.40			0.40	
Clearance Time (s)			5.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)		2025	1355					728			694	
v/s Ratio Prot								c0.22				
v/s Ratio Perm		0.31	0.33								0.21	
v/c Ratio		0.68	0.33					0.55			0.53	
Uniform Delay, d1		12.9	0.0					14.0			13.8	
Progression Factor		0.50	1.00					0.85			1.00	
Incremental Delay, d2		0.4	0.3					2.9			2.9	
Delay (s)		6.8	0.3					14.8			16.8	
Level of Service		A	A					B			B	
Approach Delay (s)		5.4			0.0			14.8			16.8	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	10	367	67	345	331	0	0	220	1199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1810	1517	1785	1881			1570	1477
Flt Permitted				0.95	1.00	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)				1730	1810	1517	353	1881			1570	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	11	399	73	375	360	0	0	239	1303
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	42	0
Lane Group Flow (vph)	0	0	0	11	399	18	375	360	0	0	744	756
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	5%	0%	1%	1%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	437	367	203	1082			903	1477
v/s Ratio Prot					c0.22			0.19			0.47	
v/s Ratio Perm				0.01		0.01	c1.06					0.51
v/c Ratio				0.03	0.91	0.05	1.85	0.33			0.82	0.51
Uniform Delay, d1				17.4	22.1	17.5	12.8	6.7			10.3	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.96	1.00
Incremental Delay, d2				0.1	26.0	0.2	399.7	0.8			8.0	1.2
Delay (s)				17.5	48.1	17.7	412.5	7.5			17.9	1.2
Level of Service				B	D	B	F	A			B	A
Approach Delay (s)		0.0			42.8			214.1			9.7	
Approach LOS		A			D			F			A	

Intersection Summary

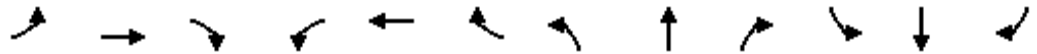
HCM Average Control Delay	69.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	89.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↕		↖	↕			↕	
Volume (vph)	29	151	26	305	64	19	16	279	599	5	48	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1854		1612	3471		1796	3049			3473	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.90	
Satd. Flow (perm)	1805	1854		1612	3471		1796	3049			3131	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	332	70	21	17	303	651	5	52	7
RTOR Reduction (vph)	0	8	0	0	13	0	0	408	0	0	5	0
Lane Group Flow (vph)	32	184	0	332	78	0	17	546	0	0	59	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	12%	0%	0%	0%	5%	5%	0%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	0.9	12.9		9.6	21.6		0.4	20.6			16.2	
Effective Green, g (s)	0.9	12.9		9.6	21.6		0.4	20.6			16.2	
Actuated g/C Ratio	0.02	0.23		0.17	0.39		0.01	0.37			0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	29	434		281	1361		13	1140			921	
v/s Ratio Prot	0.02	c0.10		c0.21	0.02		0.01	c0.18				
v/s Ratio Perm											0.02	
v/c Ratio	1.10	0.42		1.18	0.06		1.31	0.48			0.06	
Uniform Delay, d1	27.1	17.9		22.8	10.4		27.4	13.2			14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	200.4	0.7		112.1	0.0		363.0	0.3			0.0	
Delay (s)	227.5	18.6		134.8	10.4		390.3	13.5			14.0	
Level of Service	F	B		F	B		F	B			B	
Approach Delay (s)		48.4			108.1			20.1			14.0	
Approach LOS		D			F			C			B	

Intersection Summary

HCM Average Control Delay	45.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	730	63	24	151	13	174	176	271	138	108	33
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.91		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1805	3356		1805	3561		1805	1845		1643	2312	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (perm)	1805	3356		1805	3561		1805	1845		1643	2312	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	793	68	26	164	14	189	191	295	150	117	36
RTOR Reduction (vph)	0	4	0	0	5	0	0	229	0	0	15	0
Lane Group Flow (vph)	54	857	0	26	173	0	189	257	0	100	188	0
Confl. Peds. (#/hr)			10				10	10		10	10	10
Heavy Vehicles (%)	0%	5%	19%	0%	0%	0%	0%	53%	90%	0%	75%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	4.9	28.5		2.6	26.7		17.6	17.6		13.6	13.6	
Effective Green, g (s)	4.9	28.5		2.6	26.7		17.6	17.6		13.6	13.6	
Actuated g/C Ratio	0.06	0.36		0.03	0.34		0.22	0.22		0.17	0.17	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	113	1222		60	1214		406	415		285	402	
v/s Ratio Prot	c0.03	c0.26		0.01	0.05		0.10	c0.14		0.06	c0.08	
v/s Ratio Perm												
v/c Ratio	0.48	0.70		0.43	0.14		0.47	0.62		0.35	0.47	
Uniform Delay, d1	35.5	21.3		37.1	17.9		26.3	27.3		28.5	29.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	2.0		5.0	0.1		1.2	3.3		1.0	1.2	
Delay (s)	38.6	23.2		42.1	17.9		27.4	30.6		29.5	30.3	
Level of Service	D	C		D	B		C	C		C	C	
Approach Delay (s)		24.1			21.0			29.7			30.0	
Approach LOS		C			C			C			C	

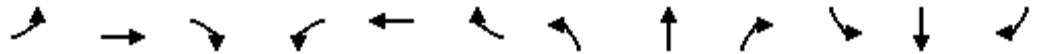
Intersection Summary

HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	78.3	Sum of lost time (s)	11.5
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	30	117	178	56	611	0	0	121	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3566	1581	1789	1124			2735	1579
Flt Permitted					0.99	1.00	0.67	1.00			1.00	1.00
Satd. Flow (perm)					3566	1581	1258	1124			2735	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	127	193	61	664	0	0	132	59
RTOR Reduction (vph)	0	0	0	0	0	154	0	0	0	0	0	15
Lane Group Flow (vph)	0	0	0	0	160	39	61	664	0	0	132	44
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	21%	92%	0%	0%	0%	0%	69%	79%	0%	32%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					12.8	12.8	67.7	67.7			67.7	67.7
Effective Green, g (s)					12.8	12.8	67.7	67.7			67.7	67.7
Actuated g/C Ratio					0.14	0.14	0.75	0.75			0.75	0.75
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					507	225	946	845			2057	1188
v/s Ratio Prot								c0.59			0.05	
v/s Ratio Perm					0.04	0.02	0.05					0.03
v/c Ratio					0.32	0.17	0.06	0.79			0.06	0.04
Uniform Delay, d1					34.7	33.9	2.9	6.8			2.9	2.8
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.4	0.4	0.1	7.3			0.1	0.1
Delay (s)					35.0	34.3	3.0	14.0			3.0	2.9
Level of Service					D	C	A	B			A	A
Approach Delay (s)		0.0			34.6			13.1			2.9	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	792	470	59	300	321	0	567	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.92			1.00	1.00
Flt Protected	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2708	1568	4592			1752	1881
Flt Permitted	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2708	1568	4592			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	861	511	64	326	349	0	616	435
RTOR Reduction (vph)	0	0	15	0	0	0	0	0
Lane Group Flow (vph)	448	924	49	675	0	0	616	435
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	45%	3%	1%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	32.2	32.2	32.2	22.8			21.5	47.8
Effective Green, g (s)	32.2	32.2	32.2	22.8			21.5	47.8
Actuated g/C Ratio	0.36	0.36	0.36	0.25			0.24	0.53
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	588	969	561	1163			419	999
v/s Ratio Prot				c0.15			c0.35	0.23
v/s Ratio Perm	0.27	0.34	0.03					
v/c Ratio	0.76	0.95	0.09	0.87dr			1.47	0.44
Uniform Delay, d1	25.5	28.2	19.2	29.4			34.2	12.9
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	5.2	18.4	0.0	2.1			224.2	0.1
Delay (s)	30.7	46.6	19.2	31.5			258.5	13.0
Level of Service	C	D	B	C			F	B
Approach Delay (s)		40.4		31.5				156.9
Approach LOS		D		C				F

Intersection Summary

HCM Average Control Delay	77.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔		↕	↕		↕	↕
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	84	12	36	143	105	60	337	156	36	114	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	91	13	39	155	114	65	366	170	39	124	36

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	140	13	195	114	248	353	101	98
Volume Left (vph)	49	0	39	0	65	0	39	0
Volume Right (vph)	0	13	0	114	0	170	0	36
Hadj (s)	0.17	-0.70	0.25	-0.67	1.10	1.05	1.01	0.58
Departure Headway (s)	7.6	6.7	7.4	6.5	7.4	7.4	8.0	7.6
Degree Utilization, x	0.29	0.02	0.40	0.20	0.51	0.72	0.22	0.21
Capacity (veh/h)	448	500	466	528	465	474	428	451
Control Delay (s)	12.5	8.7	14.0	9.9	16.9	26.3	12.1	11.3
Approach Delay (s)	12.2		12.5		22.4		11.7	
Approach LOS	B		B		C		B	

Intersection Summary

Delay	17.1
HCM Level of Service	C
Intersection Capacity Utilization	54.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗		↗	↕↗	
Volume (veh/h)	13	367	13	10	146	14	42	20	39	34	23	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	399	14	11	159	15	46	22	42	37	25	58
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	179			418			688	633	409	671	632	169
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	179			418			688	633	409	671	632	169
tC, single (s)	4.1			4.6			7.5	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.9	4.7	3.3	3.5	4.8	3.3
p0 queue free %	99			99			83	93	93	88	92	93
cM capacity (veh/h)	1403			921			266	299	641	319	298	868

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	413	14	170	15	110	37	17	66
Volume Left	14	0	11	0	46	37	0	0
Volume Right	0	14	0	15	42	0	0	58
cSH	1403	1700	921	1700	354	319	298	699
Volume to Capacity	0.01	0.01	0.01	0.01	0.31	0.12	0.06	0.09
Queue Length 95th (ft)	1	0	1	0	32	10	4	8
Control Delay (s)	0.4	0.0	0.7	0.0	19.7	17.8	17.8	10.7
Lane LOS	A		A		C	C	C	B
Approach Delay (s)	0.3		0.6		19.7	13.9		
Approach LOS					C	B		

Intersection Summary

Average Delay	4.9
Intersection Capacity Utilization	49.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	154	12	12	125	0	0	0	0	25	109	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						0.99	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.97	
Flt Protected		1.00	1.00		1.00						0.99	
Satd. Flow (prot)		3610	1550		3587						3432	
Flt Permitted		1.00	1.00		0.94						0.99	
Satd. Flow (perm)		3610	1550		3372						3432	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	167	13	13	136	0	0	0	0	27	118	34
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	28	0
Lane Group Flow (vph)	0	167	9	0	149	0	0	0	0	0	151	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		55.4	55.4		55.4						12.6	
Effective Green, g (s)		55.4	55.4		55.4						12.6	
Actuated g/C Ratio		0.72	0.72		0.72						0.16	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2614	1122		2442						565	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.04	
v/c Ratio		0.06	0.01		0.06						0.27	
Uniform Delay, d1		3.1	2.9		3.0						27.9	
Progression Factor		1.00	1.00		0.24						1.00	
Incremental Delay, d2		0.0	0.0		0.0						0.3	
Delay (s)		3.1	2.9		0.8						28.2	
Level of Service		A	A		A						C	
Approach Delay (s)		3.1			0.8			0.0			28.2	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕	↗		↕↕				
Volume (vph)	13	141	0	0	137	39	5	149	49	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		3518			3539	1520		3407				
Flt Permitted		0.94			1.00	1.00		1.00				
Satd. Flow (perm)		3309			3539	1520		3407				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	153	0	0	149	42	5	162	53	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	12	0	44	0	0	0	0
Lane Group Flow (vph)	0	167	0	0	149	30	0	176	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		55.4			55.4	55.4		12.6				
Effective Green, g (s)		55.4			55.4	55.4		12.6				
Actuated g/C Ratio		0.72			0.72	0.72		0.16				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2396			2563	1101		561				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.05				0.02		0.05				
v/c Ratio		0.07			0.06	0.03		0.31				
Uniform Delay, d1		3.1			3.0	3.0		28.1				
Progression Factor		0.53			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.3				
Delay (s)		1.7			3.1	3.0		28.5				
Level of Service		A			A	A		C				
Approach Delay (s)		1.7			3.1			28.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↵	↵↵	↑	↑↑↑	↵	↵	↵	↵
Volume (vph)	89	136	0	293	33	0	1040	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frpb, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1697	3335		5187	1341		1681	1690
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1697	3335		5187	1341		1681	1690
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	148	0	318	36	0	1130	34
RTOR Reduction (vph)	39	0	0	0	0	0	0	0
Lane Group Flow (vph)	58	148	0	318	36	0	576	588
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	5%	5%	6%	0%	17%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	10.8	10.8		10.9	10.9		49.3	49.3
Effective Green, g (s)	10.8	10.8		10.9	10.9		49.3	49.3
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	216	424		665	172		975	980
v/s Ratio Prot				c0.06			0.34	c0.35
v/s Ratio Perm	0.03	c0.04			0.03			
v/c Ratio	0.27	0.35		0.48	0.21		0.59	0.60
Uniform Delay, d1	33.5	33.9		34.4	33.2		11.4	11.5
Progression Factor	0.53	0.68		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.5		0.5	0.6		2.6	2.7
Delay (s)	18.5	23.7		35.0	33.8		14.0	14.2
Level of Service	B	C		C	C		B	B
Approach Delay (s)			21.6	34.8				14.1
Approach LOS			C	C				B
Intersection Summary								
HCM Average Control Delay			19.3			HCM Level of Service		B
HCM Volume to Capacity ratio			0.54					
Actuated Cycle Length (s)			85.0			Sum of lost time (s)		14.0
Intersection Capacity Utilization			53.8%			ICU Level of Service		A
Analysis Period (min)			15					
c Critical Lane Group								

HCM Signalized Intersection Capacity Analysis
 29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	293	895	30	1470	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.91	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3042	1455	1537	1524	4571
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3042	1455	1537	1524	4571
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	318	973	33	1598	0
RTOR Reduction (vph)	0	0	17	0	0
Lane Group Flow (vph)	805	486	13	802	799
Heavy Vehicles (%)	7%	1%	1%	1%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	47.0	47.0	28.5	28.5	28.5
Effective Green, g (s)	47.0	47.0	28.5	28.5	28.5
Actuated g/C Ratio	0.55	0.55	0.34	0.34	0.34
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1682	805	515	511	1533
v/s Ratio Prot	0.26		0.01	c0.53	0.17
v/s Ratio Perm		c0.33			
v/c Ratio	0.48	0.60	0.02	1.57	1.39dl
Uniform Delay, d1	11.6	12.8	18.9	28.2	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	3.3	0.0	265.6	0.3
Delay (s)	12.5	16.1	19.0	293.9	23.1
Level of Service	B	B	B	F	C
Approach Delay (s)	13.9				156.2
Approach LOS	B				F

Intersection Summary

HCM Average Control Delay	93.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	561	23	9	205	0	0	0	0	294	244	204
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5147			5173					1805	3539	1570
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5147			4717					1805	3539	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	610	25	10	223	0	0	0	0	320	265	222
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	117
Lane Group Flow (vph)	0	629	0	0	233	0	0	0	0	320	265	105
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		30.0			30.0					38.0	38.0	38.0
Effective Green, g (s)		30.0			30.0					38.0	38.0	38.0
Actuated g/C Ratio		0.38			0.38					0.48	0.48	0.48
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1930			1769					857	1681	746
v/s Ratio Prot		c0.12									0.07	
v/s Ratio Perm					0.05					c0.18		0.07
v/c Ratio		0.33			0.13					0.37	0.16	0.14
Uniform Delay, d1		17.8			16.4					13.4	11.9	11.8
Progression Factor		1.00			0.20					1.00	1.00	1.00
Incremental Delay, d2		0.5			0.1					1.2	0.2	0.4
Delay (s)		18.3			3.4					14.6	12.1	12.2
Level of Service		B			A					B	B	B
Approach Delay (s)		18.3			3.4			0.0			13.1	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↶↶↶			↶↶↶	↶		↶↶↶				
Volume (vph)	408	464	0	0	214	859	11	941	48	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.97		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.90	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4830			4295	1334		5028				
Flt Permitted	0.95	0.67			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3285			4295	1334		5028				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	443	504	0	0	233	934	12	1023	52	0	0	0
RTOR Reduction (vph)	0	0	0	0	16	16	0	7	0	0	0	0
Lane Group Flow (vph)	230	717	0	0	684	451	0	1080	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	7%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	12.0	42.0			26.5	26.5		27.0				
Effective Green, g (s)	12.0	42.0			26.5	26.5		27.0				
Actuated g/C Ratio	0.15	0.52			0.33	0.33		0.34				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	233	1956			1423	442		1697				
v/s Ratio Prot	c0.15	0.05			0.16							
v/s Ratio Perm		0.14				c0.34		0.21				
v/c Ratio	0.99	1.00dl			0.92dr	1.02		0.64				
Uniform Delay, d1	33.9	11.2			21.3	26.8		22.4				
Progression Factor	1.03	1.95			1.00	1.00		1.00				
Incremental Delay, d2	54.5	0.5			1.2	48.0		1.8				
Delay (s)	89.4	22.3			22.4	74.8		24.2				
Level of Service	F	C			C	E		C				
Approach Delay (s)		38.6			43.4			24.2			0.0	
Approach LOS		D			D			C			A	

Intersection Summary

















HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

- dl Defacto Left Lane. Recode with 1 though lane as a left lane.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	305	1077	0	990	173	100	35	0	21	162	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.88			0.98			1.00			0.99	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		3078			3504			3429			3524	
Flt Permitted		1.00			1.00			0.96			0.99	
Satd. Flow (perm)		3078			3504			3429			3524	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	332	1171	0	1076	188	109	38	0	23	176	10
RTOR Reduction (vph)	0	471	0	0	22	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	1032	0	0	1242	0	0	147	0	0	204	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	1%	2%	1%	2%	0%	0%	1%	3%	5%	0%	1%	1%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1563			1779			317			759	
v/s Ratio Prot		0.34			c0.35			c0.04			c0.06	
v/s Ratio Perm												
v/c Ratio		0.92dr			0.70			0.46			0.27	
Uniform Delay, d1		11.8			12.2			28.0			21.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.2			2.3			4.8			0.9	
Delay (s)		14.1			14.5			32.8			22.1	
Level of Service		B			B			C			C	
Approach Delay (s)		14.1			14.5			32.8			22.1	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			15.7				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			65.0				Sum of lost time (s)		12.0			
Intersection Capacity Utilization			72.6%				ICU Level of Service				C	
Analysis Period (min)			15									
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	86	611	22	113	333	150	16	319	86	190	234	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5142	1528	1772	3371		1771	1863	1556	1793	1881	1572
Flt Permitted		0.81	1.00	0.34	1.00		0.50	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)		4195	1528	641	3371		925	1863	1556	679	1881	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	664	24	123	362	163	17	347	93	207	254	39
RTOR Reduction (vph)	0	0	10	0	65	0	0	0	36	0	0	24
Lane Group Flow (vph)	0	757	14	123	460	0	17	347	57	207	254	15
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	0%	1%	1%	1%	0%	1%	2%	1%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.58	0.58	0.58	0.58		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2412	879	369	1938		278	559	467	204	564	472
v/s Ratio Prot					0.14			0.19			0.14	
v/s Ratio Perm		0.18	0.01	c0.19			0.02		0.04	c0.30		0.01
v/c Ratio		0.31	0.02	0.33	0.24		0.06	0.62	0.12	1.01	0.45	0.03
Uniform Delay, d1		8.8	7.3	8.9	8.4		20.0	24.1	20.3	28.0	22.7	19.8
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	2.4	0.3		0.4	5.1	0.5	66.9	2.6	0.1
Delay (s)		9.2	7.3	11.4	8.7		20.4	29.2	20.9	94.9	25.2	19.9
Level of Service		A	A	B	A		C	C	C	F	C	B
Approach Delay (s)		9.1			9.2			27.2			53.7	
Approach LOS		A			A			C			D	

Intersection Summary

HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	408	596	0	617	1608	0	0	0	553	0	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.95			0.98	0.98				1.00		0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.92	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3097			3004	1375				3433		1537
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3097			3004	1375				3433		1537
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	443	648	0	671	1748	0	0	0	601	0	295
RTOR Reduction (vph)	0	223	0	0	245	0	0	0	0	0	0	222
Lane Group Flow (vph)	263	868	0	0	1300	874	0	0	0	601	0	73
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	1%	4%	1%	5%	0%	0%	0%	2%	14%	2%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	14.1	54.2			36.1	82.7				20.5		20.5
Effective Green, g (s)	14.1	54.2			36.1	82.7				20.5		20.5
Actuated g/C Ratio	0.17	0.66			0.44	1.00				0.25		0.25
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	305	2030			1311	1375				851		381
v/s Ratio Prot	c0.15	0.28			c0.43					0.18		
v/s Ratio Perm						c0.64						0.05
v/c Ratio	0.86	0.43			0.99	0.64				0.71		0.19
Uniform Delay, d1	33.4	6.8			23.1	0.0				28.4		24.6
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	21.3	0.1			22.7	2.3				2.7		0.2
Delay (s)	54.7	7.0			45.9	2.3				31.0		24.8
Level of Service	D	A			D	A				C		C
Approach Delay (s)		16.2			30.1			0.0			29.0	
Approach LOS		B			C			A			C	

Intersection Summary

HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	134	707	0	0	1429	343	379	81	753	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.89	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5036	1550	1649	1497	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5036	1550	1649	1497	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	768	0	0	1553	373	412	88	818	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	222	0	131	131	0	0	0
Lane Group Flow (vph)	146	768	0	0	1553	151	371	350	335	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	4%	3%	2%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	5.3	32.4			23.1	23.1	16.8	16.8	16.8			
Effective Green, g (s)	5.3	32.4			23.1	23.1	16.8	16.8	16.8			
Actuated g/C Ratio	0.09	0.57			0.40	0.40	0.29	0.29	0.29			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	166	2909			2034	626	484	440	442			
v/s Ratio Prot	c0.08	0.15			c0.31		0.23	c0.23	0.22			
v/s Ratio Perm						0.10						
v/c Ratio	0.88	0.26			0.76	0.24	0.77	0.80	0.76			
Uniform Delay, d1	25.6	6.3			14.7	11.3	18.4	18.6	18.4			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	37.2	0.0			1.8	0.2	7.1	9.6	7.3			
Delay (s)	62.8	6.4			16.4	11.5	25.5	28.3	25.7			
Level of Service	E	A			B	B	C	C	C			
Approach Delay (s)		15.4			15.5			26.6			0.0	
Approach LOS		B			B			C			A	
























Intersection Summary

HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	393	705	571	151	1000	125	403	42	148	127	67	615	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88	
Frpb, ped/bikes	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00	
Satd. Flow (prot)	3433	3272	1411	1805	3505	1615	1698	1721	1599		1840	2705	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00	
Satd. Flow (perm)	3433	3272	1411	1805	3505	1615	1698	1721	1599		1840	2705	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	427	766	621	164	1087	136	438	46	161	138	73	668	
RTOR Reduction (vph)	0	22	280	0	0	43	0	0	138	0	0	256	
Lane Group Flow (vph)	427	943	142	164	1087	93	241	243	23	0	211	412	
Confl. Peds. (#/hr)			20									20	
Heavy Vehicles (%)	2%	2%	1%	0%	3%	0%	1%	0%	1%	0%	0%	2%	
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm	
Protected Phases	5	2		1	6	6	8	8	8	7	7		
Permitted Phases			2									7	
Actuated Green, G (s)	10.1	29.0	29.0	9.3	28.2	28.2	12.1	12.1	12.1		19.6	19.6	
Effective Green, g (s)	10.1	29.0	29.0	9.3	28.2	28.2	12.1	12.1	12.1		19.6	19.6	
Actuated g/C Ratio	0.12	0.34	0.34	0.11	0.33	0.33	0.14	0.14	0.14		0.23	0.23	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	403	1103	476	195	1149	530	239	242	225		419	616	
v/s Ratio Prot	c0.12	0.29		0.09	c0.31	0.06	c0.14	0.14	0.01		0.11		
v/s Ratio Perm			0.10									c0.15	
v/c Ratio	1.06	0.86	0.30	0.84	0.95	0.18	1.01	1.00	0.10		0.50	0.67	
Uniform Delay, d1	38.0	26.5	21.0	37.6	28.2	20.6	37.0	37.0	32.2		29.0	30.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	61.5	6.6	0.4	26.5	15.3	0.2	60.4	58.9	0.2		1.0	2.8	
Delay (s)	99.4	33.2	21.4	64.1	43.4	20.8	97.3	95.9	32.4		29.9	33.0	
Level of Service	F	C	C	E	D	C	F	F	C		C	C	
Approach Delay (s)		46.0			43.6			80.6			32.3		
Approach LOS		D			D			F			C		
Intersection Summary													
HCM Average Control Delay			47.5									HCM Level of Service	D
HCM Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			86.0									Sum of lost time (s)	12.0
Intersection Capacity Utilization			73.7%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	643	137	60	519	63	423	415	53	77	253	232
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3411		1787	3436		1787	1810		1805	1863	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.48	1.00	1.00
Satd. Flow (perm)	1752	3411		1787	3436		1787	1810		905	1863	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	699	149	65	564	68	460	451	58	84	275	252
RTOR Reduction (vph)	0	19	0	0	10	0	0	6	0	0	0	50
Lane Group Flow (vph)	159	829	0	65	622	0	460	504	0	84	275	202
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	3%	2%	1%	1%	3%	0%	1%	3%	1%	0%	2%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	9.1	25.0		3.9	19.8		23.7	33.6		17.8	17.8	26.9
Effective Green, g (s)	9.1	25.0		3.9	19.8		23.7	33.6		17.8	17.8	26.9
Actuated g/C Ratio	0.11	0.29		0.05	0.23		0.27	0.39		0.21	0.21	0.31
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	185	987		81	787		490	704		269	384	547
v/s Ratio Prot	c0.09	c0.24		0.04	0.18		c0.26	c0.28		0.03	c0.15	0.04
v/s Ratio Perm										0.04		0.09
v/c Ratio	0.86	0.84		0.80	0.79		0.94	0.72		0.31	0.72	0.37
Uniform Delay, d1	38.0	28.8		40.9	31.3		30.6	22.3		30.0	31.9	23.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	30.5	6.4		41.8	5.4		25.8	3.5		0.7	6.2	0.4
Delay (s)	68.5	35.2		82.6	36.8		56.5	25.8		30.7	38.2	23.6
Level of Service	E	D		F	D		E	C		C	D	C
Approach Delay (s)		40.5			41.1			40.4			31.1	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	174	647	153	100	316	44	159	815	107	168	814	75
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3457		1805	3539	1579	1787	3471	1580	1805	3574	1476
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3457		1805	3539	1579	1787	3471	1580	1805	3574	1476
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	703	166	109	343	48	173	886	116	183	885	82
RTOR Reduction (vph)	0	23	0	0	0	29	0	0	29	0	0	20
Lane Group Flow (vph)	189	846	0	109	343	19	173	886	87	183	885	62
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	1%	1%	0%	2%	0%	1%	4%	0%	0%	1%	7%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	25.4		7.5	23.4	23.4	11.7	31.9	31.9	10.2	30.4	30.4
Effective Green, g (s)	9.5	25.4		7.5	23.4	23.4	11.7	31.9	31.9	10.2	30.4	30.4
Actuated g/C Ratio	0.11	0.28		0.08	0.26	0.26	0.13	0.35	0.35	0.11	0.34	0.34
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	976		150	920	411	232	1230	560	205	1207	499
v/s Ratio Prot	c0.11	c0.24		0.06	0.10		0.10	c0.26		c0.10	0.25	
v/s Ratio Perm						0.01			0.06			0.04
v/c Ratio	1.02	0.87		0.73	0.37	0.05	0.75	0.72	0.16	0.89	0.73	0.12
Uniform Delay, d1	40.2	30.7		40.2	27.3	24.9	37.7	25.2	19.8	39.4	26.2	20.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	71.9	8.2		16.0	0.3	0.0	12.2	3.7	0.6	34.9	4.0	0.5
Delay (s)	112.2	38.9		56.3	27.5	25.0	50.0	28.8	20.4	74.3	30.2	21.1
Level of Service	F	D		E	C	C	D	C	C	E	C	C
Approach Delay (s)		52.0			33.6			31.1			36.6	
Approach LOS		D			C			C			D	

Intersection Summary

HCM Average Control Delay	38.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	128	556	4	112	275	25	140	838	22	63	648	22
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3570		1805	3494		1805	3525		1805	3554	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	3570		1805	3494		1805	3525		1805	3554	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	604	4	122	299	27	152	911	24	68	704	24
RTOR Reduction (vph)	0	1	0	0	6	0	0	1	0	0	2	0
Lane Group Flow (vph)	139	607	0	122	320	0	152	934	0	68	726	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	1%	1%	0%	0%	2%	0%	0%	2%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	11.7	21.9		11.2	21.4		12.2	33.0		7.3	28.1	
Effective Green, g (s)	11.7	21.9		11.2	21.4		12.2	33.0		7.3	28.1	
Actuated g/C Ratio	0.13	0.25		0.13	0.24		0.14	0.38		0.08	0.32	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	239	895		231	856		252	1331		151	1143	
v/s Ratio Prot	c0.08	c0.17		0.07	0.09		c0.08	c0.26		0.04	0.20	
v/s Ratio Perm												
v/c Ratio	0.58	0.68		0.53	0.37		0.60	0.70		0.45	0.64	
Uniform Delay, d1	35.6	29.6		35.6	27.4		35.3	23.0		38.1	25.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	2.1		2.2	0.3		4.0	1.7		2.1	1.2	
Delay (s)	39.1	31.6		37.8	27.7		39.4	24.7		40.3	26.4	
Level of Service	D	C		D	C		D	C		D	C	
Approach Delay (s)		33.0			30.5			26.8			27.6	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	513	516	195	2109	1480	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	1553		5110	4990	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	3433	1553		3226	4990	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	558	561	212	2292	1609	291
RTOR Reduction (vph)	0	21	0	0	21	0
Lane Group Flow (vph)	558	540	0	2504	1879	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	2%	0%	2%	1%	1%	1%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	37.0	37.0		75.0	75.0	
Effective Green, g (s)	37.0	37.0		75.0	75.0	
Actuated g/C Ratio	0.31	0.31		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1059	479		2016	3119	
v/s Ratio Prot	0.16				0.38	
v/s Ratio Perm		c0.35		c0.78		
v/c Ratio	0.53	1.13		2.55dl	0.60	
Uniform Delay, d1	34.3	41.5		22.5	13.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	80.5		113.3	0.9	
Delay (s)	36.1	122.0		135.8	14.4	
Level of Service	D	F		F	B	
Approach Delay (s)	79.2			135.8	14.4	
Approach LOS	E			F	B	

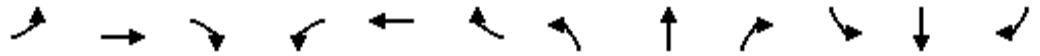
Intersection Summary

HCM Average Control Delay	82.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		
dl Defacto Left Lane. Recode with 1 though lane as a left lane.			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	676	98	85	709	46	136	359	70	120	176	489
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3392		1787	3499		1719	3444		1787	1881	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1719	3392		1787	3499		1719	3444		1787	1881	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	735	107	92	771	50	148	390	76	130	191	532
RTOR Reduction (vph)	0	14	0	0	6	0	0	21	0	0	0	216
Lane Group Flow (vph)	293	828	0	92	815	0	148	445	0	130	191	316
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	5%	4%	2%	1%	2%	3%	5%	2%	0%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	29.3		6.7	23.9		7.1	18.4		6.1	17.4	17.4
Effective Green, g (s)	12.1	29.3		6.7	23.9		7.1	18.4		6.1	17.4	17.4
Actuated g/C Ratio	0.16	0.38		0.09	0.31		0.09	0.24		0.08	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	272	1299		157	1093		160	828		142	428	357
v/s Ratio Prot	c0.17	0.24		0.05	c0.23		c0.09	0.13		0.07	0.10	
v/s Ratio Perm												c0.20
v/c Ratio	1.08	0.64		0.59	0.75		0.93	0.54		0.92	0.45	0.88
Uniform Delay, d1	32.2	19.3		33.6	23.6		34.4	25.3		34.9	25.4	28.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	76.6	1.0		5.5	2.8		49.2	0.7		50.5	0.7	21.9
Delay (s)	108.8	20.3		39.1	26.4		83.7	26.0		85.4	26.2	50.5
Level of Service	F	C		D	C		F	C		F	C	D
Approach Delay (s)		43.2			27.7			39.9			50.4	
Approach LOS		D			C			D			D	

Intersection Summary

HCM Average Control Delay	40.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘			↖↗		↗	↗↘	↗	↗	↗↘	↗
Volume (vph)	133	676	248	80	595	110	174	956	91	216	812	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1712	3404			3238		1770	3471	1524	1805	3539	1547
Flt Permitted	0.24	1.00			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	436	3404			2252		1770	3471	1524	1805	3539	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	735	270	87	647	120	189	1039	99	235	883	118
RTOR Reduction (vph)	0	55	0	0	19	0	0	0	18	0	0	24
Lane Group Flow (vph)	145	950	0	0	835	0	189	1039	81	235	883	94
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	5%	1%	1%	0%	1%	1%	2%	4%	2%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	31.7	31.7			31.7		5.1	17.4	17.4	8.2	20.5	20.5
Effective Green, g (s)	31.7	31.7			31.7		5.1	17.4	17.4	8.2	20.5	20.5
Actuated g/C Ratio	0.46	0.46			0.46		0.07	0.25	0.25	0.12	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	199	1557			1030		130	872	383	214	1047	458
v/s Ratio Prot		0.28					0.11	c0.30		0.13	c0.25	
v/s Ratio Perm	0.33				c0.37				0.05			0.06
v/c Ratio	0.73	0.61			0.81		1.45	1.19	0.21	1.10	0.84	0.21
Uniform Delay, d1	15.3	14.2			16.2		32.1	25.9	20.5	30.5	22.9	18.3
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.5	0.7			4.9		241.7	97.5	0.3	90.2	6.3	0.2
Delay (s)	27.8	14.9			21.1		273.8	123.5	20.8	120.8	29.2	18.5
Level of Service	C	B			C		F	F	C	F	C	B
Approach Delay (s)		16.5			21.1			137.2			45.6	
Approach LOS		B			C			F			D	

Intersection Summary

HCM Average Control Delay	60.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰↰	↰↰		↰↰	↰↰
Volume (vph)	258	473	447	162	279	894
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3424		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3424		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	514	486	176	303	972
RTOR Reduction (vph)	0	402	44	0	0	0
Lane Group Flow (vph)	280	112	618	0	303	972
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	11.7	11.7	19.8		10.4	28.5
Effective Green, g (s)	11.7	11.7	19.8		10.4	28.5
Actuated g/C Ratio	0.22	0.22	0.37		0.19	0.53
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	392	605	1258		676	1909
v/s Ratio Prot	c0.16	0.04	0.18		c0.09	c0.27
v/s Ratio Perm						
v/c Ratio	0.71	0.18	0.49		0.45	0.51
Uniform Delay, d1	19.6	17.2	13.2		19.2	8.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.1	0.1	0.3		0.5	0.2
Delay (s)	25.6	17.4	13.5		19.7	8.4
Level of Service	C	B	B		B	A
Approach Delay (s)	20.3		13.5			11.1
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	223	178	83	66	272	42	149	463	69	112	752	374
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3610	1571	1805	3490		1805	3526		1787	3610	1573
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3610	1571	1805	3490		1805	3526		1787	3610	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	242	193	90	72	296	46	162	503	75	122	817	407
RTOR Reduction (vph)	0	0	68	0	17	0	0	12	0	0	0	227
Lane Group Flow (vph)	242	193	22	72	325	0	162	566	0	122	817	180
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	1%	0%	0%	0%	1%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	5.1	16.6	16.6	3.8	15.3		7.2	24.1		7.9	24.8	24.8
Effective Green, g (s)	5.1	16.6	16.6	3.8	15.3		7.2	24.1		7.9	24.8	24.8
Actuated g/C Ratio	0.07	0.24	0.24	0.06	0.22		0.11	0.35		0.12	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	259	876	381	100	781		190	1242		206	1309	570
v/s Ratio Prot	c0.07	0.05		0.04	c0.09		c0.09	0.16		0.07	c0.23	
v/s Ratio Perm			0.01									0.11
v/c Ratio	0.93	0.22	0.06	0.72	0.42		0.85	0.46		0.59	0.62	0.32
Uniform Delay, d1	31.5	20.7	19.9	31.8	22.7		30.1	17.1		28.7	18.0	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.3	0.1	0.1	21.9	0.4		29.0	0.3		4.5	0.9	0.3
Delay (s)	69.8	20.9	20.0	53.6	23.1		59.1	17.4		33.2	18.9	16.0
Level of Service	E	C	B	D	C		E	B		C	B	B
Approach Delay (s)		43.2			28.4			26.5			19.3	
Approach LOS		D			C			C			B	

Intersection Summary

HCM Average Control Delay	26.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	68.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖↗	↖↗	↖	↖↗	↖↗	↖
Volume (vph)	69	117	50	68	101	186	65	370	38	200	943	26
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3402		1805	3201		3467	3574	1579	3502	3610	1578
Flt Permitted	0.56	1.00		0.64	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1058	3402		1212	3201		3467	3574	1579	3502	3610	1578
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	127	54	74	110	202	71	402	41	217	1025	28
RTOR Reduction (vph)	0	41	0	0	155	0	0	0	24	0	0	8
Lane Group Flow (vph)	75	140	0	74	157	0	71	402	17	217	1025	20
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	1%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	11.5	11.5		11.5	11.5		2.5	20.2	20.2	5.6	23.3	23.3
Effective Green, g (s)	11.5	11.5		11.5	11.5		2.5	20.2	20.2	5.6	23.3	23.3
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.05	0.41	0.41	0.11	0.47	0.47
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	794		283	747		176	1464	647	398	1706	746
v/s Ratio Prot		0.04			0.05		0.02	0.11		c0.06	c0.28	
v/s Ratio Perm	c0.07			0.06					0.01			0.01
v/c Ratio	0.30	0.18		0.26	0.21		0.40	0.27	0.03	0.55	0.60	0.03
Uniform Delay, d1	15.6	15.1		15.4	15.2		22.7	9.7	8.7	20.6	9.6	6.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1		0.5	0.1		1.5	0.1	0.0	1.5	0.6	0.0
Delay (s)	16.3	15.2		15.9	15.4		24.2	9.8	8.7	22.2	10.2	7.0
Level of Service	B	B		B	B		C	A	A	C	B	A
Approach Delay (s)		15.5			15.5			11.7			12.2	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	49.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

46: Maritime Street & Burma Road

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	293	0	47	64	5	264	17	17	6	54	109	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.85		1.00	0.96		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1070		1020	1244		902	2290		1570	2457	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	1070		1020	1244		902	2290		1570	2457	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	318	0	51	70	5	287	18	18	7	59	118	165
RTOR Reduction (vph)	0	35	0	0	225	0	0	6	0	0	133	0
Lane Group Flow (vph)	318	16	0	70	67	0	18	19	0	59	150	0
Heavy Vehicles (%)	8%	0%	51%	77%	100%	29%	100%	32%	100%	15%	58%	17%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	14.9	17.1		9.4	11.6		0.6	8.1		2.8	10.3	
Effective Green, g (s)	14.9	17.1		9.4	11.6		0.6	8.1		2.8	10.3	
Actuated g/C Ratio	0.28	0.32		0.18	0.22		0.01	0.15		0.05	0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	466	343		180	270		10	347		82	474	
v/s Ratio Prot	c0.19	0.02		0.07	c0.05		0.02	0.01		c0.04	c0.06	
v/s Ratio Perm												
v/c Ratio	0.68	0.05		0.39	0.25		1.80	0.05		0.72	0.32	
Uniform Delay, d1	17.1	12.5		19.5	17.3		26.4	19.4		24.9	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.1		1.4	0.5		602.1	0.1		25.9	0.4	
Delay (s)	21.2	12.6		20.9	17.8		628.5	19.4		50.8	18.9	
Level of Service	C	B		C	B		F	B		D	B	
Approach Delay (s)		20.0			18.4			274.4			24.4	
Approach LOS		C			B			F			C	

Intersection Summary

HCM Average Control Delay	30.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

47: 14th Street & Maritime Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕↔		↗	↕↔	
Volume (vph)	0	0	0	27	0	44	0	0	12	21	168	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0		4.0	4.0	
Lane Util. Factor					1.00			0.95		1.00	0.95	
Frt					0.92			0.85		1.00	1.00	
Flt Protected					0.98			1.00		0.95	1.00	
Satd. Flow (prot)					1565			2131		1656	2188	
Flt Permitted					1.00			1.00		0.95	1.00	
Satd. Flow (perm)					1594			2131		1656	2188	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	29	0	48	0	0	13	23	183	0
RTOR Reduction (vph)	0	0	0	0	45	0	0	10	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	32	0	0	3	0	23	183	0
Heavy Vehicles (%)	0%	0%	0%	16%	0%	5%	0%	74%	44%	9%	65%	0%
Turn Type	Perm			Perm	NA		Prot	NA		Prot	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6								
Actuated Green, G (s)					1.0			4.6		0.5	9.1	
Effective Green, g (s)					1.0			4.6		0.5	9.1	
Actuated g/C Ratio					0.06			0.25		0.03	0.50	
Clearance Time (s)					4.0			4.0		4.0	4.0	
Vehicle Extension (s)					3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)					88			542		46	1100	
v/s Ratio Prot								0.00		0.01	c0.08	
v/s Ratio Perm					c0.02							
v/c Ratio					0.36			0.01		0.50	0.17	
Uniform Delay, d1					8.2			5.0		8.7	2.4	
Progression Factor					1.00			1.00		1.00	1.00	
Incremental Delay, d2					2.5			0.0		8.3	0.1	
Delay (s)					10.7			5.0		17.0	2.5	
Level of Service					B			A		B	A	
Approach Delay (s)		0.0			10.7			5.0			4.1	
Approach LOS		A			B			A			A	

Intersection Summary

HCM Average Control Delay	5.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	18.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 48: 7th Street & Navy Roadway/Maritime Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Volume (vph)	8	61	394	70	49	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1900	878	1165	1994	1068	897
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1900	878	1165	1994	1068	897
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	66	428	76	53	216
RTOR Reduction (vph)	0	61	0	0	0	174
Lane Group Flow (vph)	9	5	428	76	53	42
Heavy Vehicles (%)	90%	84%	55%	81%	69%	80%
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	3.9	3.9	25.2	33.1	9.9	9.9
Effective Green, g (s)	3.9	3.9	25.2	33.1	9.9	9.9
Actuated g/C Ratio	0.08	0.08	0.49	0.65	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	145	67	576	1294	207	174
v/s Ratio Prot	0.00		c0.37	c0.04	c0.05	
v/s Ratio Perm		0.01				0.05
v/c Ratio	0.06	0.08	0.74	0.06	0.26	0.24
Uniform Delay, d1	21.9	21.9	10.3	3.3	17.4	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.5	5.2	0.0	0.7	0.7
Delay (s)	22.0	22.4	15.5	3.3	18.1	18.1
Level of Service	C	C	B	A	B	B
Approach Delay (s)	22.3			13.6	18.1	
Approach LOS	C			B	B	

Intersection Summary

HCM Average Control Delay	15.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	51.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	8	61	49	199	394	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	950	1962	2136	897	2259	892
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	950	1962	2136	897	2259	892
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	66	53	216	428	76
RTOR Reduction (vph)	0	0	0	0	0	53
Lane Group Flow (vph)	9	66	53	216	428	23
Heavy Vehicles (%)	90%	84%	69%	80%	55%	81%
Turn Type	Prot	NA	NA	Free	NA	Perm
Protected Phases	5	2	6		7	
Permitted Phases				Free		7
Actuated Green, G (s)	0.7	6.6	1.9	20.8	6.2	6.2
Effective Green, g (s)	0.7	6.6	1.9	20.8	6.2	6.2
Actuated g/C Ratio	0.03	0.32	0.09	1.00	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	32	623	195	897	673	266
v/s Ratio Prot	0.01	0.03	0.02		c0.19	
v/s Ratio Perm				c0.24		0.03
v/c Ratio	0.28	0.11	0.27	0.24	0.64	0.09
Uniform Delay, d1	9.8	5.0	8.8	0.0	6.3	5.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.8	0.1	0.8	0.6	2.0	0.1
Delay (s)	14.6	5.1	9.6	0.6	8.3	5.4
Level of Service	B	A	A	A	A	A
Approach Delay (s)		6.2	2.4		7.9	
Approach LOS		A	A		A	

Intersection Summary

HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	20.8	Sum of lost time (s)	4.0
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

49: W. Truck Services & Burma Road

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑			↑↓		↑	↑↓	
Volume (veh/h)	0	141	0	12	36	114	0	0	74	141	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	153	0	13	39	124	0	0	80	153	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					788							
pX, platoon unblocked												
vC, conflicting volume	163			153			280	342	77	284	280	101
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	163			153			280	342	77	284	280	101
tC, single (s)	4.1			4.3			7.5	6.5	7.0	8.1	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	100			99			100	100	92	71	100	100
cM capacity (veh/h)	1428			1382			650	578	962	530	625	941

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2
Volume Total	102	51	176	80	102	51
Volume Left	0	0	13	0	102	51
Volume Right	0	0	124	80	0	0
cSH	1700	1700	1382	962	530	530
Volume to Capacity	0.06	0.03	0.01	0.08	0.19	0.10
Queue Length 95th (ft)	0	0	1	7	18	8
Control Delay (s)	0.0	0.0	0.6	9.1	13.4	12.5
Lane LOS			A	A	B	B
Approach Delay (s)	0.0		0.6	9.1	13.1	
Approach LOS				A	B	

Intersection Summary

Average Delay		5.1				
Intersection Capacity Utilization		34.0%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/25/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	266	146	0	0	122	124	204	232	109	110	0	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1037	2735			2943		893	3022		1770		1921
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1037	2735			2943		893	3022		1770		1921
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	289	159	0	0	133	135	222	252	118	120	0	334
RTOR Reduction (vph)	0	0	0	0	115	0	0	48	0	0	0	284
Lane Group Flow (vph)	289	159	0	0	153	0	198	346	0	120	0	50
Heavy Vehicles (%)	74%	32%	0%	0%	26%	1%	84%	6%	0%	2%	0%	48%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	16.1	30.4			10.3		16.1	16.1		10.3		10.3
Effective Green, g (s)	16.1	30.4			10.3		16.1	16.1		10.3		10.3
Actuated g/C Ratio	0.23	0.44			0.15		0.23	0.23		0.15		0.15
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	243	1208			441		209	707		265		288
v/s Ratio Prot	c0.28	0.06			c0.05		c0.22	0.11		c0.07		0.03
v/s Ratio Perm												
v/c Ratio	1.19	0.13			0.35		0.95	0.49		0.45		0.17
Uniform Delay, d1	26.3	11.4			26.2		25.9	22.8		26.7		25.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	118.6	0.0			0.5		47.0	0.5		1.2		0.3
Delay (s)	145.0	11.4			26.7		72.9	23.3		27.9		25.8
Level of Service	F	B			C		E	C		C		C
Approach Delay (s)		97.6			26.7		39.9			26.4		
Approach LOS		F			C		D			C		

Intersection Summary

HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/25/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	226	675	0	0	0	0	0	912	1434	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		0.99						1.00	1.00			
Frt		1.00						0.93	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4808						4533	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4808						4533	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	734	0	0	0	0	0	991	1559	0	0	0
RTOR Reduction (vph)	0	52	0	0	0	0	0	29	23	0	0	0
Lane Group Flow (vph)	0	928	0	0	0	0	0	1742	756	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	6%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		20.3						29.7	36.2			
Effective Green, g (s)		20.3						29.7	36.2			
Actuated g/C Ratio		0.34						0.49	0.60			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		1627						2244	830			
v/s Ratio Prot								0.38				
v/s Ratio Perm		0.19							c0.55			
v/c Ratio		0.57						1.00dr	0.91			
Uniform Delay, d1		16.3						12.4	10.5			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		1.5						1.7	14.1			
Delay (s)		17.7						14.2	24.6			
Level of Service		B						B	C			
Approach Delay (s)		17.7			0.0			17.4			0.0	
Approach LOS		B			A			B			A	

Intersection Summary

HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 29: Castro Street & 12th Street & I-980 NB On-Ramp

4/25/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	293	895	30	1470	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.91	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3042	1455	1537	1524	4571
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3042	1455	1537	1524	4571
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	318	973	33	1598	0
RTOR Reduction (vph)	0	0	14	0	0
Lane Group Flow (vph)	805	486	16	802	799
Heavy Vehicles (%)	7%	1%	1%	1%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	30.5	30.5	45.0	45.0	45.0
Effective Green, g (s)	30.5	30.5	45.0	45.0	45.0
Actuated g/C Ratio	0.36	0.36	0.53	0.53	0.53
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1092	522	814	807	2420
v/s Ratio Prot	0.26		0.01	c0.53	0.17
v/s Ratio Perm		c0.33			
v/c Ratio	0.89dr	0.93	0.02	0.99	0.88dl
Uniform Delay, d1	23.8	26.2	9.5	19.9	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.5	25.5	0.0	30.0	0.1
Delay (s)	28.2	51.8	9.5	49.8	11.5
Level of Service	C	D	A	D	B
Approach Delay (s)	37.1				30.3
Approach LOS	D				C

Intersection Summary

HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

- dl Defacto Left Lane. Recode with 1 though lane as a left lane.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/25/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘			↖↗		↗	↗↘	↗	↗	↗↘	↗
Volume (vph)	133	676	248	80	595	110	174	956	91	216	812	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			0.99		1.00	1.00	0.95	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	3397			3235		1770	3471	1508	1805	3539	1534
Flt Permitted	0.22	1.00			0.63		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	394	3397			2056		1770	3471	1508	1805	3539	1534
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	735	270	87	647	120	189	1039	99	235	883	118
RTOR Reduction (vph)	0	39	0	0	14	0	0	0	19	0	0	27
Lane Group Flow (vph)	145	966	0	0	840	0	189	1039	80	235	883	91
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	5%	1%	1%	0%	1%	1%	2%	4%	2%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	42.2	42.2			42.2		12.5	30.1	30.1	13.0	30.6	30.6
Effective Green, g (s)	42.2	42.2			42.2		12.5	30.1	30.1	13.0	30.6	30.6
Actuated g/C Ratio	0.43	0.43			0.43		0.13	0.31	0.31	0.13	0.31	0.31
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	171	1473			892		227	1074	467	241	1113	482
v/s Ratio Prot		0.28					0.11	c0.30		c0.13	0.25	
v/s Ratio Perm	0.37				c0.41				0.05			0.06
v/c Ratio	0.85	0.66			0.94		0.83	0.97	0.17	0.98	0.79	0.19
Uniform Delay, d1	24.7	21.8			26.4		41.4	33.1	24.5	42.0	30.5	24.3
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.3	1.1			17.7		22.2	19.8	0.2	50.5	4.0	0.2
Delay (s)	55.0	22.9			44.1		63.6	52.9	24.7	92.5	34.4	24.5
Level of Service	D	C			D		E	D	C	F	C	C
Approach Delay (s)		26.9			44.1			52.3			44.5	
Approach LOS		C			D			D			D	

Intersection Summary

HCM Average Control Delay	42.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	97.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	195	262	269	646	54	51	21	84	20	23	12
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (prot)	1752	3539	1011	1583	3552		1618	1723	879	1504	1048	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1752	3539	1011	1583	3552		1618	1723	879	1504	1048	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	212	285	292	702	59	55	23	91	22	25	13
RTOR Reduction (vph)	0	0	214	0	4	0	0	0	80	0	12	0
Lane Group Flow (vph)	26	212	71	292	757	0	38	40	11	22	26	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	3%	2%	56%	14%	0%	3%	6%	0%	80%	20%	100%	8%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	2.5	17.6	17.6	23.5	38.6		8.4	8.4	8.4	4.5	4.5	
Effective Green, g (s)	2.5	17.6	17.6	23.5	38.6		8.4	8.4	8.4	4.5	4.5	
Actuated g/C Ratio	0.04	0.25	0.25	0.33	0.55		0.12	0.12	0.12	0.06	0.06	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	62	883	252	528	1945		193	205	105	96	67	
v/s Ratio Prot	0.01	0.06		c0.18	c0.21		c0.02	0.02		0.01	c0.02	
v/s Ratio Perm			0.07						0.01			
v/c Ratio	0.42	0.24	0.28	0.55	0.39		0.20	0.20	0.10	0.23	0.39	
Uniform Delay, d1	33.3	21.1	21.4	19.2	9.2		28.0	28.0	27.7	31.4	31.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.5	0.2	1.1	1.3	0.2		0.7	0.6	0.6	1.2	3.7	
Delay (s)	37.8	21.4	22.4	20.5	9.4		28.7	28.6	28.3	32.6	35.3	
Level of Service	D	C	C	C	A		C	C	C	C	D	
Approach Delay (s)		22.8			12.5			28.5			34.3	
Approach LOS		C			B			C			C	

Intersection Summary

HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	11.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	44	170	100	238	546	226	236	219	226	148	222	76
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.92		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3267		1597	3505	1553	1752	2781		1752	3082	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3267		1597	3505	1553	1752	2781		1752	3082	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	185	109	259	593	246	257	238	246	161	241	83
RTOR Reduction (vph)	0	75	0	0	0	150	0	209	0	0	52	0
Lane Group Flow (vph)	48	219	0	259	593	96	257	275	0	161	272	0
Confl. Peds. (#/hr)			5									
Heavy Vehicles (%)	0%	3%	5%	13%	3%	4%	3%	26%	14%	3%	17%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	3.2	18.5		7.6	22.9	22.9	7.1	8.8		7.1	8.8	
Effective Green, g (s)	3.2	18.5		7.6	22.9	22.9	7.1	8.8		7.1	8.8	
Actuated g/C Ratio	0.05	0.32		0.13	0.39	0.39	0.12	0.15		0.12	0.15	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	99	1033		207	1372	608	213	418		213	464	
v/s Ratio Prot	0.03	0.07		c0.16	c0.17		c0.15	0.10		c0.09	0.09	
v/s Ratio Perm						0.06						
v/c Ratio	0.48	0.21		1.25	0.43	0.16	1.21	0.66		0.76	0.59	
Uniform Delay, d1	26.8	14.7		25.4	13.0	11.5	25.7	23.4		24.9	23.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.2		146.5	0.4	0.2	128.6	3.9		14.6	2.0	
Delay (s)	31.2	14.8		171.9	13.4	11.8	154.3	27.3		39.4	25.2	
Level of Service	C	B		F	B	B	F	C		D	C	
Approach Delay (s)		17.1			50.4			71.4			29.9	
Approach LOS		B			D			E			C	

Intersection Summary		
HCM Average Control Delay	48.2	HCM Level of Service D
HCM Volume to Capacity ratio	0.69	
Actuated Cycle Length (s)	58.5	Sum of lost time (s) 11.5
Intersection Capacity Utilization	59.2%	ICU Level of Service B
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↖	↑↑						↗	
Volume (vph)	0	499	71	172	707	0	0	0	0	31	179	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.98		1.00	1.00						0.93	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		4899		1797	3471						3172	
Flt Permitted		1.00		0.41	1.00						1.00	
Satd. Flow (perm)		4899		769	3471						3172	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	542	77	187	768	0	0	0	0	34	195	227
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	101	0
Lane Group Flow (vph)	0	602	0	187	768	0	0	0	0	0	355	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	8%	4%	1%	0%	4%	1%	1%	0%	0%	1%	1%	7%
Turn Type		NA		Perm	NA						Perm	NA
Protected Phases		4			8							6
Permitted Phases				8						6		
Actuated Green, G (s)		26.9		26.9	26.9						12.2	
Effective Green, g (s)		26.9		26.9	26.9						12.2	
Actuated g/C Ratio		0.55		0.55	0.55						0.25	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		2684		421	1902						788	
v/s Ratio Prot		0.12			0.22							
v/s Ratio Perm				c0.24							0.11	
v/c Ratio		0.22		0.44	0.40						0.45	
Uniform Delay, d1		5.7		6.6	6.4						15.6	
Progression Factor		1.00		0.37	0.32						1.00	
Incremental Delay, d2		0.0		0.3	0.1						0.1	
Delay (s)		5.7		2.7	2.1						15.8	
Level of Service		A		A	A						B	
Approach Delay (s)		5.7			2.2			0.0			15.8	
Approach LOS		A			A			A			B	

Intersection Summary

HCM Average Control Delay	6.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	139	391	0	0	814	55	65	91	83	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.95				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5016			5030			3290				
Flt Permitted		0.68			1.00			0.99				
Satd. Flow (perm)		3470			5030			3290				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	425	0	0	885	60	71	99	90	0	0	0
RTOR Reduction (vph)	0	0	0	0	7	0	0	68	0	0	0	0
Lane Group Flow (vph)	0	576	0	0	938	0	0	192	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		26.9			26.9			12.2				
Effective Green, g (s)		26.9			26.9			12.2				
Actuated g/C Ratio		0.55			0.55			0.25				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1901			2756			817				
v/s Ratio Prot					0.19							
v/s Ratio Perm		0.17						0.06				
v/c Ratio		0.30			0.34			0.24				
Uniform Delay, d1		6.0			6.2			14.7				
Progression Factor		0.35			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.1				
Delay (s)		2.1			6.2			14.8				
Level of Service		A			A			B				
Approach Delay (s)		2.1			6.2			14.8			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕			↕↕↕			↕↕			↕↕	
Volume (vph)	52	267	42	35	537	34	195	630	34	42	147	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		4898			4985			3539			3498	
Flt Permitted		0.81			0.90			0.81			0.62	
Satd. Flow (perm)		4004			4500			2890			2182	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	290	46	38	584	37	212	685	37	46	160	29
RTOR Reduction (vph)	0	19	0	0	8	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	374		0	0	651	0	0	931	0	0	221
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		47.5			47.5			24.0			24.0	
Effective Green, g (s)		47.5			47.5			24.0			24.0	
Actuated g/C Ratio		0.59			0.59			0.30			0.30	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2377			2672			867			655	
v/s Ratio Prot												
v/s Ratio Perm		0.09			c0.14			c0.32			0.10	
v/c Ratio		0.16			0.24			1.07			0.34	
Uniform Delay, d1		7.3			7.7			28.0			21.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.2			52.2			1.4	
Delay (s)		7.4			7.9			80.2			23.2	
Level of Service		A			A			F			C	
Approach Delay (s)		7.4			7.9			80.2			23.2	
Approach LOS		A			A			F			C	

Intersection Summary

HCM Average Control Delay	39.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗		↕↕	↗	↖	↕	↗		↖	↗
Volume (vph)	26	451	48	91	800	39	87	199	82	19	389	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)		3468	1488		3367	1547	1728	1845	1574		1825	1543
Flt Permitted		0.87	1.00		0.82	1.00	0.18	1.00	1.00		0.98	1.00
Satd. Flow (perm)		3031	1488		2783	1547	330	1845	1574		1795	1543
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	490	52	99	870	42	95	216	89	21	423	70
RTOR Reduction (vph)	0	0	21	0	0	12	0	0	62	0	0	36
Lane Group Flow (vph)	0	518	31	0	969	30	95	216	27	0	444	34
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	4%	29%	4%	0%	4%	3%	0%	0%	4%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		54.2	54.2		54.2	54.2	26.8	26.8	26.8		26.8	26.8
Effective Green, g (s)		54.2	54.2		54.2	54.2	26.8	26.8	26.8		26.8	26.8
Actuated g/C Ratio		0.60	0.60		0.60	0.60	0.30	0.30	0.30		0.30	0.30
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1825	896		1676	932	98	549	469		535	459
v/s Ratio Prot								0.12				
v/s Ratio Perm		0.17	0.02		0.35	0.02	0.29		0.02		0.25	0.02
v/c Ratio		0.28	0.03		0.58	0.03	0.97	0.39	0.06		0.83	0.07
Uniform Delay, d1		8.6	7.3		10.9	7.3	31.2	25.1	22.6		29.5	22.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		0.4	0.1		1.5	0.1	79.6	0.2	0.0		9.8	0.0
Delay (s)		9.0	7.3		12.4	7.3	110.8	25.3	22.6		39.3	22.7
Level of Service		A	A		B	A	F	C	C		D	C
Approach Delay (s)		8.8			12.2			45.0			37.0	
Approach LOS		A			B			D			D	

Intersection Summary

HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	14	488	43	13	693	59	49	383	28	247	474	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	0.99	1.00	1.00	1.00	1.00		0.99	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3470	1510	1793	3406	1555	1744	3502		1741	3466	
Flt Permitted		0.93	1.00	0.41	1.00	1.00	0.36	1.00		0.46	1.00	
Satd. Flow (perm)		3233	1510	766	3406	1555	654	3502		841	3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	530	47	14	753	64	53	416	30	268	515	80
RTOR Reduction (vph)	0	0	23	0	0	27	0	8	0	0	18	0
Lane Group Flow (vph)	0	545	24	14	753	37	53	438	0	268	577	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	4%	4%	0%	6%	1%	3%	2%	0%	3%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		42.6	42.6	42.6	42.6	42.6	32.9	32.9		32.9	32.9	
Effective Green, g (s)		42.6	42.6	42.6	42.6	42.6	32.9	32.9		32.9	32.9	
Actuated g/C Ratio		0.50	0.50	0.50	0.50	0.50	0.39	0.39		0.39	0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1620	757	384	1707	779	253	1355		326	1342	
v/s Ratio Prot					c0.22			0.13				0.17
v/s Ratio Perm		0.17	0.02	0.02		0.02	0.08			c0.32		
v/c Ratio		0.34	0.03	0.04	0.44	0.05	0.21	0.32		0.82	0.43	
Uniform Delay, d1		12.7	10.7	10.8	13.6	10.8	17.4	18.3		23.4	19.2	
Progression Factor		1.00	1.00	1.05	0.75	1.33	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6	0.1	0.2	0.8	0.1	0.9	0.3		15.9	0.3	
Delay (s)		13.3	10.8	11.5	10.9	14.5	18.2	18.5		39.3	19.5	
Level of Service		B	B	B	B	B	B	B		D	B	
Approach Delay (s)		13.1			11.2			18.5			25.6	
Approach LOS		B			B			B			C	

Intersection Summary		
HCM Average Control Delay	17.4	HCM Level of Service B
HCM Volume to Capacity ratio	0.61	
Actuated Cycle Length (s)	85.0	Sum of lost time (s) 9.5
Intersection Capacity Utilization	71.2%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	↗
Volume (vph)	52	731	35	13	540	35	38	85	98	27	135	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		1.00	
Satd. Flow (prot)	1797	3471	1579	1799	3471	1579		3549	1362		3287	
Flt Permitted	0.43	1.00	1.00	0.34	1.00	1.00		0.69	1.00		0.92	
Satd. Flow (perm)	814	3471	1579	647	3471	1579		2484	1362		3034	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	795	38	14	587	38	41	92	107	29	147	175
RTOR Reduction (vph)	0	0	9	0	0	9	0	0	92	0	150	0
Lane Group Flow (vph)	57	795	29	14	587	29	0	133	15	0	201	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	0%	4%	0%	0%	0%	16%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	64.3	64.3	64.3	64.3	64.3	64.3		12.2	12.2		12.2	
Effective Green, g (s)	64.3	64.3	64.3	64.3	64.3	64.3		12.2	12.2		12.2	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76		0.14	0.14		0.14	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	616	2626	1194	489	2626	1194		357	195		435	
v/s Ratio Prot		c0.23			0.17							
v/s Ratio Perm	0.07		0.02	0.02		0.02		0.05	0.01		c0.07	
v/c Ratio	0.09	0.30	0.02	0.03	0.22	0.02		0.37	0.08		0.46	
Uniform Delay, d1	2.7	3.3	2.6	2.6	3.0	2.6		32.9	31.5		33.4	
Progression Factor	0.88	1.11	0.74	2.00	2.57	3.38		1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3	0.0	0.1	0.2	0.0		0.2	0.1		0.3	
Delay (s)	2.7	3.9	1.9	5.3	8.0	8.7		33.2	31.6		33.7	
Level of Service	A	A	A	A	A	A		C	C		C	
Approach Delay (s)		3.7			8.0			32.5			33.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	217	542	690	66	645	234
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1752	3406	3471	1536	3391	1361
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1752	3406	3471	1536	3391	1361
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	236	589	750	72	701	254
RTOR Reduction (vph)	0	0	0	33	4	167
Lane Group Flow (vph)	236	589	750	39	722	62
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	3%	6%	4%	2%	3%	5%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	15.4	54.0	34.6	34.6	23.0	23.0
Effective Green, g (s)	15.4	54.0	34.6	34.6	23.0	23.0
Actuated g/C Ratio	0.18	0.64	0.41	0.41	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	317	2164	1413	625	918	368
v/s Ratio Prot	c0.13	0.17	c0.22		c0.21	
v/s Ratio Perm				0.03		0.05
v/c Ratio	0.74	0.27	0.53	0.06	0.79	0.17
Uniform Delay, d1	32.9	6.8	19.1	15.3	28.7	23.7
Progression Factor	0.93	1.57	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.8	0.3	1.4	0.2	4.2	0.1
Delay (s)	38.6	11.0	20.5	15.5	32.9	23.8
Level of Service	D	B	C	B	C	C
Approach Delay (s)		18.9	20.1		30.7	
Approach LOS		B	C		C	

Intersection Summary

HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	60	241	134	484	705	124	63	717	244	8	1131	78
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)	3502	3539	1459	3502	3610	1532		5113	1532		5134	1532
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.93	1.00
Satd. Flow (perm)	3502	3539	1459	3502	3610	1532		3564	1532		4784	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	262	146	526	766	135	68	779	265	9	1229	85
RTOR Reduction (vph)	0	0	5	0	0	59	0	0	173	0	0	31
Lane Group Flow (vph)	65	262	141	526	766	76	0	847	92	0	1238	54
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	2%	5%	0%	0%	0%	1%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		2	6		6
Actuated Green, G (s)	6.0	31.7	31.7	11.9	37.6	37.6		31.4	31.4		31.4	31.4
Effective Green, g (s)	6.0	31.7	31.7	11.9	37.6	37.6		31.4	31.4		31.4	31.4
Actuated g/C Ratio	0.07	0.35	0.35	0.13	0.42	0.42		0.35	0.35		0.35	0.35
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	233	1247	514	463	1508	640		1243	534		1669	534
v/s Ratio Prot	0.02	0.07		c0.15	c0.21							
v/s Ratio Perm			c0.10			0.05		0.24	0.06		c0.26	0.04
v/c Ratio	0.28	0.21	0.28	1.14	0.51	0.12		0.68	0.17		0.74	0.10
Uniform Delay, d1	39.9	20.4	20.9	39.0	19.4	16.0		25.0	20.3		25.7	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.4	1.3	84.7	1.2	0.4		1.6	0.2		1.8	0.1
Delay (s)	40.6	20.8	22.2	123.7	20.6	16.4		26.6	20.5		27.6	19.9
Level of Service	D	C	C	F	C	B		C	C		C	B
Approach Delay (s)		23.9			58.2			25.1			27.1	
Approach LOS		C			E			C			C	

Intersection Summary

HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑		↘	↑↑	
Volume (vph)	84	118	30	69	131	147	19	104	72	79	85	10
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1890	795	981	2087	1086	902	1729		976	1813	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	1890	795	981	2087	1086	902	1729		976	1813	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	91	128	33	75	142	160	21	113	78	86	92	11
RTOR Reduction (vph)	0	0	26	0	0	121	0	60	0	0	5	0
Lane Group Flow (vph)	91	128	7	75	142	39	21	131	0	86	98	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	0%	91%	100%	84%	73%	46%	100%	96%	93%	85%	95%	100%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						
Actuated Green, G (s)	7.6	14.2	14.2	9.3	15.9	15.9	2.9	15.3		10.0	22.4	
Effective Green, g (s)	7.6	14.2	14.2	9.3	15.9	15.9	2.9	15.3		10.0	22.4	
Actuated g/C Ratio	0.12	0.22	0.22	0.14	0.24	0.24	0.04	0.23		0.15	0.34	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	208	408	172	139	504	262	40	402		148	617	
v/s Ratio Prot	0.05	0.07		c0.08	c0.07		0.02	c0.08		c0.09	0.05	
v/s Ratio Perm			0.01			0.04						
v/c Ratio	0.44	0.31	0.04	0.54	0.28	0.15	0.53	0.33		0.58	0.16	
Uniform Delay, d1	27.1	21.7	20.4	26.3	20.3	19.6	30.8	21.0		26.0	15.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.4	0.1	4.0	0.3	0.3	11.9	0.5		5.7	0.1	
Delay (s)	28.6	22.1	20.5	30.2	20.6	19.9	42.7	21.4		31.7	15.3	
Level of Service	C	C	C	C	C	B	D	C		C	B	
Approach Delay (s)		24.3			22.2			23.5			22.7	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/23/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	82	80	189	625	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1769		3273	2175		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1769		3273	2175		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	87	205	679	0	0
RTOR Reduction (vph)	49	0	0	0	0	0
Lane Group Flow (vph)	127	0	205	679	0	0
Heavy Vehicles (%)	83%	95%	7%	66%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	9.3		3.9	21.2		
Effective Green, g (s)	9.3		3.9	21.2		
Actuated g/C Ratio	0.44		0.18	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	776		602	2175		
v/s Ratio Prot	0.07		0.06	0.31		
v/s Ratio Perm						
v/c Ratio	0.16		0.34	0.31		
Uniform Delay, d1	3.6		7.5	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.1		0.3	0.1		
Delay (s)	3.7		7.9	0.1		
Level of Service	A		A	A		
Approach Delay (s)	3.7			1.9	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	2.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	21.2	Sum of lost time (s)	0.0
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	30	0	0	161	200	284	294	115	117	0	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (prot)	955	2087			2817		1014	3015		1770		1921
Flt Permitted	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (perm)	955	2087			2817		1014	3015		1770		1921
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	33	0	0	175	217	309	320	125	127	0	236
RTOR Reduction (vph)	0	0	0	0	171	0	0	35	0	0	0	200
Lane Group Flow (vph)	37	33	0	0	221	0	250	469	0	127	0	36
Heavy Vehicles (%)	89%	73%	0%	0%	38%	1%	62%	4%	0%	2%	0%	48%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	2.6	18.3			11.7		16.7	16.7		8.4		8.4
Effective Green, g (s)	2.6	18.3			11.7		16.7	16.7		8.4		8.4
Actuated g/C Ratio	0.05	0.33			0.21		0.30	0.30		0.15		0.15
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	45	689			595		306	909		268		291
v/s Ratio Prot	c0.04	0.02			c0.08		c0.25	0.16		c0.07		0.02
v/s Ratio Perm												
v/c Ratio	0.82	0.05			0.37		0.82	0.52		0.47		0.12
Uniform Delay, d1	26.2	12.6			18.7		17.9	16.0		21.5		20.3
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	70.2	0.0			0.4		15.4	0.5		1.3		0.2
Delay (s)	96.3	12.7			19.1		33.3	16.5		22.8		20.5
Level of Service	F	B			B		C	B		C		C
Approach Delay (s)		56.9			19.1			22.1			21.3	
Approach LOS		E			B			C			C	

Intersection Summary

HCM Average Control Delay	22.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	19	358	14	4	378	27	46	10	5	28	14	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			0.99	1.00		0.99	
Frt		0.99			0.99			1.00	0.85		0.96	
Flt Protected		1.00			1.00			0.96	1.00		0.98	
Satd. Flow (prot)		3146			3237			1808	1575		1722	
Flt Permitted		0.92			0.95			0.77	1.00		0.87	
Satd. Flow (perm)		2914			3085			1449	1575		1535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	389	15	4	411	29	50	11	5	30	15	18
RTOR Reduction (vph)	0	2	0	0	5	0	0	0	4	0	14	0
Lane Group Flow (vph)	0	423	0	0	439	0	0	61	1	0	49	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	15%	0%	0%	11%	0%	0%	0%	0%	0%	0%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		69.0			69.0			23.0	23.0		23.0	
Effective Green, g (s)		69.0			69.0			23.0	23.0		23.0	
Actuated g/C Ratio		0.69			0.69			0.23	0.23		0.23	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		2011			2129			333	362		353	
v/s Ratio Prot												
v/s Ratio Perm		c0.14			0.14			c0.04	0.00		0.03	
v/c Ratio		0.21			0.21			0.18	0.00		0.14	
Uniform Delay, d1		5.6			5.6			30.9	29.7		30.6	
Progression Factor		1.00			0.89			1.00	1.00		1.00	
Incremental Delay, d2		0.2			0.2			1.2	0.0		0.8	
Delay (s)		5.9			5.2			32.2	29.7		31.4	
Level of Service		A			A			C	C		C	
Approach Delay (s)		5.9			5.2			32.0			31.4	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	477	21	172	324	49	12	47	59	76	89	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1766		1805	3317			1729		1734	1817	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.46	1.00	
Satd. Flow (perm)	1805	1766		1805	3317			1672		841	1817	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	518	23	187	352	53	13	51	64	83	97	32
RTOR Reduction (vph)	0	1	0	0	8	0	0	42	0	0	14	0
Lane Group Flow (vph)	46	540	0	187	397	0	0	86	0	83	115	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	7%	0%	0%	7%	2%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	3.6	61.9		14.8	73.1			12.3		12.3	12.3	
Effective Green, g (s)	3.6	61.9		14.8	73.1			12.3		12.3	12.3	
Actuated g/C Ratio	0.04	0.62		0.15	0.73			0.12		0.12	0.12	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	65	1093		267	2425			206		103	223	
v/s Ratio Prot	c0.03	c0.31		c0.10	0.12							0.06
v/s Ratio Perm								0.05		c0.10		
v/c Ratio	0.71	0.49		0.70	0.16			0.42		0.81	0.52	
Uniform Delay, d1	47.7	10.5		40.5	4.1			40.5		42.7	41.1	
Progression Factor	0.92	0.92		0.64	3.24			1.00		1.00	1.00	
Incremental Delay, d2	24.7	1.6		6.1	0.1			0.5		33.5	0.8	
Delay (s)	68.5	11.2		32.0	13.5			41.0		76.2	41.9	
Level of Service	E	B		C	B			D		E	D	
Approach Delay (s)		15.7			19.3			41.0			55.3	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	527	44	226	597	21	14	41	112	11	50	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	0.99			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1798	3376		1783	3389			1874	1510		1823	
Flt Permitted	0.32	1.00		0.34	1.00			0.95	1.00		0.97	
Satd. Flow (perm)	600	3376		646	3389			1796	1510		1786	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	573	48	246	649	23	15	45	122	12	54	18
RTOR Reduction (vph)	0	6	0	0	3	0	0	0	66	0	10	0
Lane Group Flow (vph)	22	615	0	246	669	0	0	60	56	0	74	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	1%	6%	2%	0%	0%	5%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2		2	2		2
Actuated Green, G (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	276	1553		297	1559			826	695		822	
v/s Ratio Prot		0.18			0.20							
v/s Ratio Perm	0.04			c0.38				0.03	0.04		c0.04	
v/c Ratio	0.08	0.40		0.83	0.43			0.07	0.08		0.09	
Uniform Delay, d1	15.1	17.8		23.6	18.2			15.1	15.1		15.2	
Progression Factor	0.70	0.77		0.84	0.87			1.00	1.00		1.00	
Incremental Delay, d2	0.5	0.7		22.5	0.9			0.2	0.2		0.2	
Delay (s)	11.2	14.4		42.2	16.6			15.3	15.4		15.4	
Level of Service	B	B		D	B			B	B		B	
Approach Delay (s)		14.3			23.5			15.3			15.4	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	19.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	103	762	61	47	493	110	31	180	74	23	24	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1801	3338		1048	3438	1542	1386	2154			3076	
Flt Permitted	0.43	1.00		0.27	1.00	1.00	0.70	1.00			0.84	
Satd. Flow (perm)	822	3338		303	3438	1542	1024	2154			2619	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	828	66	51	536	120	34	196	80	25	26	30
RTOR Reduction (vph)	0	6	0	0	0	43	0	45	0	0	22	0
Lane Group Flow (vph)	112	888	0	51	536	77	34	231	0	0	59	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	17%	72%	5%	3%	29%	50%	82%	0%	25%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Effective Green, g (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.28	0.28			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	526	2136		194	2200	987	287	603			733	
v/s Ratio Prot		c0.27			0.16			c0.11				
v/s Ratio Perm	0.14			0.17		0.05	0.03				0.02	
v/c Ratio	0.21	0.42		0.26	0.24	0.08	0.12	0.38			0.08	
Uniform Delay, d1	7.5	8.8		7.8	7.7	6.8	26.8	29.0			26.5	
Progression Factor	0.39	0.35		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	0.9	0.6		3.3	0.3	0.2	0.8	1.8			0.2	
Delay (s)	3.8	3.7		11.1	7.9	7.0	27.7	30.9			26.7	
Level of Service	A	A		B	A	A	C	C			C	
Approach Delay (s)		3.7			8.0			30.5			26.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑	↗	↗	↑↑	↗
Volume (vph)	201	723	34	50	419	27	57	72	96	116	206	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1712	4220		1801	4693		1726	1845	1584	1758	3505	1277
Flt Permitted	0.46	1.00		0.27	1.00		0.61	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	829	4220		508	4693		1112	1845	1584	1307	3505	1277
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	218	786	37	54	455	29	62	78	104	126	224	33
RTOR Reduction (vph)	0	8	0	0	12	0	0	0	49	0	0	16
Lane Group Flow (vph)	218	815	0	54	472	0	62	78	55	126	224	17
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	5%	23%	0%	0%	10%	0%	4%	3%	0%	2%	3%	24%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	26.0	26.0		26.0	26.0		39.5	39.5	39.5	39.5	39.5	39.5
Effective Green, g (s)	26.0	26.0		26.0	26.0		39.5	39.5	39.5	39.5	39.5	39.5
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.53	0.53	0.53	0.53	0.53	0.53
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	287	1463		176	1627		586	972	834	688	1846	673
v/s Ratio Prot		0.19			0.10			0.04				0.06
v/s Ratio Perm	c0.26			0.11			0.06		0.03	c0.10		0.01
v/c Ratio	0.76	0.56		0.31	0.29		0.11	0.08	0.07	0.18	0.12	0.03
Uniform Delay, d1	21.7	19.8		17.9	17.8		8.9	8.8	8.7	9.3	9.0	8.5
Progression Factor	1.00	1.00		1.00	1.00		1.15	1.14	1.53	1.00	1.00	1.00
Incremental Delay, d2	9.8	0.3		0.4	0.0		0.3	0.1	0.1	0.6	0.1	0.1
Delay (s)	31.5	20.1		18.3	17.8		10.5	10.2	13.4	9.9	9.1	8.6
Level of Service	C	C		B	B		B	B	B	A	A	A
Approach Delay (s)		22.5			17.9			11.6			9.3	
Approach LOS		C			B			B			A	

Intersection Summary

HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	120	370	0	0	0	0	0	1111	1351	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.94	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4497						4578	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4497						4578	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	402	0	0	0	0	0	1208	1468	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	183	179	0	0	0
Lane Group Flow (vph)	0	524	0	0	0	0	0	1759	555	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	3%	17%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		27.0						23.0	28.7			
Effective Green, g (s)		27.0						23.0	28.7			
Actuated g/C Ratio		0.45						0.38	0.48			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2024						1755	658			
v/s Ratio Prot								c0.38				
v/s Ratio Perm		0.12							c0.40			
v/c Ratio		0.26						1.00	0.84			
Uniform Delay, d1		10.3						18.5	13.7			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.3						22.1	9.7			
Delay (s)		10.6						40.6	23.3			
Level of Service		B						D	C			
Approach Delay (s)		10.6			0.0			35.9			0.0	
Approach LOS		B			A			D			A	
Intersection Summary												
HCM Average Control Delay			31.7									HCM Level of Service C
HCM Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			60.0									Sum of lost time (s) 5.0
Intersection Capacity Utilization			73.7%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	26	630	946	0	0	0	0	311	60	24	142	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.94	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			0.99	
Satd. Flow (prot)		4332	1341					1825			1763	
Flt Permitted		1.00	1.00					1.00			0.93	
Satd. Flow (perm)		4332	1341					1825			1649	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	685	1028	0	0	0	0	338	65	26	154	0
RTOR Reduction (vph)	0	322	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	905	514	0	0	0	0	395	0	0	180	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	5%	7%	2%	0%	0%	0%	0%	1%	3%	0%	8%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4				4
Permitted Phases	2		Free							4		
Actuated Green, G (s)		20.0	60.0					31.0			31.0	
Effective Green, g (s)		20.0	60.0					31.0			31.0	
Actuated g/C Ratio		0.33	1.00					0.52			0.52	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		1444	1341					943			852	
v/s Ratio Prot								0.22				
v/s Ratio Perm		0.21	0.38								0.11	
v/c Ratio		0.63	0.38					0.42			0.21	
Uniform Delay, d1		16.9	0.0					8.9			7.9	
Progression Factor		0.94	1.00					0.76			1.00	
Incremental Delay, d2		0.4	0.5					1.3			0.6	
Delay (s)		16.3	0.5					8.1			8.4	
Level of Service		B	A					A			A	
Approach Delay (s)		11.6			0.0			8.1			8.4	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	37	481	50	213	301	0	0	235	1102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.99	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1827	1517	1767	1863			1582	1477
Flt Permitted				0.95	1.00	1.00	0.22	1.00			1.00	1.00
Satd. Flow (perm)				1730	1827	1517	403	1863			1582	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	40	523	54	232	327	0	0	255	1198
RTOR Reduction (vph)	0	0	0	0	0	41	0	0	0	0	20	0
Lane Group Flow (vph)	0	0	0	40	523	13	232	327	0	0	726	707
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	4%	0%	2%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	442	367	232	1071			910	1477
v/s Ratio Prot					c0.29			0.18			0.46	
v/s Ratio Perm				0.02		0.01	c0.58					0.48
v/c Ratio				0.10	1.18	0.04	1.00	0.31			0.80	0.48
Uniform Delay, d1				17.7	22.8	17.4	12.8	6.6			10.0	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.71	1.00
Incremental Delay, d2				0.5	103.4	0.2	59.1	0.7			7.0	1.1
Delay (s)				18.1	126.2	17.6	71.8	7.3			14.1	1.1
Level of Service				B	F	B	E	A			B	A
Approach Delay (s)		0.0			109.7			34.1			7.7	
Approach LOS		A			F			C			A	

Intersection Summary

HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘		↗	↕		↗	↕			↕	
Volume (vph)	3	103	29	532	157	25	38	163	798	21	245	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.88			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1829		1583	3526		1805	2941			3501	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.62	
Satd. Flow (perm)	1805	1829		1583	3526		1805	2941			2174	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	112	32	578	171	27	41	177	867	23	266	36
RTOR Reduction (vph)	0	10	0	0	10	0	0	596	0	0	10	0
Lane Group Flow (vph)	3	134	0	578	188	0	41	448	0	0	315	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	14%	0%	0%	0%	4%	6%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	1.1	17.2		29.5	45.6		2.2	21.9			15.7	
Effective Green, g (s)	1.1	17.2		29.5	45.6		2.2	21.9			15.7	
Actuated g/C Ratio	0.01	0.21		0.37	0.57		0.03	0.27			0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	25	390		579	1995		49	799			423	
v/s Ratio Prot	0.00	c0.07		c0.37	0.05		0.02	c0.15				
v/s Ratio Perm											c0.15	
v/c Ratio	0.12	0.34		1.00	0.09		0.84	0.87dr			0.75	
Uniform Delay, d1	39.3	26.9		25.5	8.0		39.0	25.2			30.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.1	0.5		36.7	0.0		70.1	0.9			7.0	
Delay (s)	41.4	27.4		62.2	8.0		109.1	26.1			37.6	
Level of Service	D	C		E	A		F	C			D	
Approach Delay (s)		27.7			48.4			29.3			37.6	
Approach LOS		C			D			C			D	

Intersection Summary

HCM Average Control Delay	36.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	22	643	170	131	452	30	74	43	86	75	160	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3275		1805	3570		1805	1724		1643	2333	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3275		1805	3570		1805	1724		1643	2333	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	699	185	142	491	33	80	47	93	82	174	190
RTOR Reduction (vph)	0	17	0	0	3	0	0	80	0	0	159	0
Lane Group Flow (vph)	24	867	0	142	521	0	80	60	0	74	213	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	7%	0%	0%	0%	0%	75%	91%	0%	75%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	2.8	33.2		12.2	43.1		11.8	11.8		14.2	14.2	
Effective Green, g (s)	2.8	33.2		12.2	43.1		11.8	11.8		14.2	14.2	
Actuated g/C Ratio	0.03	0.38		0.14	0.49		0.14	0.14		0.16	0.16	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	58	1244		252	1760		244	233		267	379	
v/s Ratio Prot	0.01	c0.26		c0.08	0.15		c0.04	0.03		0.05	c0.09	
v/s Ratio Perm												
v/c Ratio	0.41	0.70		0.56	0.30		0.33	0.26		0.28	0.56	
Uniform Delay, d1	41.5	22.9		35.1	13.1		34.2	33.9		32.1	33.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	1.9		2.9	0.1		1.1	0.8		0.8	2.3	
Delay (s)	46.2	24.7		38.0	13.3		35.3	34.7		32.9	36.0	
Level of Service	D	C		D	B		D	C		C	D	
Approach Delay (s)		25.3			18.5			34.9			35.5	
Approach LOS		C			B			C			D	

Intersection Summary

HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	101	222	200	36	368	0	0	403	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3546	1583	1796	1005			3059	1581
Flt Permitted					0.98	1.00	0.50	1.00			1.00	1.00
Satd. Flow (perm)					3546	1583	941	1005			3059	1581
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	110	241	217	39	400	0	0	438	286
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	97
Lane Group Flow (vph)	0	0	0	0	351	46	39	400	0	0	438	189
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	14%	94%	0%	0%	0%	0%	89%	100%	1%	18%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					15.9	15.9	49.6	49.6			49.6	49.6
Effective Green, g (s)					15.9	15.9	49.6	49.6			49.6	49.6
Actuated g/C Ratio					0.21	0.21	0.66	0.66			0.66	0.66
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					752	336	622	665			2023	1046
v/s Ratio Prot								c0.40			0.14	
v/s Ratio Perm					0.10	0.03	0.04					0.12
v/c Ratio					0.47	0.14	0.06	0.60			0.22	0.18
Uniform Delay, d1					25.8	24.0	4.5	7.1			5.0	4.9
Progression Factor					1.00	1.00	1.00	1.00			0.87	0.69
Incremental Delay, d2					0.5	0.2	0.2	4.0			0.2	0.4
Delay (s)					26.3	24.2	4.7	11.1			4.6	3.7
Level of Service					C	C	A	B			A	A
Approach Delay (s)		0.0			25.5			10.6			4.3	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/23/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	889	162	88	213	317	0	383	421
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.91			1.00	1.00
Flt Protected	0.95	0.96	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2798	1568	4486			1752	1881
Flt Permitted	0.95	0.96	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2798	1568	4486			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	966	176	96	232	345	0	416	458
RTOR Reduction (vph)	0	0	39	0	0	0	0	0
Lane Group Flow (vph)	483	659	58	577	0	0	416	458
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	72%	3%	3%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	22.5	22.5	22.5	21.5			17.5	42.5
Effective Green, g (s)	22.5	22.5	22.5	21.5			17.5	42.5
Actuated g/C Ratio	0.30	0.30	0.30	0.29			0.23	0.57
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	493	839	470	1286			409	1066
v/s Ratio Prot				0.13			c0.24	c0.24
v/s Ratio Perm	c0.29	0.24	0.04					
v/c Ratio	0.98	0.94dl	0.12	0.45			1.02	0.43
Uniform Delay, d1	26.0	24.0	19.1	21.9			28.8	9.3
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	34.7	4.5	0.0	1.1			48.9	0.1
Delay (s)	60.7	28.5	19.1	23.0			77.6	9.4
Level of Service	E	C	B	C			E	A
Approach Delay (s)		40.4		23.0				41.9
Approach LOS		D		C				D

Intersection Summary

HCM Average Control Delay	37.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		





















dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	56	28	81	89	49	20	160	35	91	128	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	61	30	88	97	53	22	174	38	99	139	35
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	88	30	185	53	109	125	168	104				
Volume Left (vph)	27	0	88	0	22	0	99	0				
Volume Right (vph)	0	30	0	53	0	38	0	35				
Hadj (s)	0.15	-0.70	1.05	-0.70	1.27	1.32	0.84	0.65				
Departure Headway (s)	6.6	5.8	7.3	5.5	7.3	7.4	6.9	6.7				
Degree Utilization, x	0.16	0.05	0.37	0.08	0.22	0.26	0.32	0.19				
Capacity (veh/h)	509	579	473	612	473	470	505	518				
Control Delay (s)	9.7	7.9	13.4	7.8	11.2	11.7	11.8	10.0				
Approach Delay (s)	9.2		12.1		11.4		11.2					
Approach LOS	A		B		B		B					
Intersection Summary												
Delay			11.2									
HCM Level of Service			B									
Intersection Capacity Utilization			41.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗		↗	↕↗	
Volume (veh/h)	11	100	35	14	219	5	27	1	9	12	48	91
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	109	38	15	238	5	29	1	10	13	52	99
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	248			152			536	417	119	421	449	248
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	248			152			536	417	119	421	449	248
tC, single (s)	4.1			4.7			8.1	7.5	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			4.4	4.9	3.3	3.5	4.8	3.3
p0 queue free %	99			99			88	100	99	98	87	87
cM capacity (veh/h)	1323			1128			254	392	931	522	388	787

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	121	38	253	5	40	13	35	116
Volume Left	12	0	15	0	29	13	0	0
Volume Right	0	38	0	5	10	0	0	99
cSH	1323	1700	1128	1700	312	522	388	682
Volume to Capacity	0.01	0.02	0.01	0.00	0.13	0.02	0.09	0.17
Queue Length 95th (ft)	1	0	1	0	11	2	7	15
Control Delay (s)	0.8	0.0	0.6	0.0	18.2	12.1	15.2	11.4
Lane LOS	A		A		C	B	C	B
Approach Delay (s)	0.6		0.6		18.2	12.2		
Approach LOS					C	B		

Intersection Summary

Average Delay		4.8						
Intersection Capacity Utilization		39.8%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	182	13	21	102	0	0	0	0	19	180	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		3610	1550		3566						3500	
Flt Permitted		1.00	1.00		0.91						1.00	
Satd. Flow (perm)		3610	1550		3258						3500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	198	14	23	111	0	0	0	0	21	196	23
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	198	10	0	134	0	0	0	0	0	224	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.6	54.6		54.6						13.4	
Effective Green, g (s)		54.6	54.6		54.6						13.4	
Actuated g/C Ratio		0.71	0.71		0.71						0.18	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2577	1106		2325						613	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.06	
v/c Ratio		0.08	0.01		0.06						0.36	
Uniform Delay, d1		3.3	3.2		3.3						27.8	
Progression Factor		1.00	1.00		0.30						1.00	
Incremental Delay, d2		0.1	0.0		0.0						0.4	
Delay (s)		3.4	3.2		1.0						28.2	
Level of Service		A	A		A						C	
Approach Delay (s)		3.4			1.0			0.0			28.2	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕	↗		↕↕				
Volume (vph)	23	159	0	0	123	27	7	128	56	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		3506			3539	1520		3377				
Flt Permitted		0.92			1.00	1.00		1.00				
Satd. Flow (perm)		3250			3539	1520		3377				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	173	0	0	134	29	8	139	61	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	8	0	50	0	0	0	0
Lane Group Flow (vph)	0	198	0	0	134	21	0	158	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.6			54.6	54.6		13.4				
Effective Green, g (s)		54.6			54.6	54.6		13.4				
Actuated g/C Ratio		0.71			0.71	0.71		0.18				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2320			2526	1085		592				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.06				0.01		0.05				
v/c Ratio		0.09			0.05	0.02		0.27				
Uniform Delay, d1		3.3			3.3	3.2		27.3				
Progression Factor		0.42			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.2				
Delay (s)		1.5			3.3	3.2		27.5				
Level of Service		A			A	A		C				
Approach Delay (s)		1.5			3.3			27.5			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/23/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↵	↵↵	↑	↑↑↑	↵	↵	↵	↵
Volume (vph)	49	138	0	569	108	0	1847	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.95
Satd. Flow (prot)	1584	3127		5187	1278		1715	1723
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.95
Satd. Flow (perm)	1584	3127		5187	1278		1715	1723
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	150	0	618	117	0	2008	53
RTOR Reduction (vph)	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	49	150	0	618	117	0	1024	1037
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	12%	12%	8%	0%	22%	2%	0%	0%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	12.1	12.1		19.8	19.8		69.1	69.1
Effective Green, g (s)	12.1	12.1		19.8	19.8		69.1	69.1
Actuated g/C Ratio	0.11	0.11		0.17	0.17		0.60	0.60
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	167	329		893	220		1030	1035
v/s Ratio Prot				c0.12			0.60	c0.60
v/s Ratio Perm	0.03	c0.05			0.09			
v/c Ratio	0.29	0.46		0.69	0.53		0.99	1.00
Uniform Delay, d1	47.5	48.4		44.7	43.4		22.8	23.0
Progression Factor	0.75	0.79		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	1.0		2.3	2.5		26.7	28.4
Delay (s)	36.7	39.1		47.1	45.8		49.4	51.4
Level of Service	D	D		D	D		D	D
Approach Delay (s)			38.5	46.9				50.4
Approach LOS			D	D				D

Intersection Summary

HCM Average Control Delay	48.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/23/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	242	295	26	740	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.95	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3078	1470	1552	1539	4617
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3078	1470	1552	1539	4617
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	321	28	804	0
RTOR Reduction (vph)	0	0	17	0	0
Lane Group Flow (vph)	401	183	8	405	402
Heavy Vehicles (%)	10%	0%	0%	0%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	69.6	69.6	35.9	35.9	35.9
Effective Green, g (s)	69.6	69.6	35.9	35.9	35.9
Actuated g/C Ratio	0.61	0.61	0.31	0.31	0.31
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1863	890	484	480	1441
v/s Ratio Prot	c0.13		0.01	c0.26	0.09
v/s Ratio Perm		0.12			
v/c Ratio	0.22	0.21	0.02	0.84	0.28
Uniform Delay, d1	10.3	10.2	27.3	36.9	29.8
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.5	0.0	12.8	0.1
Delay (s)	10.6	10.8	27.4	49.7	29.9
Level of Service	B	B	C	D	C
Approach Delay (s)	10.6				39.5
Approach LOS	B				D

Intersection Summary

HCM Average Control Delay	27.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	349	31	7	170	0	0	0	0	546	867	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5104			5172					1787	3539	1565
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5104			4741					1787	3539	1565
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	379	34	8	185	0	0	0	0	593	942	327
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	114
Lane Group Flow (vph)	0	400	0	0	193	0	0	0	0	593	942	213
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		16.0			16.0					52.0	52.0	52.0
Effective Green, g (s)		16.0			16.0					52.0	52.0	52.0
Actuated g/C Ratio		0.20			0.20					0.65	0.65	0.65
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1021			948					1162	2300	1017
v/s Ratio Prot		c0.08									0.27	
v/s Ratio Perm					0.04					c0.33		0.14
v/c Ratio		0.39			0.20					0.51	0.41	0.21
Uniform Delay, d1		27.8			26.7					7.3	6.7	5.7
Progression Factor		1.00			1.12					1.00	1.00	1.00
Incremental Delay, d2		1.1			0.5					1.6	0.5	0.5
Delay (s)		28.9			30.2					8.9	7.2	6.1
Level of Service		C			C					A	A	A
Approach Delay (s)		28.9			30.2			0.0			7.6	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	237	771	0	0	175	268	5	255	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.96		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.93	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4848			4496	1329		5052				
Flt Permitted	0.95	0.93			1.00	1.00		1.00				
Satd. Flow (perm)	1552	4536			4496	1329		5052				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	258	838	0	0	190	291	5	277	22	0	0	0
RTOR Reduction (vph)	0	0	0	0	119	118	0	11	0	0	0	0
Lane Group Flow (vph)	232	864	0	0	217	27	0	293	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	0%	0%	1%	5%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	18.0	36.5			15.0	15.0		32.5				
Effective Green, g (s)	18.0	36.5			15.0	15.0		32.5				
Actuated g/C Ratio	0.22	0.46			0.19	0.19		0.41				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	349	2140			843	249		2052				
v/s Ratio Prot	c0.15	0.09			0.05							
v/s Ratio Perm		c0.09				0.02		0.06				
v/c Ratio	0.66	0.40			0.26	0.11		0.14				
Uniform Delay, d1	28.3	14.5			27.7	27.0		15.0				
Progression Factor	1.00	0.78			1.00	1.00		1.00				
Incremental Delay, d2	8.9	0.5			0.7	0.9		0.1				
Delay (s)	37.2	11.9			28.5	27.8		15.1				
Level of Service	D	B			C	C		B				
Approach Delay (s)		17.2			28.3			15.1			0.0	
Approach LOS		B			C			B			A	

Intersection Summary

















HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/23/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	208	1022	0	929	106	52	3	81	12	186	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.88			0.98			0.91			1.00	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		3052			3537			3194			3486	
Flt Permitted		1.00			1.00			0.98			1.00	
Satd. Flow (perm)		3052			3537			3194			3486	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	226	1111	0	1010	115	57	3	88	13	202	5
RTOR Reduction (vph)	0	531	0	0	13	0	0	80	0	0	2	0
Lane Group Flow (vph)	0	806	0	0	1112	0	0	68	0	0	218	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	1%	1%	3%	0%	0%	1%	1%	1%	0%	3%	1%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1549			1796			295			751	
v/s Ratio Prot		0.26			c0.31			c0.02			c0.06	
v/s Ratio Perm												
v/c Ratio		0.52			0.62			0.23			0.29	
Uniform Delay, d1		10.7			11.5			27.4			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			1.6			1.8			1.0	
Delay (s)		12.0			13.1			29.2			22.3	
Level of Service		B			B			C			C	
Approach Delay (s)		12.0			13.1			29.2			22.3	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			14.1			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			65.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			67.0%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	39	201	20	74	280	42	54	211	61	101	222	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.98	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5107	1496	1754	3517		1787	1881	1570	1787	1881	1570
Flt Permitted		0.85	1.00	0.58	1.00		0.50	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)		4397	1496	1079	3517		934	1881	1570	970	1881	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	218	22	80	304	46	59	229	66	110	241	25
RTOR Reduction (vph)	0	0	9	0	14	0	0	0	37	0	0	15
Lane Group Flow (vph)	0	260	13	80	336	0	59	229	29	110	241	10
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	3%	0%	3%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.60	0.60	0.60	0.60		0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2638	898	647	2110		264	531	443	274	531	443
v/s Ratio Prot					c0.10			0.12				c0.13
v/s Ratio Perm		0.06	0.01	0.07			0.06		0.02	0.11		0.01
v/c Ratio		0.10	0.01	0.12	0.16		0.22	0.43	0.07	0.40	0.45	0.02
Uniform Delay, d1		7.2	6.9	7.3	7.5		23.4	24.9	22.3	24.7	25.1	22.0
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	0.4	0.2		2.0	2.5	0.3	4.3	2.8	0.1
Delay (s)		7.3	6.9	7.7	7.7		25.3	27.5	22.6	29.0	27.9	22.1
Level of Service		A	A	A	A		C	C	C	C	C	C
Approach Delay (s)		7.3			7.7			26.2			27.8	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	260	345	0	910	593	0	0	0	685	0	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.96			1.00	0.98				1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.98	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1770	3144			3319	1349				3467		1560
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1770	3144			3319	1349				3467		1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	283	375	0	989	645	0	0	0	745	0	313
RTOR Reduction (vph)	0	172	0	0	15	0	0	0	0	0	0	135
Lane Group Flow (vph)	95	486	0	0	1122	497	0	0	0	745	0	178
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	2%	0%	2%	0%	1%	7%	0%	0%	0%	1%	6%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	3.7	32.1			24.4	59.4				19.3		19.3
Effective Green, g (s)	3.7	32.1			24.4	59.4				19.3		19.3
Actuated g/C Ratio	0.06	0.54			0.41	1.00				0.32		0.32
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	110	1699			1363	1349				1126		507
v/s Ratio Prot	c0.05	0.15			c0.34					c0.21		
v/s Ratio Perm						0.37						0.11
v/c Ratio	0.86	0.29			0.82	0.37				0.66		0.35
Uniform Delay, d1	27.6	7.4			15.6	0.0				17.2		15.3
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	46.0	0.1			4.2	0.8				1.5		0.4
Delay (s)	73.6	7.5			19.7	0.8				18.7		15.7
Level of Service	E	A			B	A				B		B
Approach Delay (s)		15.8			14.0			0.0			17.8	
Approach LOS		B			B			A			B	

Intersection Summary		
HCM Average Control Delay	15.6	HCM Level of Service B
HCM Volume to Capacity ratio	0.76	
Actuated Cycle Length (s)	59.4	Sum of lost time (s) 12.0
Intersection Capacity Utilization	66.2%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	78	604	0	0	657	292	456	1	856	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.87	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.99	1.00			
Satd. Flow (prot)	1787	5187			5136	1552	1618	1454	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.99	1.00			
Satd. Flow (perm)	1787	5187			5136	1552	1618	1454	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	657	0	0	714	317	496	1	930	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	225	0	94	94	0	0	0
Lane Group Flow (vph)	85	657	0	0	714	92	446	403	390	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	0%	0%	0%	1%	1%	6%	0%	2%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	3.6	22.9			15.3	15.3	21.7	21.7	21.7			
Effective Green, g (s)	3.6	22.9			15.3	15.3	21.7	21.7	21.7			
Actuated g/C Ratio	0.07	0.44			0.29	0.29	0.41	0.41	0.41			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	122	2258			1494	451	668	600	620			
v/s Ratio Prot	c0.05	0.13			c0.14		0.28	c0.28	0.26			
v/s Ratio Perm						0.06						
v/c Ratio	0.70	0.29			0.48	0.20	0.67	0.67	0.63			
Uniform Delay, d1	24.0	9.6			15.4	14.1	12.5	12.6	12.3			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	15.9	0.1			0.2	0.2	2.5	3.0	2.0			
Delay (s)	39.9	9.7			15.6	14.3	15.1	15.5	14.3			
Level of Service	D	A			B	B	B	B	B			
Approach Delay (s)		13.1			15.2			14.9			0.0	
Approach LOS		B			B			B			A	

Intersection Summary		
HCM Average Control Delay	14.6	HCM Level of Service
HCM Volume to Capacity ratio	0.60	B
Actuated Cycle Length (s)	52.6	Sum of lost time (s)
Intersection Capacity Utilization	55.7%	ICU Level of Service
Analysis Period (min)	15	B
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 36: Christie Avenue & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	335	795	393	92	577	80	301	30	92	72	42	272
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3433	3331	1404	1805	3574	1615	1698	1720	1615		1842	2716
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3433	3331	1404	1805	3574	1615	1698	1720	1615		1842	2716
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	364	864	427	100	627	87	327	33	100	78	46	296
RTOR Reduction (vph)	0	4	237	0	0	55	0	0	89	0	0	241
Lane Group Flow (vph)	364	903	147	100	627	32	180	180	11	0	124	55
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	2%	3%	2%	0%	1%	0%	1%	0%	0%	0%	0%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	13.2	25.3	25.3	5.1	17.2	17.2	7.2	7.2	7.2		12.3	12.3
Effective Green, g (s)	13.2	25.3	25.3	5.1	17.2	17.2	7.2	7.2	7.2		12.3	12.3
Actuated g/C Ratio	0.20	0.38	0.38	0.08	0.26	0.26	0.11	0.11	0.11		0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	688	1279	539	140	933	422	186	188	176		344	507
v/s Ratio Prot	c0.11	c0.27		0.06	0.18	0.02	c0.11	0.10	0.01		c0.07	
v/s Ratio Perm			0.11									0.02
v/c Ratio	0.53	0.71	0.27	0.71	0.67	0.07	0.97	0.96	0.06		0.36	0.11
Uniform Delay, d1	23.6	17.2	14.0	29.7	21.8	18.4	29.2	29.2	26.3		23.4	22.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	1.8	0.3	15.9	1.9	0.1	56.0	52.8	0.1		0.6	0.1
Delay (s)	24.3	19.0	14.3	45.5	23.7	18.4	85.2	82.0	26.5		24.0	22.3
Level of Service	C	B	B	D	C	B	F	F	C		C	C
Approach Delay (s)		19.0			25.9			71.2			22.8	
Approach LOS		B			C			E			C	

Intersection Summary		
HCM Average Control Delay	28.3	HCM Level of Service C
HCM Volume to Capacity ratio	0.62	
Actuated Cycle Length (s)	65.9	Sum of lost time (s) 12.0
Intersection Capacity Utilization	59.9%	ICU Level of Service B
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	511	206	75	422	31	141	126	24	27	181	66
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3311		1787	3527		1787	1831		1805	1845	1552
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.65	1.00	1.00
Satd. Flow (perm)	1752	3311		1787	3527		1787	1831		1242	1845	1552
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	555	224	82	459	34	153	137	26	29	197	72
RTOR Reduction (vph)	0	58	0	0	8	0	0	10	0	0	0	46
Lane Group Flow (vph)	182	721	0	82	485	0	153	153	0	29	197	26
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	3%	3%	2%	1%	1%	0%	1%	1%	0%	0%	3%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	7.2	20.9		3.8	17.5		6.2	18.9		14.9	14.9	22.1
Effective Green, g (s)	7.2	20.9		3.8	17.5		6.2	18.9		14.9	14.9	22.1
Actuated g/C Ratio	0.12	0.34		0.06	0.28		0.10	0.31		0.24	0.24	0.36
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	204	1120		110	999		179	560		319	445	655
v/s Ratio Prot	c0.10	c0.22		0.05	0.14		c0.09	0.08		0.00	c0.11	0.00
v/s Ratio Perm										0.02		0.01
v/c Ratio	0.89	0.64		0.75	0.49		0.85	0.27		0.09	0.44	0.04
Uniform Delay, d1	26.9	17.3		28.5	18.4		27.4	16.3		18.2	19.9	12.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	35.0	1.3		23.7	0.4		30.6	0.3		0.1	0.7	0.0
Delay (s)	61.9	18.6		52.2	18.8		58.0	16.5		18.3	20.6	13.0
Level of Service	E	B		D	B		E	B		B	C	B
Approach Delay (s)		26.8			23.5			36.6			18.6	
Approach LOS		C			C			D			B	

Intersection Summary

HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗		↘	↗	↗	↘	↗	↗	↘	↗	↗
Volume (vph)	69	201	186	161	674	29	190	871	63	70	1293	44
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3246		1805	3574	1577	1787	3574	1578	1805	3505	1547
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3246		1805	3574	1577	1787	3574	1578	1805	3505	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	218	202	175	733	32	207	947	68	76	1405	48
RTOR Reduction (vph)	0	160	0	0	0	8	0	0	13	0	0	6
Lane Group Flow (vph)	75	260	0	175	733	24	207	947	55	76	1405	42
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	3%	1%	0%	1%	0%	1%	1%	0%	0%	3%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	5.2	20.7		11.4	26.9	26.9	15.3	44.7	44.7	8.2	37.6	37.6
Effective Green, g (s)	5.2	20.7		11.4	26.9	26.9	15.3	44.7	44.7	8.2	37.6	37.6
Actuated g/C Ratio	0.05	0.21		0.11	0.27	0.27	0.15	0.45	0.45	0.08	0.38	0.38
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	672		206	961	424	273	1598	705	148	1318	582
v/s Ratio Prot	0.04	0.08		c0.10	c0.21		c0.12	0.26		0.04	c0.40	
v/s Ratio Perm						0.02			0.04			0.03
v/c Ratio	0.82	0.39		0.85	0.76	0.06	0.76	0.59	0.08	0.51	1.07	0.07
Uniform Delay, d1	46.9	34.2		43.5	33.6	27.1	40.6	20.8	15.8	44.0	31.2	20.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.4	0.4		26.4	3.6	0.1	11.4	1.6	0.2	3.0	44.4	0.2
Delay (s)	87.3	34.5		69.9	37.2	27.2	52.0	22.4	16.1	47.0	75.6	20.2
Level of Service	F	C		E	D	C	D	C	B	D	E	C
Approach Delay (s)		42.5			43.0			27.1			72.5	
Approach LOS		D			D			C			E	

Intersection Summary

HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	281	2	64	372	16	165	385	13	50	751	18
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3502		1805	3551		1787	3590		1805	3526	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3502		1805	3551		1787	3590		1805	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	305	2	70	404	17	179	418	14	54	816	20
RTOR Reduction (vph)	0	1	0	0	3	0	0	2	0	0	1	0
Lane Group Flow (vph)	55	306	0	70	418	0	179	430	0	54	835	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	3%	0%	0%	1%	0%	1%	0%	0%	0%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	4.9	16.2		7.0	18.3		13.2	36.5		4.8	28.1	
Effective Green, g (s)	4.9	16.2		7.0	18.3		13.2	36.5		4.8	28.1	
Actuated g/C Ratio	0.06	0.21		0.09	0.23		0.17	0.46		0.06	0.36	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	110	723		161	828		300	1669		110	1262	
v/s Ratio Prot	0.03	0.09		c0.04	c0.12		c0.10	0.12		0.03	c0.24	
v/s Ratio Perm												
v/c Ratio	0.50	0.42		0.43	0.50		0.60	0.26		0.49	0.66	
Uniform Delay, d1	35.6	27.1		33.9	26.2		30.2	12.8		35.7	21.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.5	0.4		1.9	0.5		3.2	0.1		3.4	1.3	
Delay (s)	39.2	27.5		35.8	26.6		33.4	12.8		39.1	22.5	
Level of Service	D	C		D	C		C	B		D	C	
Approach Delay (s)		29.3			27.9			18.9			23.5	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	78.5	Sum of lost time (s)	11.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/23/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	242	263	243	1696	1141	207
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	3467	1564		5155	4987	
Flt Permitted	0.95	1.00		0.64	1.00	
Satd. Flow (perm)	3467	1564		3303	4987	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	286	264	1843	1240	225
RTOR Reduction (vph)	0	47	0	0	29	0
Lane Group Flow (vph)	263	239	0	2107	1436	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	2%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	27.0	27.0		55.0	55.0	
Effective Green, g (s)	27.0	27.0		55.0	55.0	
Actuated g/C Ratio	0.30	0.30		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1040	469		2019	3048	
v/s Ratio Prot	0.08				0.29	
v/s Ratio Perm		c0.15		c0.64		
v/c Ratio	0.25	0.51		1.69dl	0.47	
Uniform Delay, d1	23.9	26.0		17.5	9.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.9		32.5	0.5	
Delay (s)	24.4	30.0		50.0	10.1	
Level of Service	C	C		D	B	
Approach Delay (s)	27.3			50.0	10.1	
Approach LOS	C			D	B	

Intersection Summary

HCM Average Control Delay	32.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	458	796	292	80	604	41	56	149	51	55	267	150
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3350		1805	3533		1805	3382		1770	1845	1524
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3350		1805	3533		1805	3382		1770	1845	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	498	865	317	87	657	45	61	162	55	60	290	163
RTOR Reduction (vph)	0	38	0	0	6	0	0	38	0	0	0	130
Lane Group Flow (vph)	498	1144	0	87	696	0	61	179	0	60	290	33
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	2%	2%	2%	0%	1%	1%	0%	2%	1%	2%	3%	6%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	23.6	39.7		7.0	23.1		3.8	16.8		3.8	16.8	16.8
Effective Green, g (s)	23.6	39.7		7.0	23.1		3.8	16.8		3.8	16.8	16.8
Actuated g/C Ratio	0.28	0.48		0.08	0.28		0.05	0.20		0.05	0.20	0.20
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	501	1597		152	980		82	682		81	372	307
v/s Ratio Prot	c0.28	c0.34		0.05	0.20		0.03	0.05		c0.03	c0.16	
v/s Ratio Perm												0.02
v/c Ratio	0.99	0.72		0.57	0.71		0.74	0.26		0.74	0.78	0.11
Uniform Delay, d1	29.8	17.3		36.7	27.1		39.3	28.0		39.3	31.5	27.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.4	1.6		5.1	2.5		30.1	0.2		30.1	9.9	0.2
Delay (s)	68.2	18.9		41.8	29.5		69.4	28.2		69.3	41.4	27.3
Level of Service	E	B		D	C		E	C		E	D	C
Approach Delay (s)		33.5			30.9			37.3			40.2	
Approach LOS		C			C			D			D	

Intersection Summary		
HCM Average Control Delay	34.2	HCM Level of Service C
HCM Volume to Capacity ratio	0.81	
Actuated Cycle Length (s)	83.3	Sum of lost time (s) 12.0
Intersection Capacity Utilization	76.8%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	648	185	44	689	91	137	718	37	161	1132	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1746	3400			3266		1805	3574	1555	1787	3505	1533
Flt Permitted	0.22	1.00			0.86		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	403	3400			2822		1805	3574	1555	1787	3505	1533
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	704	201	48	749	99	149	780	40	175	1230	168
RTOR Reduction (vph)	0	39	0	0	14	0	0	0	11	0	0	28
Lane Group Flow (vph)	136	866	0	0	882	0	149	780	29	175	1230	140
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	3%	2%	2%	0%	1%	0%	0%	1%	0%	1%	3%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	30.3	30.3			30.3		5.1	18.5	18.5	7.2	20.6	20.6
Effective Green, g (s)	30.3	30.3			30.3		5.1	18.5	18.5	7.2	20.6	20.6
Actuated g/C Ratio	0.45	0.45			0.45		0.07	0.27	0.27	0.11	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	180	1515			1257		135	972	423	189	1062	464
v/s Ratio Prot		0.25					c0.08	0.22		0.10	c0.35	
v/s Ratio Perm	c0.34				0.31				0.02			0.09
v/c Ratio	0.76	0.57			0.70		1.10	0.80	0.07	0.93	1.16	0.30
Uniform Delay, d1	15.8	14.0			15.2		31.4	23.0	18.4	30.1	23.7	18.2
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.4	0.5			1.8		108.0	4.9	0.1	44.5	82.0	0.4
Delay (s)	32.2	14.5			17.0		139.4	27.9	18.4	74.6	105.7	18.6
Level of Service	C	B			B		F	C	B	E	F	B
Approach Delay (s)		16.8			17.0			44.7			92.9	
Approach LOS		B			B			D			F	

Intersection Summary		
HCM Average Control Delay	49.6	HCM Level of Service D
HCM Volume to Capacity ratio	0.94	
Actuated Cycle Length (s)	68.0	Sum of lost time (s) 12.0
Intersection Capacity Utilization	99.9%	ICU Level of Service F
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/23/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	70	318	957	69	348	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3569		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3569		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	346	1040	75	378	425
RTOR Reduction (vph)	0	308	6	0	0	0
Lane Group Flow (vph)	76	38	1109	0	378	425
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	6.0	6.0	25.7		11.2	33.9
Effective Green, g (s)	6.0	6.0	25.7		11.2	33.9
Actuated g/C Ratio	0.11	0.11	0.47		0.20	0.62
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	197	305	1671		714	2229
v/s Ratio Prot	c0.04	0.01	c0.31		c0.11	0.12
v/s Ratio Perm						
v/c Ratio	0.39	0.12	0.66		0.53	0.19
Uniform Delay, d1	22.7	22.1	11.3		19.5	4.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.3	0.2	1.0		0.7	0.0
Delay (s)	24.0	22.3	12.3		20.2	4.6
Level of Service	C	C	B		C	A
Approach Delay (s)	22.6		12.3			11.9
Approach LOS	C		B			B

Intersection Summary			
HCM Average Control Delay		14.0	HCM Level of Service B
HCM Volume to Capacity ratio		0.59	
Actuated Cycle Length (s)		54.9	Sum of lost time (s) 12.0
Intersection Capacity Utilization		52.8%	ICU Level of Service A
Analysis Period (min)		15	
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑	↖	↖	↑↑		↖	↑↑		↖	↑↑	↖
Volume (vph)	379	162	96	24	213	48	116	897	48	60	438	356
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3610	1571	1805	3488		1805	3577		1770	3574	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3610	1571	1805	3488		1805	3577		1770	3574	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	412	176	104	26	232	52	126	975	52	65	476	387
RTOR Reduction (vph)	0	0	74	0	26	0	0	4	0	0	0	251
Lane Group Flow (vph)	412	176	30	26	258	0	126	1023	0	65	476	136
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	0%	2%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Effective Green, g (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Actuated g/C Ratio	0.11	0.29	0.29	0.04	0.22		0.08	0.38		0.05	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	383	1047	455	80	784		142	1370		81	1253	546
v/s Ratio Prot	c0.12	0.05		0.01	c0.07		0.07	c0.29		c0.04	0.13	
v/s Ratio Perm			0.02									0.09
v/c Ratio	1.08	0.17	0.07	0.33	0.33		0.89	0.75		0.80	0.38	0.25
Uniform Delay, d1	30.1	17.9	17.4	31.3	21.9		30.9	18.0		31.9	16.4	15.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	67.7	0.1	0.1	2.4	0.2		43.4	2.3		41.8	0.2	0.2
Delay (s)	97.8	18.0	17.4	33.7	22.2		74.3	20.3		73.7	16.6	15.9
Level of Service	F	B	B	C	C		E	C		E	B	B
Approach Delay (s)		65.4			23.1			26.2			20.3	
Approach LOS		E			C			C			C	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗↘	↗↘	↗	↗↘	↗↘	↗
Volume (vph)	76	118	23	56	144	257	96	769	88	188	258	48
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3446		1805	3205		3502	3610	1579	3502	3610	1577
Flt Permitted	0.44	1.00		0.65	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	822	3446		1244	3205		3502	3610	1579	3502	3610	1577
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	128	25	61	157	279	104	836	96	204	280	52
RTOR Reduction (vph)	0	19	0	0	170	0	0	0	46	0	0	29
Lane Group Flow (vph)	83	134	0	61	266	0	104	836	50	204	280	23
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	2%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	12.1	12.1		12.1	12.1		3.9	19.1	19.1	6.5	21.7	21.7
Effective Green, g (s)	12.1	12.1		12.1	12.1		3.9	19.1	19.1	6.5	21.7	21.7
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.08	0.38	0.38	0.13	0.44	0.44
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	200	839		303	780		275	1387	607	458	1576	689
v/s Ratio Prot		0.04			0.08		0.03	c0.23		c0.06	0.08	
v/s Ratio Perm	c0.10			0.05					0.03			0.01
v/c Ratio	0.41	0.16		0.20	0.34		0.38	0.60	0.08	0.45	0.18	0.03
Uniform Delay, d1	15.8	14.8		15.0	15.5		21.7	12.3	9.7	19.9	8.6	8.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.1		0.3	0.3		0.9	0.7	0.1	0.7	0.1	0.0
Delay (s)	17.2	14.9		15.3	15.8		22.6	13.0	9.8	20.6	8.6	8.0
Level of Service	B	B		B	B		C	B	A	C	A	A
Approach Delay (s)		15.7			15.7			13.7			13.1	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	49.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	445	105	63	693	24	356	23	246	51	12	44
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3574	952	1467	3512		1151	1208	1437	1752	1493	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1687	3574	952	1467	3512		1151	1208	1437	1752	1493	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	484	114	68	753	26	387	25	267	55	13	48
RTOR Reduction (vph)	0	0	78	0	2	0	0	0	188	0	44	0
Lane Group Flow (vph)	11	484	36	68	777	0	205	207	79	55	17	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	7%	1%	66%	23%	2%	7%	49%	0%	10%	3%	50%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	1.1	24.4	24.4	7.5	30.8		23.2	23.2	23.2	6.4	6.4	
Effective Green, g (s)	1.1	24.4	24.4	7.5	30.8		23.2	23.2	23.2	6.4	6.4	
Actuated g/C Ratio	0.01	0.31	0.31	0.10	0.39		0.30	0.30	0.30	0.08	0.08	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	24	1118	298	141	1387		342	359	427	144	123	
v/s Ratio Prot	0.01	0.14		c0.05	c0.22		c0.18	0.17		c0.03	0.01	
v/s Ratio Perm			0.04						0.06			
v/c Ratio	0.46	0.43	0.12	0.48	0.56		0.60	0.58	0.19	0.38	0.14	
Uniform Delay, d1	38.2	21.3	19.1	33.4	18.3		23.4	23.2	20.4	33.9	33.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	13.2	0.5	0.3	2.6	0.7		3.3	2.7	0.3	1.7	0.5	
Delay (s)	51.4	21.8	19.4	36.0	19.1		26.7	25.9	20.7	35.6	33.8	
Level of Service	D	C	B	D	B		C	C	C	D	C	
Approach Delay (s)		21.9			20.4			24.1			34.6	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	22.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	78.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕	↗	↖	↕		↖	↕	
Volume (vph)	120	363	257	208	513	212	144	317	391	91	174	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Fr _t	1.00	0.94		1.00	1.00	0.85	1.00	0.92		1.00	0.98	
Fl _t Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1736	3284		1597	3406	1583	1770	2812		1703	3311	
Fl _t Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1736	3284		1597	3406	1583	1770	2812		1703	3311	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	395	279	226	558	230	157	345	425	99	189	27
RTOR Reduction (vph)	0	164	0	0	0	153	0	271	0	0	13	0
Lane Group Flow (vph)	130	510	0	226	558	77	157	499	0	99	203	0
Confl. Peds. (#/hr)			5									
Heavy Vehicles (%)	4%	2%	3%	13%	6%	2%	2%	31%	7%	6%	8%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	8.2	20.9		11.4	24.1	24.1	9.8	15.6		7.7	13.5	
Effective Green, g (s)	8.2	20.9		11.4	24.1	24.1	9.8	15.6		7.7	13.5	
Actuated g/C Ratio	0.11	0.29		0.16	0.33	0.33	0.14	0.22		0.11	0.19	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	197	952		253	1138	529	241	608		182	620	
v/s Ratio Prot	0.07	0.16		c0.14	c0.16		c0.09	c0.18		0.06	0.06	
v/s Ratio Perm						0.05						
v/c Ratio	0.66	0.54		0.89	0.49	0.15	0.65	0.82		0.54	0.33	
Uniform Delay, d ₁	30.6	21.5		29.8	19.1	16.8	29.5	26.9		30.5	25.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d ₂	8.1	0.9		30.7	0.6	0.2	6.4	8.9		3.7	0.4	
Delay (s)	38.7	22.4		60.4	19.7	17.0	36.0	35.8		34.2	25.7	
Level of Service	D	C		E	B	B	D	D		C	C	
Approach Delay (s)		25.1			28.2			35.9			28.4	
Approach LOS		C			C			D			C	

Intersection Summary

HCM Average Control Delay	29.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	12.5
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑	↑↑						↑↑	
Volume (vph)	0	780	57	220	711	0	0	0	0	80	142	157
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.94	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		4938		1798	3374						3204	
Flt Permitted		1.00		0.30	1.00						0.99	
Satd. Flow (perm)		4938		567	3374						3204	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	848	62	239	773	0	0	0	0	87	154	171
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	108	0
Lane Group Flow (vph)	0	905	0	239	773	0	0	0	0	0	304	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	7%	4%	1%	0%	7%	1%	1%	1%	0%	1%	0%	8%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		47.5		47.5	47.5						13.0	
Effective Green, g (s)		47.5		47.5	47.5						13.0	
Actuated g/C Ratio		0.67		0.67	0.67						0.18	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		3327		382	2273						591	
v/s Ratio Prot		0.18			0.23							
v/s Ratio Perm				0.42							0.09	
v/c Ratio		0.27		0.63	0.34						0.51	
Uniform Delay, d1		4.6		6.5	4.9						25.9	
Progression Factor		1.00		0.61	0.39						1.00	
Incremental Delay, d2		0.0		2.2	0.0						0.3	
Delay (s)		4.6		6.2	1.9						26.2	
Level of Service		A		A	A						C	
Approach Delay (s)		4.6			3.0			0.0			26.2	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM Average Control Delay			7.7		HCM Level of Service					A		
HCM Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			70.5		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			56.1%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	189	671	0	0	824	27	107	151	159	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.94				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5026			5057			3269				
Flt Permitted		0.67			1.00			0.99				
Satd. Flow (perm)		3412			5057			3269				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	205	729	0	0	896	29	116	164	173	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	123	0	0	0	0
Lane Group Flow (vph)	0	934	0	0	923	0	0	330	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		47.5			47.5			13.0				
Effective Green, g (s)		47.5			47.5			13.0				
Actuated g/C Ratio		0.67			0.67			0.18				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		2299			3407			603				
v/s Ratio Prot					0.18							
v/s Ratio Perm		c0.27						0.10				
v/c Ratio		0.41			0.27			0.55				
Uniform Delay, d1		5.2			4.6			26.1				
Progression Factor		0.40			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.5				
Delay (s)		2.1			4.6			26.6				
Level of Service		A			A			C				
Approach Delay (s)		2.1			4.6			26.6			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔			↔↕↔			↔↕			↔↕	
Volume (vph)	35	630	103	63	345	62	65	660	75	121	711	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.98			0.99			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		4937			4853			3537			3539	
Flt Permitted		0.90			0.79			0.55			0.53	
Satd. Flow (perm)		4451			3837			1956			1891	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	685	112	68	375	67	71	717	82	132	773	73
RTOR Reduction (vph)	0	10	0	0	13	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	825		0	497		0	860		0	971	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5			48.5			23.0			23.0	
Effective Green, g (s)		48.5			48.5			23.0			23.0	
Actuated g/C Ratio		0.61			0.61			0.29			0.29	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2698			2326			562			544	
v/s Ratio Prot												
v/s Ratio Perm		c0.19			0.13			0.44			c0.51	
v/c Ratio		0.31			0.21			1.53			1.78	
Uniform Delay, d1		7.6			7.1			28.5			28.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.2			247.5			360.5	
Delay (s)		7.9			7.3			276.0			389.0	
Level of Service		A			A			F			F	
Approach Delay (s)		7.9			7.3			276.0			389.0	
Approach LOS		A			A			F			F	

Intersection Summary

HCM Average Control Delay	197.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	116.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕↕	↗
Volume (vph)	68	813	175	87	636	54	113	247	94	45	179	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3495	1517		3292	1547	1706	1810	1485		1849	1559
Flt Permitted		0.82	1.00		0.72	1.00	0.36	1.00	1.00		0.63	1.00
Satd. Flow (perm)		2861	1517		2372	1547	639	1810	1485		1180	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	884	190	95	691	59	123	268	102	49	195	37
RTOR Reduction (vph)	0	0	58	0	0	15	0	0	81	0	0	29
Lane Group Flow (vph)	0	958	132	0	786	44	123	268	21	0	244	8
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	3%	2%	23%	7%	0%	5%	5%	6%	0%	2%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		62.4	62.4		62.4	62.4	18.6	18.6	18.6		18.6	18.6
Effective Green, g (s)		62.4	62.4		62.4	62.4	18.6	18.6	18.6		18.6	18.6
Actuated g/C Ratio		0.69	0.69		0.69	0.69	0.21	0.21	0.21		0.21	0.21
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1984	1052		1645	1073	132	374	307		244	322
v/s Ratio Prot								0.15				
v/s Ratio Perm		c0.33	0.09		0.33	0.03	0.19		0.01		c0.21	0.00
v/c Ratio		0.48	0.13		0.48	0.04	0.93	0.72	0.07		1.00	0.02
Uniform Delay, d1		6.4	4.6		6.3	4.4	35.1	33.2	28.7		35.7	28.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		0.8	0.2		1.0	0.1	57.0	5.4	0.0		57.6	0.0
Delay (s)		7.2	4.9		7.3	4.4	92.1	38.6	28.8		93.3	28.5
Level of Service		A	A		A	A	F	D	C		F	C
Approach Delay (s)		6.8			7.1			49.9			84.8	
Approach LOS		A			A			D			F	

Intersection Summary

HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	68	797	42	25	668	69	115	538	30	152	398	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3529	1510	1799	3282	1540	1744	3510		1761	3419	
Flt Permitted		0.83	1.00	0.24	1.00	1.00	0.33	1.00		0.32	1.00	
Satd. Flow (perm)		2942	1510	449	3282	1540	614	3510		585	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	866	46	27	726	75	125	585	33	165	433	157
RTOR Reduction (vph)	0	0	19	0	0	30	0	7	0	0	51	0
Lane Group Flow (vph)	0	940	27	27	726	45	125	611	0	165	539	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	2%	4%	0%	10%	2%	3%	2%	0%	2%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2				6
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		47.0	47.0	47.0	47.0	47.0	28.5	28.5		28.5	28.5	
Effective Green, g (s)		47.0	47.0	47.0	47.0	47.0	28.5	28.5		28.5	28.5	
Actuated g/C Ratio		0.55	0.55	0.55	0.55	0.55	0.34	0.34		0.34	0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1627	835	248	1815	852	206	1177		196	1146	
v/s Ratio Prot					0.22			0.17				0.16
v/s Ratio Perm		c0.32	0.02	0.06		0.03	0.20			c0.28		
v/c Ratio		0.58	0.03	0.11	0.40	0.05	0.61	0.52		0.84	0.47	
Uniform Delay, d1		12.5	8.7	9.0	10.9	8.7	23.6	22.7		26.2	22.3	
Progression Factor		1.00	1.00	0.53	0.79	0.34	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5	0.1	0.9	0.6	0.1	7.3	0.8		27.4	0.4	
Delay (s)		14.0	8.7	5.6	9.3	3.1	30.8	23.5		53.6	22.7	
Level of Service		B	A	A	A	A	C	C		D	C	
Approach Delay (s)		13.7			8.6			24.7			29.5	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	
Volume (vph)	69	806	14	26	732	10	37	197	287	37	88	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		0.99	
Satd. Flow (prot)	1799	3539	1579	1765	3438	1579		3578	1462		3289	
Flt Permitted	0.32	1.00	1.00	0.29	1.00	1.00		0.87	1.00		0.87	
Satd. Flow (perm)	615	3539	1579	545	3438	1579		3138	1462		2891	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	876	15	28	796	11	40	214	312	40	96	123
RTOR Reduction (vph)	0	0	3	0	0	3	0	0	66	0	84	0
Lane Group Flow (vph)	75	876	12	28	796	8	0	254	246	0	175	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	2%	0%	2%	5%	0%	0%	0%	8%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	56.3	56.3	56.3	56.3	56.3	56.3		20.2	20.2		20.2	
Effective Green, g (s)	56.3	56.3	56.3	56.3	56.3	56.3		20.2	20.2		20.2	
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.66	0.66		0.24	0.24		0.24	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	407	2344	1046	361	2277	1046		746	347		687	
v/s Ratio Prot		c0.25			0.23							
v/s Ratio Perm	0.12		0.01	0.05		0.01		0.08	c0.17		0.06	
v/c Ratio	0.18	0.37	0.01	0.08	0.35	0.01		0.34	0.71		0.25	
Uniform Delay, d1	5.5	6.4	4.9	5.1	6.3	4.9		26.9	29.7		26.3	
Progression Factor	0.94	0.83	1.09	1.00	1.29	1.06		1.00	1.00		1.00	
Incremental Delay, d2	0.8	0.4	0.0	0.3	0.3	0.0		0.1	5.3		0.1	
Delay (s)	6.0	5.7	5.3	5.4	8.5	5.2		27.0	35.0		26.4	
Level of Service	A	A	A	A	A	A		C	D		C	
Approach Delay (s)		5.8			8.3			31.4			26.4	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	511	980	726	431	159	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.97	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1770	3505	3438	1536	3335	1374
Flt Permitted	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (perm)	1770	3505	3438	1536	3335	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	555	1065	789	468	173	145
RTOR Reduction (vph)	0	0	0	239	35	87
Lane Group Flow (vph)	555	1065	789	229	183	13
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	3%	5%	2%	2%	4%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	31.6	65.6	30.0	30.0	11.4	11.4
Effective Green, g (s)	31.6	65.6	30.0	30.0	11.4	11.4
Actuated g/C Ratio	0.37	0.77	0.35	0.35	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	658	2705	1213	542	447	184
v/s Ratio Prot	c0.31	0.30	c0.23		c0.05	
v/s Ratio Perm				0.15		0.01
v/c Ratio	0.84	0.39	0.65	0.42	0.41	0.07
Uniform Delay, d1	24.4	3.2	23.1	20.9	33.7	32.2
Progression Factor	0.89	1.05	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	0.4	2.7	2.4	0.2	0.1
Delay (s)	30.8	3.8	25.8	23.3	33.9	32.2
Level of Service	C	A	C	C	C	C
Approach Delay (s)		13.0	24.9		33.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	164	522	172	311	527	105	47	1618	738	95	614	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		0.99	1.00
Satd. Flow (prot)	3502	3610	1514	3502	3610	1529		5124	1577		5108	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.88	1.00		0.66	1.00
Satd. Flow (perm)	3502	3610	1514	3502	3610	1529		4509	1577		3413	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	567	187	338	573	114	51	1759	802	103	667	79
RTOR Reduction (vph)	0	0	41	0	0	28	0	0	0	0	0	42
Lane Group Flow (vph)	178	567	146	338	573	86	0	1810	802	0	770	37
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	10.0	33.1	33.1	12.0	35.1	35.1		34.9	95.0		34.9	34.9
Effective Green, g (s)	10.0	33.1	33.1	12.0	35.1	35.1		34.9	95.0		34.9	34.9
Actuated g/C Ratio	0.11	0.35	0.35	0.13	0.37	0.37		0.37	1.00		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	369	1258	528	442	1334	565		1656	1577		1254	562
v/s Ratio Prot	0.05	0.16		c0.10	0.16							
v/s Ratio Perm			0.10			0.06		c0.40	c0.51		0.23	0.02
v/c Ratio	0.48	0.45	0.28	0.76	0.43	0.15		1.09	0.51		1.29dl	0.07
Uniform Delay, d1	40.1	23.9	22.3	40.1	22.4	20.0		30.1	0.0		24.5	19.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	1.2	1.3	7.7	1.0	0.6		52.1	1.2		0.9	0.0
Delay (s)	41.1	25.1	23.6	47.8	23.5	20.6		82.2	1.2		25.4	19.5
Level of Service	D	C	C	D	C	C		F	A		C	B
Approach Delay (s)		27.8			31.2			57.3			24.9	
Approach LOS		C			C			E			C	

Intersection Summary

HCM Average Control Delay	42.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	180	141	17	31	40	79	5	213	131	203	61	14
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1941	794	960	2136	933	902	1797		1211	1955	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	1941	794	960	2136	933	902	1797		1211	1955	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	153	18	34	43	86	5	232	142	221	66	15
RTOR Reduction (vph)	0	0	14	0	0	75	0	55	0	0	7	0
Lane Group Flow (vph)	196	153	4	34	43	11	5	319	0	221	74	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	0%	86%	100%	88%	69%	69%	100%	92%	82%	49%	97%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						
Actuated Green, G (s)	17.2	23.3	23.3	6.1	12.2	12.2	1.1	27.5		25.0	51.4	
Effective Green, g (s)	17.2	23.3	23.3	6.1	12.2	12.2	1.1	27.5		25.0	51.4	
Actuated g/C Ratio	0.17	0.24	0.24	0.06	0.12	0.12	0.01	0.28		0.25	0.52	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	314	457	187	59	263	115	10	500		306	1016	
v/s Ratio Prot	c0.11	c0.08		0.04	0.02		0.01	c0.18		c0.18	0.04	
v/s Ratio Perm			0.01			0.01						
v/c Ratio	0.62	0.33	0.02	0.58	0.16	0.09	0.50	0.64		0.72	0.07	
Uniform Delay, d1	37.9	31.4	29.0	45.1	38.8	38.4	48.6	31.3		33.8	11.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	0.4	0.0	12.9	0.3	0.3	34.4	2.7		8.2	0.0	
Delay (s)	41.7	31.8	29.1	58.0	39.1	38.8	83.0	34.0		41.9	11.9	
Level of Service	D	C	C	E	D	D	F	C		D	B	
Approach Delay (s)		37.0			42.9			34.7			33.9	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	98.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/23/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	214	237	223	344	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.92		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1933		3367	2087		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1933		3367	2087		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	233	258	242	374	0	0
RTOR Reduction (vph)	165	0	0	0	0	0
Lane Group Flow (vph)	326	0	242	374	0	0
Heavy Vehicles (%)	71%	73%	4%	73%	2%	2%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	7.5		5.3	20.8		
Effective Green, g (s)	7.5		5.3	20.8		
Actuated g/C Ratio	0.36		0.25	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	697		858	2087		
v/s Ratio Prot	c0.17		0.07	c0.18		
v/s Ratio Perm						
v/c Ratio	0.47		0.28	0.18		
Uniform Delay, d1	5.1		6.2	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.5		0.2	0.0		
Delay (s)	5.6		6.4	0.0		
Level of Service	A		A	A		
Approach Delay (s)	5.6			2.5	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	3.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	20.8	Sum of lost time (s)	4.0
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	121	92	0	0	97	144	89	281	109	179	0	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.91		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	992	2391			2981		903	3207		1787		2256
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	992	2391			2981		903	3207		1787		2256
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	100	0	0	105	157	97	305	118	195	0	249
RTOR Reduction (vph)	0	0	0	0	129	0	0	40	0	0	0	202
Lane Group Flow (vph)	132	100	0	0	133	0	87	393	0	195	0	47
Heavy Vehicles (%)	82%	51%	0%	0%	24%	1%	82%	2%	0%	1%	0%	26%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	10.3	25.3			11.0		12.8	12.8		11.8		11.8
Effective Green, g (s)	10.3	25.3			11.0		12.8	12.8		11.8		11.8
Actuated g/C Ratio	0.17	0.41			0.18		0.21	0.21		0.19		0.19
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	165	977			530		187	663		341		430
v/s Ratio Prot	c0.13	0.04			c0.04		0.10	c0.12		c0.11		0.02
v/s Ratio Perm												
v/c Ratio	0.80	0.10			0.25		0.47	0.59		0.57		0.11
Uniform Delay, d1	24.8	11.3			21.9		21.5	22.2		22.8		20.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	23.5	0.0			0.2		1.8	1.4		2.3		0.1
Delay (s)	48.3	11.3			22.2		23.4	23.6		25.1		20.8
Level of Service	D	B			C		C	C		C		C
Approach Delay (s)		32.4			22.2			23.6			22.7	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	61.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	27	463	15	7	269	25	14	15	10	44	17	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		0.99	
Frt		1.00			0.99			1.00	0.85		0.96	
Flt Protected		1.00			1.00			0.98	1.00		0.97	
Satd. Flow (prot)		3537			3209			1846	1577		1757	
Flt Permitted		0.93			0.94			0.89	1.00		0.86	
Satd. Flow (perm)		3282			3032			1684	1577		1547	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	29	503	16	8	292	27	15	16	11	48	18	27
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	8	0	16	0
Lane Group Flow (vph)	0	546	0	0	319	0	0	31	3	0	77	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	6%	1%	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		59.0			59.0			23.0	23.0		23.0	
Effective Green, g (s)		59.0			59.0			23.0	23.0		23.0	
Actuated g/C Ratio		0.66			0.66			0.26	0.26		0.26	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		2152			1988			430	403		395	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.11			0.02	0.00		c0.05	
v/c Ratio		0.25			0.16			0.07	0.01		0.19	
Uniform Delay, d1		6.4			6.0			25.4	25.0		26.2	
Progression Factor		1.00			1.42			1.00	1.00		1.00	
Incremental Delay, d2		0.3			0.2			0.3	0.0		1.1	
Delay (s)		6.7			8.6			25.7	25.0		27.3	
Level of Service		A			A			C	C		C	
Approach Delay (s)		6.7			8.6			25.5			27.3	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↕			↕		↖	↗	
Volume (vph)	55	539	13	112	410	49	18	54	96	69	75	37
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.98			0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1787		1805	3382			1708		1756	1792	
Flt Permitted	0.95	1.00		0.95	1.00			0.95		0.35	1.00	
Satd. Flow (perm)	1805	1787		1805	3382			1639		648	1792	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	586	14	122	446	53	20	59	104	75	82	40
RTOR Reduction (vph)	0	1	0	0	6	0	0	70	0	0	26	0
Lane Group Flow (vph)	60	599	0	122	493	0	0	113	0	75	96	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	0%	5%	3%	0%	0%	0%	2%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	55.0		12.6	62.8			11.4		11.4	11.4	
Effective Green, g (s)	4.8	55.0		12.6	62.8			11.4		11.4	11.4	
Actuated g/C Ratio	0.05	0.61		0.14	0.70			0.13		0.13	0.13	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	96	1092		253	2360			208		82	227	
v/s Ratio Prot	0.03	c0.34		c0.07	0.15							0.05
v/s Ratio Perm								0.07		c0.12		
v/c Ratio	0.62	0.55		0.48	0.21			0.54		0.91	0.42	
Uniform Delay, d1	41.7	10.2		35.7	4.8			36.9		38.8	36.3	
Progression Factor	0.90	0.82		1.42	0.20			1.00		1.00	1.00	
Incremental Delay, d2	8.7	2.0		0.5	0.2			1.6		69.9	0.5	
Delay (s)	46.3	10.4		51.2	1.2			38.4		108.7	36.7	
Level of Service	D	B		D	A			D		F	D	
Approach Delay (s)		13.6			11.0			38.4			64.1	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↖	↗		↕	
Volume (vph)	29	727	10	61	537	24	39	76	147	9	5	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00	1.00		0.99	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)	1786	3400		1780	3413			1860	1498		1754	
Flt Permitted	0.35	1.00		0.26	1.00			0.92	1.00		0.92	
Satd. Flow (perm)	663	3400		479	3413			1735	1498		1646	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	790	11	66	584	26	42	83	160	10	5	7
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	56	0	4	0
Lane Group Flow (vph)	32	800	0	66	607	0	0	125	104	0	18	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	1%	5%	2%	0%	0%	5%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2		2		2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	302	1549		218	1555			790	682		750	
v/s Ratio Prot		c0.24			0.18							
v/s Ratio Perm	0.05			0.14				c0.07	0.07		0.01	
v/c Ratio	0.11	0.52		0.30	0.39			0.16	0.15		0.02	
Uniform Delay, d1	14.0	17.4		15.5	16.2			14.4	14.3		13.5	
Progression Factor	1.34	1.34		0.78	0.79			1.00	1.00		1.00	
Incremental Delay, d2	0.6	1.1		3.3	0.7			0.4	0.5		0.1	
Delay (s)	19.4	24.4		15.3	13.6			14.8	14.8		13.5	
Level of Service	B	C		B	B			B	B		B	
Approach Delay (s)		24.2			13.7			14.8			13.5	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	77	503	52	56	879	64	36	83	29	35	64	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.99	
Satd. Flow (prot)	1803	3357		1047	3471	1498	1518	2386			3126	
Flt Permitted	0.24	1.00		0.39	1.00	1.00	0.65	1.00			0.88	
Satd. Flow (perm)	464	3357		435	3471	1498	1034	2386			2772	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	547	57	61	955	70	39	90	32	38	70	58
RTOR Reduction (vph)	0	9	0	0	0	28	0	22	0	0	40	0
Lane Group Flow (vph)	84	595	0	61	955	42	39	100	0	0	126	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	14%	72%	4%	6%	18%	33%	77%	0%	17%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Effective Green, g (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.31	0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	278	2014		261	2083	899	322	742			862	
v/s Ratio Prot		0.18			c0.28			0.04				
v/s Ratio Perm	0.18			0.14		0.03	0.04				c0.05	
v/c Ratio	0.30	0.30		0.23	0.46	0.05	0.12	0.13			0.15	
Uniform Delay, d1	8.8	8.8		8.4	9.9	7.4	22.2	22.3			22.4	
Progression Factor	0.30	0.27		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	2.5	0.3		2.1	0.7	0.1	0.8	0.4			0.4	
Delay (s)	5.1	2.7		10.5	10.7	7.5	23.0	22.7			22.7	
Level of Service	A	A		B	B	A	C	C			C	
Approach Delay (s)		3.0			10.4			22.7			22.7	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑	↗	↗	↑↑	↗
Volume (vph)	70	367	71	109	752	41	124	69	66	126	208	85
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1580	4442		1797	4539		1742	1845	1582	1774	3539	1286
Flt Permitted	0.28	1.00		0.47	1.00		0.61	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	462	4442		889	4539		1120	1845	1582	1322	3539	1286
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	399	77	118	817	45	135	75	72	137	226	92
RTOR Reduction (vph)	0	34	0	0	7	0	0	0	41	0	0	52
Lane Group Flow (vph)	76	442	0	118	855	0	135	75	31	137	226	40
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	14%	16%	1%	0%	14%	0%	3%	3%	0%	1%	2%	23%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Effective Green, g (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Actuated g/C Ratio	0.46	0.46		0.46	0.46		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	212	2038		408	2083		481	792	679	568	1520	552
v/s Ratio Prot		0.10			c0.19			0.04				0.06
v/s Ratio Perm	0.16			0.13			c0.12		0.02	0.10		0.03
v/c Ratio	0.36	0.22		0.29	0.41		0.28	0.09	0.05	0.24	0.15	0.07
Uniform Delay, d1	14.9	13.8		14.4	15.3		15.7	14.4	14.1	15.4	14.8	14.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	0.2		0.1	0.0		1.5	0.2	0.1	1.0	0.2	0.3
Delay (s)	19.6	14.1		14.5	15.4		17.2	14.7	14.2	16.4	15.0	14.5
Level of Service	B	B		B	B		B	B	B	B	B	B
Approach Delay (s)		14.8			15.3			15.8			15.3	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	15.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	226	641	0	0	0	0	0	1212	1474	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.94	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4817						4578	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4817						4578	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	697	0	0	0	0	0	1317	1602	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	161	93	0	0	0
Lane Group Flow (vph)	0	943	0	0	0	0	0	1957	708	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	6%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						16.0	34.4			
Effective Green, g (s)		34.0						16.0	34.4			
Actuated g/C Ratio		0.57						0.27	0.57			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2730						1221	788			
v/s Ratio Prot								c0.43				
v/s Ratio Perm		0.20							c0.51			
v/c Ratio		0.35						1.60	0.90			
Uniform Delay, d1		7.0						22.0	11.3			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.3						275.3	12.9			
Delay (s)		7.4						297.3	24.2			
Level of Service		A						F	C			
Approach Delay (s)		7.4			0.0			222.3			0.0	
Approach LOS		A			A			F			A	

Intersection Summary

HCM Average Control Delay	169.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	86.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	52	900	826	0	0	0	0	331	55	29	311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.95	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			1.00	
Satd. Flow (prot)		4479	1341					1834			1824	
Flt Permitted		1.00	1.00					1.00			0.95	
Satd. Flow (perm)		4479	1341					1834			1733	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	978	898	0	0	0	0	360	60	32	338	0
RTOR Reduction (vph)	0	139	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	1345	449	0	0	0	0	412	0	0	370	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	5%	4%	2%	0%	0%	0%	0%	1%	2%	0%	4%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)			26.9	60.0				24.1			24.1	
Effective Green, g (s)			26.9	60.0				24.1			24.1	
Actuated g/C Ratio			0.45	1.00				0.40			0.40	
Clearance Time (s)			5.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)		2008	1341					737			696	
v/s Ratio Prot								c0.22				
v/s Ratio Perm		0.30	0.33								0.21	
v/c Ratio		0.67	0.33					0.56			0.53	
Uniform Delay, d1		13.0	0.0					13.8			13.7	
Progression Factor		0.51	1.00					0.86			1.00	
Incremental Delay, d2		0.2	0.2					2.9			2.9	
Delay (s)		6.9	0.2					14.8			16.6	
Level of Service		A	A					B			B	
Approach Delay (s)		5.3			0.0			14.8			16.6	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 20: Jackson Street & 6th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↗	↖	↗			↖	↗
Volume (vph)	0	0	0	11	435	78	344	330	0	0	220	1197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1792	1517	1767	1881			1570	1477
Flt Permitted				0.95	1.00	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)				1730	1792	1517	351	1881			1570	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	12	473	85	374	359	0	0	239	1301
RTOR Reduction (vph)	0	0	0	0	0	64	0	0	0	0	27	0
Lane Group Flow (vph)	0	0	0	12	473	21	374	359	0	0	758	755
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	6%	0%	2%	1%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	433	367	202	1082			903	1477
v/s Ratio Prot					c0.26			0.19			0.48	
v/s Ratio Perm				0.01		0.01	c1.07					0.51
v/c Ratio				0.03	1.09	0.06	1.85	0.33			0.84	0.51
Uniform Delay, d1				17.4	22.8	17.5	12.8	6.7			10.5	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.96	1.00
Incremental Delay, d2				0.1	70.5	0.3	401.7	0.8			8.7	1.2
Delay (s)				17.5	93.3	17.8	414.4	7.5			18.8	1.2
Level of Service				B	F	B	F	A			B	A
Approach Delay (s)		0.0			80.4			215.1			10.2	
Approach LOS		A			F			F			B	

Intersection Summary

HCM Average Control Delay	77.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘		↗	↕		↗	↕			↕	
Volume (vph)	29	151	26	301	64	19	16	269	627	5	48	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.89			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1854		1656	3471		1796	3019			3501	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.90	
Satd. Flow (perm)	1805	1854		1656	3471		1796	3019			3153	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	327	70	21	17	292	682	5	52	7
RTOR Reduction (vph)	0	8	0	0	13	0	0	422	0	0	5	0
Lane Group Flow (vph)	32	184	0	327	78	0	17	552	0	0	59	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	9%	0%	0%	0%	5%	6%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	0.9	12.9		9.6	21.6		0.4	20.6			16.2	
Effective Green, g (s)	0.9	12.9		9.6	21.6		0.4	20.6			16.2	
Actuated g/C Ratio	0.02	0.23		0.17	0.39		0.01	0.37			0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	29	434		289	1361		13	1129			927	
v/s Ratio Prot	0.02	c0.10		c0.20	0.02		0.01	c0.18				
v/s Ratio Perm											0.02	
v/c Ratio	1.10	0.42		1.13	0.06		1.31	0.49			0.06	
Uniform Delay, d1	27.1	17.9		22.8	10.4		27.4	13.2			14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	200.4	0.7		93.2	0.0		363.0	0.3			0.0	
Delay (s)	227.5	18.6		115.9	10.4		390.3	13.6			14.0	
Level of Service	F	B		F	B		F	B			B	
Approach Delay (s)		48.4			93.0			20.0			14.0	
Approach LOS		D			F			C			B	

Intersection Summary

HCM Average Control Delay	41.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	764	62	24	151	13	174	149	178	138	51	33
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1805	3365		1805	3561		1805	1865		1643	2574	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.98	
Satd. Flow (perm)	1805	3365		1805	3561		1805	1865		1643	2574	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	830	67	26	164	14	189	162	193	150	55	36
RTOR Reduction (vph)	0	4	0	0	5	0	0	154	0	0	23	0
Lane Group Flow (vph)	54	893	0	26	173	0	189	201	0	81	137	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	5%	17%	0%	0%	0%	0%	61%	88%	0%	77%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	4.9	30.5		2.6	28.7		15.4	15.4		11.9	11.9	
Effective Green, g (s)	4.9	30.5		2.6	28.7		15.4	15.4		11.9	11.9	
Actuated g/C Ratio	0.06	0.40		0.03	0.38		0.20	0.20		0.16	0.16	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	116	1343		61	1338		364	376		256	401	
v/s Ratio Prot	c0.03	c0.27		0.01	0.05		0.10	c0.11		0.05	c0.05	
v/s Ratio Perm												
v/c Ratio	0.47	0.66		0.43	0.13		0.52	0.53		0.32	0.34	
Uniform Delay, d1	34.5	18.8		36.2	15.7		27.2	27.3		28.6	28.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	1.4		4.7	0.1		1.7	1.9		1.0	0.7	
Delay (s)	37.4	20.1		40.9	15.7		28.9	29.2		29.6	29.5	
Level of Service	D	C		D	B		C	C		C	C	
Approach Delay (s)		21.1			18.9			29.1			29.5	
Approach LOS		C			B			C			C	

Intersection Summary

HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	11.5
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	30	117	178	56	627	0	0	478	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3566	1581	1796	1138			2820	1579
Flt Permitted					0.99	1.00	0.46	1.00			1.00	1.00
Satd. Flow (perm)					3566	1581	869	1138			2820	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	127	193	61	682	0	0	520	59
RTOR Reduction (vph)	0	0	0	0	0	147	0	0	0	0	0	14
Lane Group Flow (vph)	0	0	0	0	160	46	61	682	0	0	520	45
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	12%	100%	0%	0%	0%	0%	67%	85%	0%	28%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					12.8	12.8	67.7	67.7			67.7	67.7
Effective Green, g (s)					12.8	12.8	67.7	67.7			67.7	67.7
Actuated g/C Ratio					0.14	0.14	0.75	0.75			0.75	0.75
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					507	225	654	856			2121	1188
v/s Ratio Prot								c0.60			0.18	
v/s Ratio Perm					0.04	0.03	0.07					0.03
v/c Ratio					0.32	0.21	0.09	0.80			0.25	0.04
Uniform Delay, d1					34.7	34.1	3.0	6.9			3.4	2.8
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.4	0.5	0.3	7.6			0.3	0.1
Delay (s)					35.0	34.6	3.3	14.5			3.7	2.9
Level of Service					D	C	A	B			A	A
Approach Delay (s)		0.0			34.8			13.6			3.6	
Approach LOS		A			C			B			A	

Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/23/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	782	363	166	384	350	0	567	451
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.93			1.00	1.00
Flt Protected	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2970	1553	4634			1752	1881
Flt Permitted	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2970	1553	4634			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	850	395	180	417	380	0	616	490
RTOR Reduction (vph)	0	0	50	0	0	0	0	0
Lane Group Flow (vph)	425	820	130	797	0	0	616	490
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	28%	4%	1%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	30.2	30.2	30.2	24.8			21.5	49.8
Effective Green, g (s)	30.2	30.2	30.2	24.8			21.5	49.8
Actuated g/C Ratio	0.34	0.34	0.34	0.28			0.24	0.55
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	551	997	521	1277			419	1041
v/s Ratio Prot				c0.17			c0.35	0.26
v/s Ratio Perm	0.26	0.28	0.08					
v/c Ratio	0.77	0.82	0.25	0.87dr			1.47	0.47
Uniform Delay, d1	26.8	27.4	21.7	28.5			34.2	12.1
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	6.0	5.3	0.1	2.3			224.2	0.1
Delay (s)	32.8	32.7	21.8	30.8			258.5	12.3
Level of Service	C	C	C	C			F	B
Approach Delay (s)		31.4		30.8				149.4
Approach LOS		C		C				F

Intersection Summary

HCM Average Control Delay	70.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		





















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	84	12	36	143	105	60	218	157	36	55	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	91	13	39	155	114	65	237	171	39	60	36
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	140	13	195	114	184	289	69	66				
Volume Left (vph)	49	0	39	0	65	0	39	0				
Volume Right (vph)	0	13	0	114	0	171	0	36				
Hadj (s)	0.17	-0.70	0.34	-0.67	1.05	0.98	0.88	0.24				
Departure Headway (s)	7.0	6.1	6.9	5.9	7.2	7.1	7.6	6.9				
Degree Utilization, x	0.27	0.02	0.37	0.19	0.37	0.57	0.14	0.13				
Capacity (veh/h)	483	546	495	574	488	487	449	488				
Control Delay (s)	11.4	8.1	12.8	9.1	13.1	17.9	10.6	9.7				
Approach Delay (s)	11.1		11.5		16.0		10.2					
Approach LOS	B		B		C		B					
Intersection Summary												
Delay			13.3									
HCM Level of Service			B									
Intersection Capacity Utilization			49.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕		↗	↕	↗
Volume (veh/h)	13	367	14	12	147	14	43	8	39	34	14	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	399	15	13	160	15	47	9	42	37	15	58
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	180			419			688	638	409	670	638	170
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	180			419			688	638	409	670	638	170
tC, single (s)	4.1			4.7			7.6	7.4	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			4.0	4.8	3.3	3.5	4.8	3.3
p0 queue free %	99			99			82	97	93	89	95	93
cM capacity (veh/h)	1402			870			263	291	641	330	294	867

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	413	15	173	15	98	37	10	63
Volume Left	14	0	13	0	47	37	0	0
Volume Right	0	15	0	15	42	0	0	58
cSH	1402	1700	870	1700	358	330	294	749
Volume to Capacity	0.01	0.01	0.01	0.01	0.27	0.11	0.03	0.08
Queue Length 95th (ft)	1	0	1	0	27	9	3	7
Control Delay (s)	0.4	0.0	0.8	0.0	18.8	17.3	17.7	10.2
Lane LOS	A		A		C	C	C	B
Approach Delay (s)	0.3		0.8		18.8	13.3		
Approach LOS					C	B		

Intersection Summary

Average Delay	4.4
Intersection Capacity Utilization	48.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	154	12	12	125	0	0	0	0	26	123	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.97	
Flt Protected		1.00	1.00		1.00						0.99	
Satd. Flow (prot)		3610	1550		3587						3443	
Flt Permitted		1.00	1.00		0.94						0.99	
Satd. Flow (perm)		3610	1550		3372						3443	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	167	13	13	136	0	0	0	0	28	134	34
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	28	0
Lane Group Flow (vph)	0	167	9	0	149	0	0	0	0	0	168	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		55.3	55.3		55.3						12.7	
Effective Green, g (s)		55.3	55.3		55.3						12.7	
Actuated g/C Ratio		0.72	0.72		0.72						0.17	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2610	1120		2438						572	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.05	
v/c Ratio		0.06	0.01		0.06						0.29	
Uniform Delay, d1		3.1	3.0		3.1						28.0	
Progression Factor		1.00	1.00		0.24						1.00	
Incremental Delay, d2		0.0	0.0		0.0						0.3	
Delay (s)		3.1	3.0		0.8						28.3	
Level of Service		A	A		A						C	
Approach Delay (s)		3.1			0.8			0.0			28.3	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 270: Mandela Parkway & 14th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↑↑	↗		↔↔				
Volume (vph)	13	141	0	0	137	40	5	159	51	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		3518			3539	1520		3410				
Flt Permitted		0.94			1.00	1.00		1.00				
Satd. Flow (perm)		3309			3539	1520		3410				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	153	0	0	149	43	5	173	55	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	12	0	46	0	0	0	0
Lane Group Flow (vph)	0	167	0	0	149	31	0	187	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		55.3			55.3	55.3		12.7				
Effective Green, g (s)		55.3			55.3	55.3		12.7				
Actuated g/C Ratio		0.72			0.72	0.72		0.17				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2392			2558	1099		566				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.05				0.02		0.05				
v/c Ratio		0.07			0.06	0.03		0.33				
Uniform Delay, d1		3.1			3.1	3.0		28.1				
Progression Factor		0.54			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.3				
Delay (s)		1.7			3.1	3.0		28.5				
Level of Service		A			A	A		C				
Approach Delay (s)		1.7			3.1			28.5			0.0	
Approach LOS		A			A			C			A	

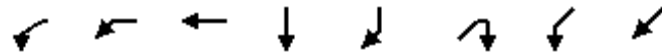
Intersection Summary

HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/23/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↖	↖↖	↑	↑↑↑	↘	↖	↖	↖
Volume (vph)	91	139	0	293	50	0	1064	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1697	3335		5187	1296		1715	1731
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1697	3335		5187	1296		1715	1731
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	151	0	318	54	0	1157	87
RTOR Reduction (vph)	39	0	0	0	0	0	0	0
Lane Group Flow (vph)	60	151	0	318	54	0	625	619
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	5%	5%	7%	0%	21%	2%	0%	0%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	10.9	10.9		10.9	10.9		49.2	49.2
Effective Green, g (s)	10.9	10.9		10.9	10.9		49.2	49.2
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	218	428		665	166		993	1002
v/s Ratio Prot				c0.06			c0.36	0.36
v/s Ratio Perm	0.04	c0.05			0.04			
v/c Ratio	0.27	0.35		0.48	0.33		0.63	0.62
Uniform Delay, d1	33.5	33.8		34.4	33.7		11.9	11.7
Progression Factor	0.58	0.72		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.5		0.5	1.1		3.0	2.9
Delay (s)	20.1	24.9		35.0	34.9		14.9	14.6
Level of Service	C	C		C	C		B	B
Approach Delay (s)			23.0	34.9				14.7
Approach LOS			C	C				B

Intersection Summary

HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/23/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑	↑	↑	↑↑↑
Volume (vph)	281	895	50	1526	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.91	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3038	1455	1537	1524	4571
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3038	1455	1537	1524	4571
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	305	973	54	1659	0
RTOR Reduction (vph)	0	0	27	0	0
Lane Group Flow (vph)	792	486	22	834	830
Heavy Vehicles (%)	7%	1%	1%	1%	3%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	47.0	47.0	28.5	28.5	28.5
Effective Green, g (s)	47.0	47.0	28.5	28.5	28.5
Actuated g/C Ratio	0.55	0.55	0.34	0.34	0.34
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1680	805	515	511	1533
v/s Ratio Prot	0.26		0.01	c0.55	0.18
v/s Ratio Perm		c0.33			
v/c Ratio	0.47	0.60	0.04	1.63	1.45dl
Uniform Delay, d1	11.5	12.8	19.0	28.2	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	3.3	0.0	293.3	0.4
Delay (s)	12.4	16.1	19.1	321.5	23.3
Level of Service	B	B	B	F	C
Approach Delay (s)	13.8				168.4
Approach LOS	B				F

Intersection Summary

HCM Average Control Delay	102.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	561	24	10	205	0	0	0	0	302	284	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5146			5172					1805	3539	1570
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5146			4698					1805	3539	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	610	26	11	223	0	0	0	0	328	309	224
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	118
Lane Group Flow (vph)	0	630	0	0	234	0	0	0	0	328	309	106
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		30.0			30.0					38.0	38.0	38.0
Effective Green, g (s)		30.0			30.0					38.0	38.0	38.0
Actuated g/C Ratio		0.38			0.38					0.48	0.48	0.48
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1930			1762					857	1681	746
v/s Ratio Prot		c0.12									0.09	
v/s Ratio Perm					0.05					c0.18		0.07
v/c Ratio		0.33			0.13					0.38	0.18	0.14
Uniform Delay, d1		17.8			16.4					13.5	12.1	11.8
Progression Factor		1.00			0.22					1.00	1.00	1.00
Incremental Delay, d2		0.5			0.1					1.3	0.2	0.4
Delay (s)		18.3			3.7					14.8	12.3	12.2
Level of Service		B			A					B	B	B
Approach Delay (s)		18.3			3.7			0.0			13.2	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖			↖↖↖	↖		↖↖↖				
Volume (vph)	408	468	0	0	216	852	13	886	79	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.97		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.90	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4831			4299	1334		5038				
Flt Permitted	0.95	0.67			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3283			4299	1334		5038				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	443	509	0	0	235	926	14	963	86	0	0	0
RTOR Reduction (vph)	0	0	0	0	18	18	0	13	0	0	0	0
Lane Group Flow (vph)	230	722	0	0	680	445	0	1050	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	1%	6%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	12.0	42.0			26.5	26.5		27.0				
Effective Green, g (s)	12.0	42.0			26.5	26.5		27.0				
Actuated g/C Ratio	0.15	0.52			0.33	0.33		0.34				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	233	1956			1424	442		1700				
v/s Ratio Prot	c0.15	0.06			0.16							
v/s Ratio Perm		0.14				c0.33		0.21				
v/c Ratio	0.99	1.00dl			0.91dr	1.01		0.62				
Uniform Delay, d1	33.9	11.2			21.3	26.8		22.2				
Progression Factor	1.02	1.94			1.00	1.00		1.00				
Incremental Delay, d2	54.5	0.5			1.1	44.5		1.7				
Delay (s)	89.2	22.2			22.4	71.2		23.9				
Level of Service	F	C			C	E		C				
Approach Delay (s)		38.4			41.9			23.9			0.0	
Approach LOS		D			D			C			A	

Intersection Summary

















HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

- dl Defacto Left Lane. Recode with 1 though lane as a left lane.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/23/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	469	1077	0	989	173	104	9	171	21	162	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.90			0.98			0.91			0.99	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3117			3504			3136			3488	
Flt Permitted		1.00			1.00			0.98			0.99	
Satd. Flow (perm)		3117			3504			3136			3488	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	510	1171	0	1075	188	113	10	186	23	176	22
RTOR Reduction (vph)	0	516	0	0	22	0	0	169	0	0	13	0
Lane Group Flow (vph)	0	1165	0	0	1241	0	0	140	0	0	208	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	1%	3%	1%	0%	0%	0%	1%	2%	4%	0%	1%	1%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1582			1779			289			751	
v/s Ratio Prot		c0.37			0.35			c0.04			c0.06	
v/s Ratio Perm												
v/c Ratio		0.88dr			0.70			0.49			0.28	
Uniform Delay, d1		12.6			12.2			28.0			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.1			2.3			5.7			0.9	
Delay (s)		15.7			14.5			33.8			22.2	
Level of Service		B			B			C			C	
Approach Delay (s)		15.7			14.5			33.8			22.2	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM Average Control Delay			17.3				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			65.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			80.1%				ICU Level of Service				D	
Analysis Period (min)			15									
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	63	606	22	112	368	150	40	318	85	190	236	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5148	1528	1737	3375		1771	1881	1556	1793	1881	1572
Flt Permitted		0.84	1.00	0.36	1.00		0.49	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)		4337	1528	652	3375		917	1881	1556	682	1881	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	659	24	122	400	163	43	346	92	207	257	68
RTOR Reduction (vph)	0	0	10	0	55	0	0	0	36	0	0	41
Lane Group Flow (vph)	0	727	14	122	508	0	43	346	56	207	257	27
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	0%	1%	3%	1%	1%	1%	1%	1%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		4	4			2			2	
Permitted Phases	4								2	2		2
Actuated Green, G (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.58	0.58	0.58	0.58		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2494	879	375	1941		275	564	467	205	564	472
v/s Ratio Prot					0.15			0.18			0.14	
v/s Ratio Perm		0.17	0.01	c0.19			0.05		0.04	c0.30		0.02
v/c Ratio		0.29	0.02	0.33	0.26		0.16	0.61	0.12	1.01	0.46	0.06
Uniform Delay, d1		8.7	7.3	8.9	8.5		20.6	24.0	20.3	28.0	22.7	19.9
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	2.3	0.3		1.2	4.9	0.5	65.4	2.6	0.2
Delay (s)		9.0	7.3	11.2	8.8		21.8	28.9	20.9	93.4	25.3	20.2
Level of Service		A	A	B	A		C	C	C	F	C	C
Approach Delay (s)		8.9			9.3			26.8			51.2	
Approach LOS		A			A			C			D	

Intersection Summary

HCM Average Control Delay	21.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	410	592	0	614	1593	0	0	0	555	0	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.95			0.98	0.98				1.00		0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.92	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3099			3021	1388				3433		1552
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3099			3021	1388				3433		1552
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	446	643	0	667	1732	0	0	0	603	0	295
RTOR Reduction (vph)	0	222	0	0	245	0	0	0	0	0	0	222
Lane Group Flow (vph)	263	867	0	0	1288	866	0	0	0	603	0	73
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	1%	0%	1%	4%	0%	0%	0%	2%	15%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	14.1	54.2			36.1	82.8				20.6		20.6
Effective Green, g (s)	14.1	54.2			36.1	82.8				20.6		20.6
Actuated g/C Ratio	0.17	0.65			0.44	1.00				0.25		0.25
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	304	2029			1317	1388				854		386
v/s Ratio Prot	c0.15	0.28			c0.43					0.18		
v/s Ratio Perm						c0.62						0.05
v/c Ratio	0.87	0.43			0.98	0.62				0.71		0.19
Uniform Delay, d1	33.4	6.9			23.0	0.0				28.3		24.5
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	21.7	0.1			19.5	2.1				2.7		0.2
Delay (s)	55.1	7.0			42.5	2.1				31.0		24.8
Level of Service	E	A			D	A				C		C
Approach Delay (s)		16.4			27.9			0.0			29.0	
Approach LOS		B			C			A			C	

Intersection Summary		
HCM Average Control Delay	24.8	HCM Level of Service C
HCM Volume to Capacity ratio	0.84	
Actuated Cycle Length (s)	82.8	Sum of lost time (s) 8.0
Intersection Capacity Utilization	74.2%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	134	717	0	0	1424	354	361	79	713	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.89	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5136	1550	1649	1485	1490			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5136	1550	1649	1485	1490			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	779	0	0	1548	385	392	86	775	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	229	0	127	127	0	0	0
Lane Group Flow (vph)	146	779	0	0	1548	156	353	331	315	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	4%	4%	3%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	5.2	32.3			23.1	23.1	16.7	16.7	16.7			
Effective Green, g (s)	5.2	32.3			23.1	23.1	16.7	16.7	16.7			
Actuated g/C Ratio	0.09	0.57			0.41	0.41	0.29	0.29	0.29			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	163	2910			2081	628	483	435	437			
v/s Ratio Prot	c0.08	0.15			c0.30		0.21	c0.22	0.21			
v/s Ratio Perm						0.10						
v/c Ratio	0.90	0.27			0.74	0.25	0.73	0.76	0.72			
Uniform Delay, d1	25.6	6.3			14.4	11.2	18.1	18.3	18.1			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	41.5	0.0			1.5	0.2	5.6	7.6	5.8			
Delay (s)	67.1	6.4			15.9	11.4	23.8	26.0	23.8			
Level of Service	E	A			B	B	C	C	C			
Approach Delay (s)		15.9			15.0			24.6			0.0	
Approach LOS		B			B			C			A	

Intersection Summary		
HCM Average Control Delay	18.1	HCM Level of Service
HCM Volume to Capacity ratio	0.77	B
Actuated Cycle Length (s)	57.0	Sum of lost time (s)
Intersection Capacity Utilization	64.3%	ICU Level of Service
Analysis Period (min)	15	C
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	383	711	570	155	1006	125	402	42	159	143	67	613
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.97	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3400	3250	1411	1805	3574	1615	1698	1721	1615		1838	2704
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3400	3250	1411	1805	3574	1615	1698	1721	1615		1838	2704
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	416	773	620	168	1093	136	437	46	173	155	73	666
RTOR Reduction (vph)	0	21	284	0	0	43	0	0	149	0	0	255
Lane Group Flow (vph)	416	944	144	168	1093	93	240	243	24	0	228	411
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	3%	3%	1%	0%	1%	0%	1%	0%	0%	0%	0%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	10.1	29.1	29.1	9.2	28.2	28.2	12.1	12.1	12.1		19.9	19.9
Effective Green, g (s)	10.1	29.1	29.1	9.2	28.2	28.2	12.1	12.1	12.1		19.9	19.9
Actuated g/C Ratio	0.12	0.34	0.34	0.11	0.33	0.33	0.14	0.14	0.14		0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	398	1096	476	192	1168	528	238	241	226		424	624
v/s Ratio Prot	c0.12	0.29		0.09	c0.31	0.06	c0.14	0.14	0.02		0.12	
v/s Ratio Perm			0.10									c0.15
v/c Ratio	1.05	0.86	0.30	0.88	0.94	0.18	1.01	1.01	0.11		0.54	0.66
Uniform Delay, d1	38.1	26.7	21.1	38.0	28.2	20.8	37.1	37.1	32.4		29.2	30.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	57.4	7.1	0.4	32.8	13.6	0.2	60.5	60.1	0.2		1.3	2.5
Delay (s)	95.5	33.8	21.5	70.8	41.7	20.9	97.6	97.2	32.6		30.5	32.6
Level of Service	F	C	C	E	D	C	F	F	C		C	C
Approach Delay (s)		45.1			43.2			80.3			32.1	
Approach LOS		D			D			F			C	

Intersection Summary

HCM Average Control Delay	47.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	86.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	681	145	62	528	64	430	418	53	85	260	231
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3411		1770	3527		1787	1826		1805	1863	1560
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.47	1.00	1.00
Satd. Flow (perm)	1752	3411		1770	3527		1787	1826		902	1863	1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	740	158	67	574	70	467	454	58	92	283	251
RTOR Reduction (vph)	0	19	0	0	10	0	0	5	0	0	0	48
Lane Group Flow (vph)	157	879	0	67	634	0	467	507	0	92	283	203
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	3%	2%	1%	2%	0%	0%	1%	2%	1%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	9.0	24.9		3.9	19.8		24.1	34.1		18.1	18.1	27.1
Effective Green, g (s)	9.0	24.9		3.9	19.8		24.1	34.1		18.1	18.1	27.1
Actuated g/C Ratio	0.10	0.29		0.04	0.23		0.28	0.39		0.21	0.21	0.31
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	181	976		79	803		495	716		272	388	558
v/s Ratio Prot	c0.09	c0.26		0.04	0.18		c0.26	c0.28		0.03	c0.15	0.04
v/s Ratio Perm										0.04		0.09
v/c Ratio	0.87	0.90		0.85	0.79		0.94	0.71		0.34	0.73	0.36
Uniform Delay, d1	38.4	29.9		41.3	31.6		30.8	22.3		30.4	32.2	23.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	32.6	11.2		53.2	5.2		26.7	3.2		0.7	6.7	0.4
Delay (s)	71.0	41.1		94.5	36.8		57.5	25.5		31.1	38.9	23.7
Level of Service	E	D		F	D		E	C		C	D	C
Approach Delay (s)		45.5			42.3			40.8			31.6	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	40.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗	↖	↖	↖↗	↖	↖	↖↗	↖
Volume (vph)	194	664	152	100	315	46	171	938	113	171	810	78
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3433		1805	3610	1579	1787	3505	1580	1805	3539	1564
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3433		1805	3610	1579	1787	3505	1580	1805	3539	1564
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	211	722	165	109	342	50	186	1020	123	186	880	85
RTOR Reduction (vph)	0	22	0	0	0	30	0	0	27	0	0	21
Lane Group Flow (vph)	211	865	0	109	342	20	186	1020	96	186	880	64
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	2%	1%	0%	0%	0%	1%	3%	0%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	25.6		7.5	23.6	23.6	11.9	31.6	31.6	10.3	30.0	30.0
Effective Green, g (s)	9.5	25.6		7.5	23.6	23.6	11.9	31.6	31.6	10.3	30.0	30.0
Actuated g/C Ratio	0.11	0.28		0.08	0.26	0.26	0.13	0.35	0.35	0.11	0.33	0.33
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	976		150	947	414	236	1231	555	207	1180	521
v/s Ratio Prot	c0.12	c0.25		0.06	0.09		0.10	c0.29		c0.10	0.25	
v/s Ratio Perm						0.01			0.06			0.04
v/c Ratio	1.14	0.89		0.73	0.36	0.05	0.79	0.83	0.17	0.90	0.75	0.12
Uniform Delay, d1	40.2	30.8		40.2	27.1	24.8	37.8	26.7	20.2	39.3	26.6	20.9
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	109.0	9.7		16.0	0.2	0.0	15.9	6.5	0.7	35.6	4.3	0.5
Delay (s)	149.3	40.5		56.3	27.3	24.9	53.7	33.2	20.9	75.0	30.9	21.3
Level of Service	F	D		E	C	C	D	C	C	E	C	C
Approach Delay (s)		61.4			33.4			35.0			37.3	
Approach LOS		E			C			C			D	

Intersection Summary		
HCM Average Control Delay	42.6	HCM Level of Service D
HCM Volume to Capacity ratio	0.80	
Actuated Cycle Length (s)	90.0	Sum of lost time (s) 6.0
Intersection Capacity Utilization	78.5%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	124	570	8	112	275	25	140	829	22	63	648	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3531		1805	3553		1805	3559		1805	3555	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	3531		1805	3553		1805	3559		1805	3555	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	620	9	122	299	27	152	901	24	68	704	24
RTOR Reduction (vph)	0	1	0	0	6	0	0	1	0	0	2	0
Lane Group Flow (vph)	135	628	0	122	320	0	152	924	0	68	726	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	1%	2%	0%	0%	0%	2%	0%	1%	0%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	11.6	22.7		11.2	22.3		12.2	32.9		7.3	28.0	
Effective Green, g (s)	11.6	22.7		11.2	22.3		12.2	32.9		7.3	28.0	
Actuated g/C Ratio	0.13	0.26		0.13	0.25		0.14	0.37		0.08	0.32	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	910		229	899		250	1329		150	1130	
v/s Ratio Prot	c0.08	c0.18		0.07	0.09		c0.08	c0.26		0.04	0.20	
v/s Ratio Perm												
v/c Ratio	0.57	0.69		0.53	0.36		0.61	0.70		0.45	0.64	
Uniform Delay, d1	35.9	29.5		36.0	27.0		35.7	23.4		38.5	25.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	2.3		2.4	0.2		4.1	1.6		2.2	1.3	
Delay (s)	39.3	31.8		38.4	27.2		39.8	25.0		40.7	27.0	
Level of Service	D	C		D	C		D	C		D	C	
Approach Delay (s)		33.1			30.3			27.1			28.2	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	88.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/23/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	468	516	195	2108	1482	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	1553		5068	4993	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	3433	1553		3200	4993	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	509	561	212	2291	1611	286
RTOR Reduction (vph)	0	21	0	0	21	0
Lane Group Flow (vph)	509	540	0	2503	1876	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	2%	0%	1%	2%	1%	1%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	37.0	37.0		75.0	75.0	
Effective Green, g (s)	37.0	37.0		75.0	75.0	
Actuated g/C Ratio	0.31	0.31		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1059	479		2000	3121	
v/s Ratio Prot	0.15				0.38	
v/s Ratio Perm		c0.35		c0.78		
v/c Ratio	0.48	1.13		2.52dl	0.60	
Uniform Delay, d1	33.7	41.5		22.5	13.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	80.5		117.5	0.9	
Delay (s)	35.3	122.0		140.0	14.4	
Level of Service	D	F		F	B	
Approach Delay (s)	80.8			140.0	14.4	
Approach LOS	F			F	B	

Intersection Summary

HCM Average Control Delay	84.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.0%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	655	103	91	684	48	134	362	70	120	183	488
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1703	3440		1787	3468		1736	3439		1805	1881	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1703	3440		1787	3468		1736	3439		1805	1881	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	712	112	99	743	52	146	393	76	130	199	530
RTOR Reduction (vph)	0	15	0	0	6	0	0	21	0	0	0	220
Lane Group Flow (vph)	293	809	0	99	789	0	146	448	0	130	199	310
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	6%	2%	3%	1%	3%	1%	4%	2%	1%	0%	1%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	29.1		6.7	23.7		7.1	18.2		6.1	17.2	17.2
Effective Green, g (s)	12.1	29.1		6.7	23.7		7.1	18.2		6.1	17.2	17.2
Actuated g/C Ratio	0.16	0.38		0.09	0.31		0.09	0.24		0.08	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	271	1315		157	1080		162	822		145	425	354
v/s Ratio Prot	c0.17	0.24		0.06	c0.23		c0.08	0.13		0.07	0.11	
v/s Ratio Perm												c0.20
v/c Ratio	1.08	0.61		0.63	0.73		0.90	0.55		0.90	0.47	0.88
Uniform Delay, d1	32.0	19.0		33.5	23.4		34.2	25.3		34.7	25.5	28.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.0	0.9		8.0	2.6		43.2	0.7		45.1	0.8	20.8
Delay (s)	110.0	19.8		41.5	25.9		77.3	26.1		79.7	26.3	49.2
Level of Service	F	B		D	C		E	C		E	C	D
Approach Delay (s)		43.5			27.6			38.2			48.5	
Approach LOS		D			C			D			D	

Intersection Summary

HCM Average Control Delay	39.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	76.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖		↖	↗	↗	↖	↗	↖
Volume (vph)	126	662	248	80	573	110	205	979	116	231	869	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1762	3401			3212		1787	3505	1540	1787	3539	1533
Flt Permitted	0.25	1.00			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	462	3401			2229		1787	3505	1540	1787	3539	1533
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	720	270	87	623	120	223	1064	126	251	945	117
RTOR Reduction (vph)	0	58	0	0	21	0	0	0	22	0	0	22
Lane Group Flow (vph)	137	932	0	0	809	0	223	1064	104	251	945	95
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	2%	1%	1%	0%	2%	1%	1%	3%	1%	1%	2%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	30.0	30.0			30.0		5.1	17.3	17.3	8.1	20.3	20.3
Effective Green, g (s)	30.0	30.0			30.0		5.1	17.3	17.3	8.1	20.3	20.3
Actuated g/C Ratio	0.45	0.45			0.45		0.08	0.26	0.26	0.12	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	206	1514			992		135	900	395	215	1066	462
v/s Ratio Prot		0.27					c0.12	c0.30		c0.14	0.27	
v/s Ratio Perm	0.30				c0.36				0.07			0.06
v/c Ratio	0.67	0.62			0.82		1.65	1.18	0.26	1.17	0.89	0.20
Uniform Delay, d1	14.7	14.3			16.3		31.2	25.1	20.0	29.7	22.5	17.5
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.8	0.8			5.3		323.9	93.4	0.4	113.9	9.1	0.2
Delay (s)	22.6	15.0			21.6		355.1	118.4	20.3	143.6	31.5	17.8
Level of Service	C	B			C		F	F	C	F	C	B
Approach Delay (s)		16.0			21.6			147.0			51.7	
Approach LOS		B			C			F			D	

Intersection Summary

HCM Average Control Delay	66.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	67.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/23/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↶↶	↶↷		↶↶	↶↶
Volume (vph)	258	503	465	162	279	894
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3429		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3429		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	547	505	176	303	972
RTOR Reduction (vph)	0	430	41	0	0	0
Lane Group Flow (vph)	280	117	640	0	303	972
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	11.6	11.6	20.1		10.4	28.8
Effective Green, g (s)	11.6	11.6	20.1		10.4	28.8
Actuated g/C Ratio	0.21	0.21	0.37		0.19	0.53
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	387	598	1274		673	1922
v/s Ratio Prot	c0.16	0.04	0.19		c0.09	c0.27
v/s Ratio Perm						
v/c Ratio	0.72	0.20	0.50		0.45	0.51
Uniform Delay, d1	19.8	17.4	13.1		19.3	8.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.2	0.3		0.5	0.2
Delay (s)	26.3	17.6	13.4		19.8	8.3
Level of Service	C	B	B		B	A
Approach Delay (s)	20.5		13.4			11.0
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	224	201	83	91	286	64	149	462	101	165	747	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3610	1571	1805	3459		1805	3465		1787	3610	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3610	1571	1805	3459		1805	3465		1787	3610	1574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	243	218	90	99	311	70	162	502	110	179	812	404
RTOR Reduction (vph)	0	0	70	0	26	0	0	22	0	0	0	223
Lane Group Flow (vph)	243	218	20	99	355	0	162	590	0	179	812	181
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	1%	0%	1%	0%	1%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	5.1	14.6	14.6	5.4	14.9		7.2	20.0		10.9	23.7	23.7
Effective Green, g (s)	5.1	14.6	14.6	5.4	14.9		7.2	20.0		10.9	23.7	23.7
Actuated g/C Ratio	0.08	0.22	0.22	0.08	0.22		0.11	0.30		0.16	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	264	788	343	146	770		194	1036		291	1279	558
v/s Ratio Prot	c0.07	0.06		0.05	c0.10		c0.09	0.17		0.10	c0.22	
v/s Ratio Perm			0.01									0.12
v/c Ratio	0.92	0.28	0.06	0.68	0.46		0.84	0.57		0.62	0.63	0.32
Uniform Delay, d1	30.7	21.8	20.7	29.9	22.5		29.3	19.8		26.0	18.0	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	34.9	0.2	0.1	11.8	0.4		25.5	0.7		3.8	1.0	0.3
Delay (s)	65.6	21.9	20.8	41.7	23.0		54.7	20.5		29.9	19.0	16.1
Level of Service	E	C	C	D	C		D	C		C	B	B
Approach Delay (s)		41.0			26.8			27.7			19.6	
Approach LOS		D			C			C			B	

Intersection Summary		
HCM Average Control Delay	26.3	HCM Level of Service C
HCM Volume to Capacity ratio	0.59	
Actuated Cycle Length (s)	66.9	Sum of lost time (s) 12.0
Intersection Capacity Utilization	67.0%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	208	53	68	177	187	65	370	38	200	943	27
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3456		1805	3277		3467	3574	1579	3502	3610	1577
Flt Permitted	0.48	1.00		0.58	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	900	3456		1097	3277		3467	3574	1579	3502	3610	1577
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	226	58	74	192	203	71	402	41	217	1025	29
RTOR Reduction (vph)	0	37	0	0	152	0	0	0	24	0	0	9
Lane Group Flow (vph)	93	247	0	74	243	0	71	402	17	217	1025	20
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	1%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	12.9	12.9		12.9	12.9		2.5	20.7	20.7	5.6	23.8	23.8
Effective Green, g (s)	12.9	12.9		12.9	12.9		2.5	20.7	20.7	5.6	23.8	23.8
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.05	0.40	0.40	0.11	0.46	0.46
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	227	871		276	826		169	1445	638	383	1678	733
v/s Ratio Prot		0.07			0.07		0.02	0.11		c0.06	c0.28	
v/s Ratio Perm	c0.10			0.07					0.01			0.01
v/c Ratio	0.41	0.28		0.27	0.29		0.42	0.28	0.03	0.57	0.61	0.03
Uniform Delay, d1	16.0	15.4		15.4	15.5		23.6	10.2	9.2	21.6	10.2	7.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.2		0.5	0.2		1.7	0.1	0.0	1.9	0.7	0.0
Delay (s)	17.2	15.6		15.9	15.7		25.3	10.3	9.2	23.6	10.9	7.4
Level of Service	B	B		B	B		C	B	A	C	B	A
Approach Delay (s)		16.0			15.7			12.3			13.0	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	274	420	554	651	68	132	25	249	23	21	15
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3343	1213	1612	3487		917	913	1316	1504	1654	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.97	1.00	0.95	1.00	
Satd. Flow (perm)	1687	3343	1213	1612	3487		917	913	1316	1504	1654	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	298	457	602	708	74	143	27	271	25	23	16
RTOR Reduction (vph)	0	0	345	0	5	0	0	0	224	0	15	0
Lane Group Flow (vph)	43	298	112	602	777	0	84	86	47	25	24	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	7%	8%	30%	12%	1%	9%	87%	100%	20%	20%	0%	13%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	4.8	20.8	20.8	27.0	43.0		14.8	14.8	14.8	5.6	5.6	
Effective Green, g (s)	4.8	20.8	20.8	27.0	43.0		14.8	14.8	14.8	5.6	5.6	
Actuated g/C Ratio	0.06	0.25	0.25	0.32	0.51		0.17	0.17	0.17	0.07	0.07	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	96	821	298	514	1770		160	160	230	99	109	
v/s Ratio Prot	0.03	0.09		c0.37	c0.22		0.09	c0.09		c0.02	0.01	
v/s Ratio Perm			0.09						0.04			
v/c Ratio	0.45	0.36	0.38	1.17	0.44		0.53	0.54	0.21	0.25	0.22	
Uniform Delay, d1	38.7	26.5	26.6	28.9	13.2		31.8	31.8	29.9	37.6	37.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	0.5	1.4	96.2	0.3		4.0	4.4	0.6	1.3	1.0	
Delay (s)	42.0	26.9	27.9	125.1	13.5		35.8	36.2	30.5	38.9	38.5	
Level of Service	D	C	C	F	B		D	D	C	D	D	
Approach Delay (s)		28.3			62.0			32.6			38.7	
Approach LOS		C			E			C			D	

Intersection Summary

HCM Average Control Delay	46.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	84.7	Sum of lost time (s)	11.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	104	217	239	250	728	226	282	261	230	148	370	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	2704		1656	3505	1553	1641	2693		1752	2690	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	2704		1656	3505	1553	1641	2693		1752	2690	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	236	260	272	791	246	307	284	250	161	402	165
RTOR Reduction (vph)	0	170	0	0	0	148	0	213	0	0	68	0
Lane Group Flow (vph)	113	326	0	272	791	98	307	321	0	161	499	0
Confl. Peds. (#/hr)			10									
Heavy Vehicles (%)	2%	5%	37%	9%	3%	4%	10%	34%	14%	3%	40%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	4.4	21.4		7.6	24.6	24.6	7.1	9.1		7.1	9.1	
Effective Green, g (s)	4.4	21.4		7.6	24.6	24.6	7.1	9.1		7.1	9.1	
Actuated g/C Ratio	0.07	0.35		0.12	0.40	0.40	0.12	0.15		0.12	0.15	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	126	938		204	1397	619	189	397		202	397	
v/s Ratio Prot	0.06	0.12		c0.16	c0.23		c0.19	0.12		0.09	c0.19	
v/s Ratio Perm						0.06						
v/c Ratio	0.90	0.35		1.33	0.57	0.16	1.62	0.81		0.80	1.26	
Uniform Delay, d1	28.4	15.0		27.1	14.4	11.9	27.3	25.5		26.6	26.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	50.3	0.4		179.5	0.8	0.2	303.9	11.8		19.7	134.5	
Delay (s)	78.7	15.4		206.5	15.2	12.1	331.2	37.2		46.3	160.8	
Level of Service	E	B		F	B	B	F	D		D	F	
Approach Delay (s)		27.1			54.4			144.5			135.5	
Approach LOS		C			D			F			F	

Intersection Summary

HCM Average Control Delay	88.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	61.7	Sum of lost time (s)	16.5
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↖	↑↑						↖	
Volume (vph)	0	549	72	172	838	0	0	0	0	31	184	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.98		1.00	1.00						0.92	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		4857		1797	3471						3097	
Flt Permitted		1.00		0.38	1.00						1.00	
Satd. Flow (perm)		4857		726	3471						3097	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	597	78	187	911	0	0	0	0	34	200	296
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	67	0
Lane Group Flow (vph)	0	661	0	187	911	0	0	0	0	0	463	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	7%	5%	2%	0%	4%	1%	1%	0%	0%	2%	2%	8%
Turn Type		NA		Perm	NA						Perm	NA
Protected Phases		4			8							6
Permitted Phases				8						6		
Actuated Green, G (s)		33.2		33.2	33.2							15.1
Effective Green, g (s)		33.2		33.2	33.2							15.1
Actuated g/C Ratio		0.57		0.57	0.57							0.26
Clearance Time (s)		5.0		5.0	5.0							5.0
Vehicle Extension (s)		2.0		2.0	2.0							2.0
Lane Grp Cap (vph)		2766		413	1977							802
v/s Ratio Prot		0.14			c0.26							
v/s Ratio Perm				0.26								0.15
v/c Ratio		0.24		0.45	0.46							0.58
Uniform Delay, d1		6.3		7.3	7.3							18.8
Progression Factor		1.00		0.34	0.30							1.00
Incremental Delay, d2		0.0		0.3	0.1							0.6
Delay (s)		6.3		2.7	2.2							19.5
Level of Service		A		A	A							B
Approach Delay (s)		6.3			2.3			0.0				19.5
Approach LOS		A			A			A				B

Intersection Summary

HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	147	433	0	0	945	55	65	91	83	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.95				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5019			5037			3289				
Flt Permitted		0.66			1.00			0.99				
Satd. Flow (perm)		3357			5037			3289				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	471	0	0	1027	60	71	99	90	0	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	0	67	0	0	0	0
Lane Group Flow (vph)	0	631	0	0	1081	0	0	193	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		33.2			33.2			15.1				
Effective Green, g (s)		33.2			33.2			15.1				
Actuated g/C Ratio		0.57			0.57			0.26				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1912			2868			852				
v/s Ratio Prot					c0.21							
v/s Ratio Perm		0.19						0.06				
v/c Ratio		0.33			0.38			0.23				
Uniform Delay, d1		6.7			6.9			17.0				
Progression Factor		0.33			1.00			1.00				
Incremental Delay, d2		0.0			0.0			0.0				
Delay (s)		2.2			6.9			17.1				
Level of Service		A			A			B				
Approach Delay (s)		2.2			6.9			17.1			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

HCM Average Control Delay	6.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕			↕↕↕			↕↕			↕↕	
Volume (vph)	52	307	42	35	666	34	196	630	34	42	147	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		4872			4994			3539			3498	
Flt Permitted		0.80			0.90			0.81			0.62	
Satd. Flow (perm)		3934			4520			2889			2181	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	334	46	38	724	37	213	685	37	46	160	29
RTOR Reduction (vph)	0	18	0	0	7	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	419	0	0	793	0	0	932	0	0	221	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		47.5			47.5			24.0			24.0	
Effective Green, g (s)		47.5			47.5			24.0			24.0	
Actuated g/C Ratio		0.59			0.59			0.30			0.30	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2336			2684			867			654	
v/s Ratio Prot												
v/s Ratio Perm		0.11			0.18			0.32			0.10	
v/c Ratio		0.18			0.30			1.07			0.34	
Uniform Delay, d1		7.4			8.0			28.0			21.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.3			52.6			1.4	
Delay (s)		7.6			8.3			80.6			23.2	
Level of Service		A			A			F			C	
Approach Delay (s)		7.6			8.3			80.6			23.2	
Approach LOS		A			A			F			C	

Intersection Summary






















HCM Average Control Delay	37.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/23/2012

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	27	468	68	89	843	39	92	201	82	19	401	143	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5	
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00	1.00		1.00	1.00	
Satd. Flow (prot)		3437	1446		3398	1547	1729	1845	1574		1809	1543	
Flt Permitted		0.87	1.00		0.82	1.00	0.18	1.00	1.00		0.98	1.00	
Satd. Flow (perm)		2984	1446		2816	1547	322	1845	1574		1780	1543	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	29	509	74	97	916	42	100	218	89	21	436	155	
RTOR Reduction (vph)	0	0	30	0	0	11	0	0	62	0	0	70	
Lane Group Flow (vph)	0	538	44	0	1013	31	100	218	27	0	457	85	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10	
Heavy Vehicles (%)	0%	5%	7%	21%	4%	0%	4%	3%	0%	0%	5%	2%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases		2			6			8			4		
Permitted Phases	2		2	6		6	8		8	4		4	
Actuated Green, G (s)		53.5	53.5		53.5	53.5	27.5	27.5	27.5		27.5	27.5	
Effective Green, g (s)		53.5	53.5		53.5	53.5	27.5	27.5	27.5		27.5	27.5	
Actuated g/C Ratio		0.59	0.59		0.59	0.59	0.31	0.31	0.31		0.31	0.31	
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1774	860		1674	920	98	564	481		544	471	
v/s Ratio Prot								0.12					
v/s Ratio Perm		0.18	0.03		0.36	0.02	0.31		0.02		0.26	0.05	
v/c Ratio		0.30	0.05		0.61	0.03	1.02	0.39	0.06		0.84	0.18	
Uniform Delay, d1		9.0	7.6		11.6	7.6	31.2	24.6	22.1		29.2	23.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.1		1.6	0.1	96.5	0.2	0.0		10.8	0.1	
Delay (s)		9.5	7.7		13.2	7.6	127.8	24.8	22.1		40.0	23.0	
Level of Service		A	A		B	A	F	C	C		D	C	
Approach Delay (s)		9.3			13.0			49.5			35.7		
Approach LOS		A			B			D			D		
Intersection Summary													
HCM Average Control Delay			22.8									HCM Level of Service	C
HCM Volume to Capacity ratio			0.74										
Actuated Cycle Length (s)			90.0									Sum of lost time (s)	9.0
Intersection Capacity Utilization			92.8%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	14	496	52	13	734	59	51	383	28	247	474	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	0.99	1.00	1.00	1.00	1.00		0.99	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3470	1510	1793	3438	1555	1744	3502		1741	3466	
Flt Permitted		0.93	1.00	0.40	1.00	1.00	0.36	1.00		0.46	1.00	
Satd. Flow (perm)		3228	1510	756	3438	1555	654	3502		841	3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	539	57	14	798	64	55	416	30	268	515	80
RTOR Reduction (vph)	0	0	28	0	0	26	0	8	0	0	18	0
Lane Group Flow (vph)	0	554	29	14	798	38	55	438	0	268	577	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	4%	4%	0%	5%	1%	3%	2%	0%	3%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2				6
Permitted Phases	4			4		4	2			6		
Actuated Green, G (s)		42.6	42.6	42.6	42.6	42.6	32.9	32.9		32.9	32.9	
Effective Green, g (s)		42.6	42.6	42.6	42.6	42.6	32.9	32.9		32.9	32.9	
Actuated g/C Ratio		0.50	0.50	0.50	0.50	0.50	0.39	0.39		0.39	0.39	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1618	757	379	1723	779	253	1355		326	1342	
v/s Ratio Prot					c0.23			0.13				0.17
v/s Ratio Perm		0.17	0.02	0.02		0.02	0.08			c0.32		
v/c Ratio		0.34	0.04	0.04	0.46	0.05	0.22	0.32		0.82	0.43	
Uniform Delay, d1		12.8	10.8	10.8	13.8	10.8	17.4	18.3		23.4	19.2	
Progression Factor		1.00	1.00	1.06	0.75	1.31	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6	0.1	0.2	0.9	0.1	0.9	0.3		15.9	0.3	
Delay (s)		13.3	10.9	11.6	11.1	14.3	18.3	18.5		39.3	19.5	
Level of Service		B	B	B	B	B	B	B		D	B	
Approach Delay (s)		13.1			11.4			18.5			25.6	
Approach LOS		B			B			B			C	

Intersection Summary

HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	739	35	13	581	35	38	85	96	27	135	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		1.00	
Satd. Flow (prot)	1797	3471	1579	1799	3505	1579		3549	1410		3287	
Flt Permitted	0.41	1.00	1.00	0.34	1.00	1.00		0.69	1.00		0.92	
Satd. Flow (perm)	777	3471	1579	641	3505	1579		2484	1410		3034	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	803	38	14	632	38	41	92	104	29	147	175
RTOR Reduction (vph)	0	0	9	0	0	9	0	0	89	0	150	0
Lane Group Flow (vph)	57	803	29	14	632	29	0	133	15	0	201	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	0%	0%	3%	0%	0%	0%	12%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	64.3	64.3	64.3	64.3	64.3	64.3		12.2	12.2		12.2	
Effective Green, g (s)	64.3	64.3	64.3	64.3	64.3	64.3		12.2	12.2		12.2	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.76	0.76		0.14	0.14		0.14	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	588	2626	1194	485	2651	1194		357	202		435	
v/s Ratio Prot		c0.23			0.18							
v/s Ratio Perm	0.07		0.02	0.02		0.02		0.05	0.01		c0.07	
v/c Ratio	0.10	0.31	0.02	0.03	0.24	0.02		0.37	0.07		0.46	
Uniform Delay, d1	2.7	3.3	2.6	2.6	3.1	2.6		32.9	31.5		33.4	
Progression Factor	0.88	1.11	0.72	1.97	2.59	3.29		1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3	0.0	0.1	0.2	0.0		0.2	0.1		0.3	
Delay (s)	2.7	3.9	1.9	5.2	8.2	8.5		33.2	31.6		33.7	
Level of Service	A	A	A	A	A	A		C	C		C	
Approach Delay (s)		3.7			8.1			32.5			33.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	217	547	730	66	645	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3406	3505	1521	3396	1429
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3406	3505	1521	3396	1429
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	236	595	793	72	701	255
RTOR Reduction (vph)	0	0	0	31	4	167
Lane Group Flow (vph)	236	595	793	41	723	62
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	6%	3%	3%	3%	0%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	15.3	54.0	34.7	34.7	23.0	23.0
Effective Green, g (s)	15.3	54.0	34.7	34.7	23.0	23.0
Actuated g/C Ratio	0.18	0.64	0.41	0.41	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	319	2164	1431	621	919	387
v/s Ratio Prot	c0.13	0.17	c0.23		c0.21	
v/s Ratio Perm				0.03		0.04
v/c Ratio	0.74	0.27	0.55	0.07	0.79	0.16
Uniform Delay, d1	33.0	6.8	19.2	15.3	28.7	23.6
Progression Factor	0.93	1.58	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	0.3	1.6	0.2	4.2	0.1
Delay (s)	37.9	11.1	20.8	15.5	32.9	23.7
Level of Service	D	B	C	B	C	C
Approach Delay (s)		18.7	20.3		30.7	
Approach LOS		B	C		C	

Intersection Summary

HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	60	241	134	484	725	124	66	718	244	8	1131	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		1.00	1.00
Satd. Flow (prot)	3502	3539	1459	3502	3610	1532		5112	1517		5134	1532
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.69	1.00		0.93	1.00
Satd. Flow (perm)	3502	3539	1459	3502	3610	1532		3522	1517		4783	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	262	146	526	788	135	72	780	265	9	1229	88
RTOR Reduction (vph)	0	0	5	0	0	58	0	0	173	0	0	32
Lane Group Flow (vph)	65	262	141	526	788	77	0	852	92	0	1238	56
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	2%	5%	0%	0%	0%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		2	6		6
Actuated Green, G (s)	6.0	31.7	31.7	11.9	37.6	37.6		31.4	31.4		31.4	31.4
Effective Green, g (s)	6.0	31.7	31.7	11.9	37.6	37.6		31.4	31.4		31.4	31.4
Actuated g/C Ratio	0.07	0.35	0.35	0.13	0.42	0.42		0.35	0.35		0.35	0.35
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	233	1247	514	463	1508	640		1229	529		1669	534
v/s Ratio Prot	0.02	0.07		c0.15	c0.22							
v/s Ratio Perm			c0.10			0.05		0.24	0.06		c0.26	0.04
v/c Ratio	0.28	0.21	0.28	1.14	0.52	0.12		0.87dl	0.17		0.74	0.11
Uniform Delay, d1	39.9	20.4	20.9	39.0	19.5	16.1		25.2	20.3		25.7	19.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.4	1.3	84.7	1.3	0.4		1.7	0.2		1.8	0.1
Delay (s)	40.6	20.8	22.2	123.7	20.8	16.5		26.9	20.5		27.6	19.9
Level of Service	D	C	C	F	C	B		C	C		C	B
Approach Delay (s)		23.9			57.8			25.4			27.0	
Approach LOS		C			E			C			C	

Intersection Summary

HCM Average Control Delay	36.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑		↑	↑↑			↑↑	
Volume (vph)	5	297	59	172	680	12	85	2	110	6	1	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes		1.00	0.98	1.00	1.00		1.00	0.98			0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.97	
Satd. Flow (prot)		1951	806	1020	2295		926	1639			1923	
Flt Permitted		0.94	1.00	0.95	1.00		0.95	1.00			0.84	
Satd. Flow (perm)		1845	806	1020	2295		926	1639			1670	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	323	64	187	739	13	92	2	120	7	1	4
RTOR Reduction (vph)	0	0	40	0	0	0	0	93	0	0	4	0
Lane Group Flow (vph)	0	328	24	187	752	0	92	29	0	0	8	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	80%	85%	97%	77%	57%	50%	95%	50%	85%	50%	100%	100%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Actuated Green, G (s)		39.1	39.1	26.9	70.0		15.3	24.4			5.1	
Effective Green, g (s)		39.1	39.1	26.9	70.0		15.3	24.4			5.1	
Actuated g/C Ratio		0.38	0.38	0.26	0.68		0.15	0.24			0.05	
Clearance Time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		698	305	265	1554		137	387			82	
v/s Ratio Prot				c0.18	c0.33		c0.10	c0.02				
v/s Ratio Perm		0.18	0.03								0.00	
v/c Ratio		0.47	0.08	0.71	0.48		0.67	0.07			0.10	
Uniform Delay, d1		24.3	20.6	34.7	8.0		41.7	30.7			47.0	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		0.5	0.1	8.3	0.2		12.2	0.1			0.5	
Delay (s)		24.8	20.7	42.9	8.3		53.9	30.8			47.5	
Level of Service		C	C	D	A		D	C			D	
Approach Delay (s)		24.1			15.2			40.7			47.5	
Approach LOS		C			B			D			D	

Intersection Summary

HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	103.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/23/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖↗	↑↑		
Volume (vph)	147	148	238	1139	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.92		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1819		2537	2242		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1819		2537	2242		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	161	259	1238	0	0
RTOR Reduction (vph)	95	0	0	0	0	0
Lane Group Flow (vph)	226	0	259	1238	0	0
Heavy Vehicles (%)	74%	93%	38%	61%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	11.6		8.7	28.3		
Effective Green, g (s)	11.6		8.7	28.3		
Actuated g/C Ratio	0.41		0.31	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	746		780	2242		
v/s Ratio Prot	0.12		0.10	0.55		
v/s Ratio Perm						
v/c Ratio	0.30		0.33	0.55		
Uniform Delay, d1	5.6		7.6	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.2		0.3	0.3		
Delay (s)	5.9		7.8	0.3		
Level of Service	A		A	A		
Approach Delay (s)	5.9			1.6	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	2.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	28.3	Sum of lost time (s)	0.0
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↑↑			↑↑		↵	↑↑		↵		↑↑
Volume (vph)	89	41	0	0	211	206	511	325	115	122	0	508
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.93		1.00	0.97		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98		0.95		1.00
Satd. Flow (prot)	1008	2299			2968		1020	2622		1770		1733
Flt Permitted	0.95	1.00			1.00		0.95	0.98		0.95		1.00
Satd. Flow (perm)	1008	2299			2968		1020	2622		1770		1733
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	45	0	0	229	224	555	353	125	133	0	552
RTOR Reduction (vph)	0	0	0	0	178	0	0	22	0	0	0	479
Lane Group Flow (vph)	97	45	0	0	275	0	344	667	0	133	0	73
Heavy Vehicles (%)	79%	57%	0%	0%	24%	1%	61%	15%	0%	2%	0%	64%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	8.1	24.7			12.6		16.2	16.2		8.1		8.1
Effective Green, g (s)	8.1	24.7			12.6		16.2	16.2		8.1		8.1
Actuated g/C Ratio	0.13	0.40			0.21		0.27	0.27		0.13		0.13
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	134	931			613		271	696		235		230
v/s Ratio Prot	c0.10	0.02			c0.09		c0.34	0.25		c0.08		0.04
v/s Ratio Perm												
v/c Ratio	0.72	0.05			0.45		1.27	0.96		0.57		0.32
Uniform Delay, d1	25.4	11.0			21.2		22.4	22.1		24.8		24.0
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	17.5	0.0			0.5		147.0	24.0		3.1		0.8
Delay (s)	42.9	11.0			21.7		169.4	46.1		27.9		24.8
Level of Service	D	B			C		F	D		C		C
Approach Delay (s)		32.8			21.7			87.1			25.4	
Approach LOS		C			C			F			C	

Intersection Summary

HCM Average Control Delay	52.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	19	371	14	4	425	27	46	10	5	28	14	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			0.99	1.00		0.99	
Frt		0.99			0.99			1.00	0.85		0.95	
Flt Protected		1.00			1.00			0.96	1.00		0.98	
Satd. Flow (prot)		3146			3294			1808	1575		1746	
Flt Permitted		0.92			0.95			0.77	1.00		0.88	
Satd. Flow (perm)		2908			3140			1442	1575		1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	403	15	4	462	29	50	11	5	30	15	25
RTOR Reduction (vph)	0	2	0	0	5	0	0	0	4	0	19	0
Lane Group Flow (vph)	0	437	0	0	490	0	0	61	1	0	51	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	15%	0%	0%	9%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm		NA
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		69.0			69.0			23.0	23.0			23.0
Effective Green, g (s)		69.0			69.0			23.0	23.0			23.0
Actuated g/C Ratio		0.69			0.69			0.23	0.23			0.23
Clearance Time (s)		4.0			4.0			4.0	4.0			4.0
Lane Grp Cap (vph)		2007			2167			332	362			362
v/s Ratio Prot												
v/s Ratio Perm		0.15			0.16			0.04	0.00			0.03
v/c Ratio		0.22			0.23			0.18	0.00			0.14
Uniform Delay, d1		5.7			5.7			31.0	29.7			30.6
Progression Factor		1.00			0.88			1.00	1.00			1.00
Incremental Delay, d2		0.2			0.2			1.2	0.0			0.8
Delay (s)		5.9			5.3			32.2	29.7			31.4
Level of Service		A			A			C	C			C
Approach Delay (s)		5.9			5.3			32.0				31.4
Approach LOS		A			A			C				C

Intersection Summary

HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	488	21	172	365	48	12	47	59	78	89	30
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	0.99		1.00	0.98			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1766		1805	3348			1729		1685	1815	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.47	1.00	
Satd. Flow (perm)	1805	1766		1805	3348			1672		825	1815	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	530	23	187	397	52	13	51	64	85	97	33
RTOR Reduction (vph)	0	1	0	0	7	0	0	42	0	0	14	0
Lane Group Flow (vph)	46	552	0	187	442	0	0	86	0	85	116	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	7%	0%	0%	6%	3%	0%	0%	0%	6%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	3.6	61.7		14.8	72.9			12.5		12.5	12.5	
Effective Green, g (s)	3.6	61.7		14.8	72.9			12.5		12.5	12.5	
Actuated g/C Ratio	0.04	0.62		0.15	0.73			0.12		0.12	0.12	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	65	1090		267	2441			209		103	227	
v/s Ratio Prot	0.03	c0.31		c0.10	0.13							0.06
v/s Ratio Perm								0.05		c0.10		
v/c Ratio	0.71	0.51		0.70	0.18			0.41		0.83	0.51	
Uniform Delay, d1	47.7	10.7		40.5	4.2			40.4		42.7	40.9	
Progression Factor	0.91	0.92		0.63	3.21			1.00		1.00	1.00	
Incremental Delay, d2	24.7	1.7		6.1	0.1			0.5		37.7	0.8	
Delay (s)	68.3	11.4		31.7	13.7			40.8		80.4	41.7	
Level of Service	E	B		C	B			D		F	D	
Approach Delay (s)		15.8			19.0			40.8			57.0	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	538	44	226	636	21	14	41	112	11	50	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1798	3347		1783	3421			1874	1524		1823	
Flt Permitted	0.30	1.00		0.34	1.00			0.95	1.00		0.97	
Satd. Flow (perm)	559	3347		634	3421			1796	1524		1786	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	585	48	246	691	23	15	45	122	12	54	18
RTOR Reduction (vph)	0	6	0	0	2	0	0	0	66	0	10	0
Lane Group Flow (vph)	22	627	0	246	712	0	0	60	56	0	74	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	7%	0%	1%	5%	2%	0%	0%	4%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	257	1540		292	1574			826	701		822	
v/s Ratio Prot		0.19			0.21							
v/s Ratio Perm	0.04			c0.39				0.03	0.04		c0.04	
v/c Ratio	0.09	0.41		0.84	0.45			0.07	0.08		0.09	
Uniform Delay, d1	15.2	17.9		23.8	18.4			15.1	15.1		15.2	
Progression Factor	0.69	0.76		0.83	0.86			1.00	1.00		1.00	
Incremental Delay, d2	0.6	0.7		24.4	0.9			0.2	0.2		0.2	
Delay (s)	11.1	14.3		44.1	16.7			15.3	15.4		15.4	
Level of Service	B	B		D	B			B	B		B	
Approach Delay (s)		14.2			23.8			15.3			15.4	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	19.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	103	769	67	95	532	110	29	181	63	23	25	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1801	3305		1163	3438	1527	1490	2221			3073	
Flt Permitted	0.41	1.00		0.27	1.00	1.00	0.70	1.00			0.84	
Satd. Flow (perm)	781	3305		330	3438	1527	1099	2221			2625	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	836	73	103	578	120	32	197	68	25	27	30
RTOR Reduction (vph)	0	6	0	0	0	43	0	35	0	0	22	0
Lane Group Flow (vph)	112	903	0	103	578	77	32	230	0	0	60	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	28%	55%	5%	4%	20%	50%	71%	0%	25%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Effective Green, g (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.28	0.28			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	500	2115		211	2200	977	308	622			735	
v/s Ratio Prot		0.27			0.17			c0.10				
v/s Ratio Perm	0.14			c0.31		0.05	0.03				0.02	
v/c Ratio	0.22	0.43		0.49	0.26	0.08	0.10	0.37			0.08	
Uniform Delay, d1	7.6	8.9		9.4	7.8	6.8	26.7	28.9			26.5	
Progression Factor	0.38	0.35		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	1.0	0.6		7.9	0.3	0.2	0.7	1.7			0.2	
Delay (s)	3.9	3.7		17.3	8.1	7.0	27.4	30.6			26.7	
Level of Service	A	A		B	A	A	C	C			C	
Approach Delay (s)		3.7			9.1			30.3			26.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑	↗	↗	↑↑	↗
Volume (vph)	204	714	37	50	436	27	55	71	96	118	215	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1713	4388		1801	4735		1743	1845	1584	1758	3438	1298
Flt Permitted	0.45	1.00		0.27	1.00		0.61	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	807	4388		517	4735		1112	1845	1584	1308	3438	1298
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	776	40	54	474	29	60	77	104	128	234	113
RTOR Reduction (vph)	0	9	0	0	11	0	0	0	50	0	0	54
Lane Group Flow (vph)	222	807	0	54	492	0	60	77	54	128	234	59
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	5%	18%	2%	0%	9%	0%	3%	3%	0%	2%	5%	22%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	26.3	26.3		26.3	26.3		39.2	39.2	39.2	39.2	39.2	39.2
Effective Green, g (s)	26.3	26.3		26.3	26.3		39.2	39.2	39.2	39.2	39.2	39.2
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.52	0.52	0.52	0.52	0.52	0.52
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	283	1539		181	1660		581	964	828	684	1797	678
v/s Ratio Prot		0.18			0.10			0.04				0.07
v/s Ratio Perm	c0.28			0.10			0.05		0.03	c0.10		0.05
v/c Ratio	0.78	0.52		0.30	0.30		0.10	0.08	0.07	0.19	0.13	0.09
Uniform Delay, d1	21.8	19.4		17.7	17.6		9.0	8.9	8.8	9.5	9.2	9.0
Progression Factor	1.00	1.00		1.00	1.00		1.14	1.14	1.51	1.00	1.00	1.00
Incremental Delay, d2	12.3	0.1		0.3	0.0		0.3	0.1	0.1	0.6	0.1	0.3
Delay (s)	34.1	19.5		18.0	17.7		10.6	10.3	13.5	10.1	9.3	9.2
Level of Service	C	B		B	B		B	B	B	B	A	A
Approach Delay (s)		22.6			17.7			11.8			9.5	
Approach LOS		C			B			B			A	

Intersection Summary

HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	120	374	0	0	0	0	0	1120	1363	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.94	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4457						4606	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4457						4606	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	407	0	0	0	0	0	1217	1482	0	0	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	183	174	0	0	0
Lane Group Flow (vph)	0	529	0	0	0	0	0	1775	567	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	4%	18%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		27.0						23.0	29.2			
Effective Green, g (s)		27.0						23.0	29.2			
Actuated g/C Ratio		0.45						0.38	0.49			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2006						1766	669			
v/s Ratio Prot								c0.39				
v/s Ratio Perm		0.12							c0.41			
v/c Ratio		0.26						1.01	0.85			
Uniform Delay, d1		10.3						18.5	13.5			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.3						22.6	9.8			
Delay (s)		10.6						41.1	23.3			
Level of Service		B						D	C			
Approach Delay (s)		10.6			0.0			36.2			0.0	
Approach LOS		B			A			D			A	
Intersection Summary												
HCM Average Control Delay			32.0									HCM Level of Service C
HCM Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			60.0									Sum of lost time (s) 5.0
Intersection Capacity Utilization			74.3%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔	↔					↕↔			↕↔	
Volume (vph)	26	633	957	0	0	0	0	311	60	24	143	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.94	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			0.99	
Satd. Flow (prot)		4325	1355					1825			1792	
Flt Permitted		1.00	1.00					1.00			0.93	
Satd. Flow (perm)		4325	1355					1825			1676	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	688	1040	0	0	0	0	338	65	26	155	0
RTOR Reduction (vph)	0	323	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	913	520	0	0	0	0	395	0	0	181	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	5%	8%	1%	0%	0%	0%	0%	1%	3%	0%	6%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)			20.1	60.0				30.9			30.9	
Effective Green, g (s)			20.1	60.0				30.9			30.9	
Actuated g/C Ratio			0.34	1.00				0.51			0.51	
Clearance Time (s)			5.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)		1449	1355					940			863	
v/s Ratio Prot								0.22				
v/s Ratio Perm		0.21	0.38								0.11	
v/c Ratio		0.63	0.38					0.42			0.21	
Uniform Delay, d1		16.8	0.0					9.0			7.9	
Progression Factor		0.94	1.00					0.76			1.00	
Incremental Delay, d2		0.4	0.5					1.4			0.6	
Delay (s)		16.2	0.5					8.2			8.5	
Level of Service		B	A					A			A	
Approach Delay (s)		11.6			0.0			8.2			8.5	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	37	538	50	213	301	0	0	235	1114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.99	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frft				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1810	1517	1767	1863			1581	1477
Flt Permitted				0.95	1.00	1.00	0.21	1.00			1.00	1.00
Satd. Flow (perm)				1730	1810	1517	395	1863			1581	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	40	585	54	232	327	0	0	255	1211
RTOR Reduction (vph)	0	0	0	0	0	41	0	0	0	0	14	0
Lane Group Flow (vph)	0	0	0	40	585	13	232	327	0	0	738	714
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	5%	0%	2%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	437	367	227	1071			909	1477
v/s Ratio Prot					c0.32			0.18			0.47	
v/s Ratio Perm				0.02		0.01	c0.59					0.48
v/c Ratio				0.10	1.34	0.04	1.02	0.31			0.81	0.48
Uniform Delay, d1				17.7	22.8	17.4	12.8	6.6			10.2	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.72	1.00
Incremental Delay, d2				0.5	167.2	0.2	65.5	0.7			7.5	1.1
Delay (s)				18.1	190.0	17.6	78.3	7.3			14.8	1.1
Level of Service				B	F	B	E	A			B	A
Approach Delay (s)		0.0			166.2			36.8			8.1	
Approach LOS		A			F			D			A	

Intersection Summary

HCM Average Control Delay	53.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	103	29	534	157	25	38	163	843	21	245	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.87			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1829		1556	3526		1805	2824			3501	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.62	
Satd. Flow (perm)	1805	1829		1556	3526		1805	2824			2182	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	112	32	580	171	27	41	177	916	23	266	36
RTOR Reduction (vph)	0	10	0	0	10	0	0	591	0	0	10	0
Lane Group Flow (vph)	3	134	0	580	188	0	41	502	0	0	315	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	16%	0%	0%	0%	4%	11%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	1.1	17.3		29.4	45.6		2.2	22.6			16.4	
Effective Green, g (s)	1.1	17.3		29.4	45.6		2.2	22.6			16.4	
Actuated g/C Ratio	0.01	0.21		0.36	0.56		0.03	0.28			0.20	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	24	389		563	1978		49	785			440	
v/s Ratio Prot	0.00	c0.07		c0.37	0.05		0.02	c0.18				
v/s Ratio Perm												0.14
v/c Ratio	0.12	0.34		1.03	0.10		0.84	0.93dr			0.72	
Uniform Delay, d1	39.6	27.2		25.9	8.3		39.4	25.8			30.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.3	0.5		45.9	0.0		70.1	1.7			5.5	
Delay (s)	42.0	27.7		71.8	8.3		109.5	27.5			35.8	
Level of Service	D	C		E	A		F	C			D	
Approach Delay (s)		28.0			55.7			30.5			35.8	
Approach LOS		C			E			C			D	

Intersection Summary

HCM Average Control Delay	39.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	22	639	216	131	452	30	74	31	127	75	397	175
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.88		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	2978		1805	3570		1805	1661		1643	2193	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	2978		1805	3570		1805	1661		1643	2193	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	695	235	142	491	33	80	34	138	82	432	190
RTOR Reduction (vph)	0	26	0	0	3	0	0	121	0	0	36	0
Lane Group Flow (vph)	24	904	0	142	521	0	80	51	0	74	594	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	5%	48%	0%	0%	0%	0%	65%	93%	0%	72%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	3.0	32.5		12.7	42.7		12.1	12.1		23.2	23.2	
Effective Green, g (s)	3.0	32.5		12.7	42.7		12.1	12.1		23.2	23.2	
Actuated g/C Ratio	0.03	0.34		0.13	0.44		0.13	0.13		0.24	0.24	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	56	1003		238	1580		226	208		395	527	
v/s Ratio Prot	0.01	c0.30		c0.08	0.15		c0.04	0.03		0.05	c0.27	
v/s Ratio Perm												
v/c Ratio	0.43	0.90		0.60	0.33		0.35	0.25		0.19	1.13	
Uniform Delay, d1	45.9	30.5		39.5	17.6		38.6	38.1		29.2	36.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	11.3		4.0	0.2		1.3	0.8		0.3	79.3	
Delay (s)	51.1	41.7		43.5	17.7		39.9	38.9		29.5	116.0	
Level of Service	D	D		D	B		D	D		C	F	
Approach Delay (s)		42.0			23.2			39.2			106.9	
Approach LOS		D			C			D			F	

Intersection Summary

HCM Average Control Delay	54.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	101	222	200	36	365	0	0	428	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3546	1583	1796	1056			2798	1581
Flt Permitted					0.98	1.00	0.48	1.00			1.00	1.00
Satd. Flow (perm)					3546	1583	917	1056			2798	1581
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	110	241	217	39	397	0	0	465	286
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	97
Lane Group Flow (vph)	0	0	0	0	351	46	39	397	0	0	465	189
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	20%	79%	0%	0%	0%	0%	80%	78%	1%	29%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					15.9	15.9	49.6	49.6			49.6	49.6
Effective Green, g (s)					15.9	15.9	49.6	49.6			49.6	49.6
Actuated g/C Ratio					0.21	0.21	0.66	0.66			0.66	0.66
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					752	336	606	698			1850	1046
v/s Ratio Prot								c0.38			0.17	
v/s Ratio Perm					0.10	0.03	0.04					0.12
v/c Ratio					0.47	0.14	0.06	0.57			0.25	0.18
Uniform Delay, d1					25.8	24.0	4.5	6.9			5.2	4.9
Progression Factor					1.00	1.00	1.00	1.00			0.86	0.64
Incremental Delay, d2					0.5	0.2	0.2	3.3			0.3	0.4
Delay (s)					26.3	24.2	4.7	10.2			4.8	3.5
Level of Service					C	C	A	B			A	A
Approach Delay (s)		0.0			25.5			9.7			4.3	
Approach LOS		A			C			A			A	

Intersection Summary

HCM Average Control Delay	12.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 24: Broadway & 5th Street & Webster Tube

4/23/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	888	210	87	213	317	0	383	421
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.91			1.00	1.00
Flt Protected	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2662	1568	4503			1752	1881
Flt Permitted	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2662	1568	4503			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	965	228	95	232	345	0	416	458
RTOR Reduction (vph)	0	0	35	0	0	0	0	0
Lane Group Flow (vph)	482	711	60	577	0	0	416	458
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	80%	3%	2%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	22.5	22.5	22.5	21.5			17.5	42.5
Effective Green, g (s)	22.5	22.5	22.5	21.5			17.5	42.5
Actuated g/C Ratio	0.30	0.30	0.30	0.29			0.23	0.57
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	493	799	470	1291			409	1066
v/s Ratio Prot				0.13			c0.24	c0.24
v/s Ratio Perm	c0.29	0.27	0.04					
v/c Ratio	0.98	0.94dl	0.13	0.45			1.02	0.43
Uniform Delay, d1	26.0	25.1	19.1	21.9			28.8	9.3
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	34.3	11.6	0.0	1.1			48.9	0.1
Delay (s)	60.3	36.6	19.2	23.0			77.6	9.4
Level of Service	E	D	B	C			E	A
Approach Delay (s)		44.2		23.0				41.9
Approach LOS		D		C				D

Intersection Summary

HCM Average Control Delay	39.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		





















dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	56	28	85	89	49	20	188	33	91	413	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	61	30	92	97	53	22	204	36	99	449	35
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	88	30	189	53	124	138	323	259				
Volume Left (vph)	27	0	92	0	22	0	99	0				
Volume Right (vph)	0	30	0	53	0	36	0	35				
Hadj (s)	0.15	-0.70	1.02	-0.70	1.25	1.26	1.04	1.01				
Departure Headway (s)	7.6	6.7	8.1	6.4	8.0	8.0	7.3	7.3				
Degree Utilization, x	0.19	0.06	0.43	0.10	0.27	0.31	0.66	0.52				
Capacity (veh/h)	444	495	423	527	435	434	485	476				
Control Delay (s)	11.1	8.9	15.9	8.9	12.8	13.3	21.9	16.8				
Approach Delay (s)	10.6		14.4		13.0		19.6					
Approach LOS	B		B		B		C					
Intersection Summary												
Delay			16.2									
HCM Level of Service			C									
Intersection Capacity Utilization			49.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗		↗	↕↗	
Volume (veh/h)	11	100	33	16	220	5	31	6	9	12	69	91
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	109	36	17	239	5	34	7	10	13	75	99
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	250			150			553	422	119	430	452	249
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	250			150			553	422	119	430	452	249
tC, single (s)	4.1			4.6			8.0	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.6			4.3	4.7	3.3	3.5	4.7	3.3
p0 queue free %	99			99			86	98	99	97	81	87
cM capacity (veh/h)	1322			1193			243	406	931	510	391	785

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	121	36	257	5	50	13	50	124
Volume Left	12	0	17	0	34	13	0	0
Volume Right	0	36	0	5	10	0	0	99
cSH	1322	1700	1193	1700	303	510	391	653
Volume to Capacity	0.01	0.02	0.01	0.00	0.17	0.03	0.13	0.19
Queue Length 95th (ft)	1	0	1	0	15	2	11	17
Control Delay (s)	0.8	0.0	0.7	0.0	19.2	12.2	15.5	11.8
Lane LOS	A		A		C	B	C	B
Approach Delay (s)	0.6		0.7		19.2	12.8		
Approach LOS					C	B		

Intersection Summary

Average Delay		5.5						
Intersection Capacity Utilization		40.4%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	182	13	21	102	0	0	0	0	19	181	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		3610	1550		3566						3444	
Flt Permitted		1.00	1.00		0.91						1.00	
Satd. Flow (perm)		3610	1550		3258						3444	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	198	14	23	111	0	0	0	0	21	197	23
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	16	0
Lane Group Flow (vph)	0	198	10	0	134	0	0	0	0	0	225	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	3%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.5	54.5		54.5						13.5	
Effective Green, g (s)		54.5	54.5		54.5						13.5	
Actuated g/C Ratio		0.71	0.71		0.71						0.18	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2572	1104		2321						608	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.07	
v/c Ratio		0.08	0.01		0.06						0.37	
Uniform Delay, d1		3.3	3.2		3.3						27.7	
Progression Factor		1.00	1.00		0.30						1.00	
Incremental Delay, d2		0.1	0.0		0.0						0.4	
Delay (s)		3.4	3.2		1.0						28.1	
Level of Service		A	A		A						C	
Approach Delay (s)		3.4			1.0			0.0			28.1	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	13.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕	↗		↕↕				
Volume (vph)	23	159	0	0	123	27	7	127	56	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		3506			3539	1520		3376				
Flt Permitted		0.92			1.00	1.00		1.00				
Satd. Flow (perm)		3250			3539	1520		3376				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	173	0	0	134	29	8	138	61	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	8	0	50	0	0	0	0
Lane Group Flow (vph)	0	198	0	0	134	21	0	157	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.5			54.5	54.5		13.5				
Effective Green, g (s)		54.5			54.5	54.5		13.5				
Actuated g/C Ratio		0.71			0.71	0.71		0.18				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2315			2521	1083		596				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.06				0.01		0.05				
v/c Ratio		0.09			0.05	0.02		0.26				
Uniform Delay, d1		3.4			3.3	3.2		27.2				
Progression Factor		0.42			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.2				
Delay (s)		1.5			3.3	3.2		27.4				
Level of Service		A			A	A		C				
Approach Delay (s)		1.5			3.3			27.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/23/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↘	↘↘	↑	↑↑↑	↘	↗	↘	↗
Volume (vph)	49	151	0	569	109	0	1847	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1570	3099		5187	1278		1715	1728
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1570	3099		5187	1278		1715	1728
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	164	0	618	118	0	2008	109
RTOR Reduction (vph)	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	49	164	0	618	118	0	1064	1053
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	13%	13%	7%	0%	22%	2%	0%	0%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	12.5	12.5		19.8	19.8		68.7	68.7
Effective Green, g (s)	12.5	12.5		19.8	19.8		68.7	68.7
Actuated g/C Ratio	0.11	0.11		0.17	0.17		0.60	0.60
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	171	337		893	220		1025	1032
v/s Ratio Prot				c0.12			c0.62	0.61
v/s Ratio Perm	0.03	c0.05			0.09			
v/c Ratio	0.28	0.49		0.69	0.54		1.04	1.02
Uniform Delay, d1	47.1	48.2		44.7	43.4		23.1	23.1
Progression Factor	0.75	0.79		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.9	1.1		2.3	2.5		38.5	33.2
Delay (s)	36.3	39.2		47.1	45.9		61.6	56.4
Level of Service	D	D		D	D		E	E
Approach Delay (s)			38.5	46.9				59.0
Approach LOS			D	D				E

Intersection Summary

HCM Average Control Delay	54.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 29: Castro Street & 12th Street & I-980 NB On-Ramp

4/23/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↔	↔	↔	↑↑↑
Volume (vph)	253	295	30	731	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.95	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3100	1470	1522	1509	4526
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3100	1470	1522	1509	4526
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	321	33	795	0
RTOR Reduction (vph)	0	0	21	0	0
Lane Group Flow (vph)	410	186	9	400	398
Heavy Vehicles (%)	9%	0%	2%	2%	1%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	69.5	69.5	36.0	36.0	36.0
Effective Green, g (s)	69.5	69.5	36.0	36.0	36.0
Actuated g/C Ratio	0.60	0.60	0.31	0.31	0.31
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1873	888	476	472	1417
v/s Ratio Prot	c0.13		0.01	c0.27	0.09
v/s Ratio Perm		0.13			
v/c Ratio	0.22	0.21	0.02	0.85	0.28
Uniform Delay, d1	10.4	10.3	27.3	36.9	29.8
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.5	0.0	13.2	0.1
Delay (s)	10.6	10.8	27.3	50.2	29.9
Level of Service	B	B	C	D	C
Approach Delay (s)	10.7				39.6
Approach LOS	B				D

Intersection Summary

HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	351	31	7	170	0	0	0	0	546	867	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5104			5172					1787	3539	1565
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5104			4740					1787	3539	1565
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	382	34	8	185	0	0	0	0	593	942	404
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	0	115
Lane Group Flow (vph)	0	403	0	0	193	0	0	0	0	593	942	289
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		16.0			16.0					52.0	52.0	52.0
Effective Green, g (s)		16.0			16.0					52.0	52.0	52.0
Actuated g/C Ratio		0.20			0.20					0.65	0.65	0.65
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1021			948					1162	2300	1017
v/s Ratio Prot		c0.08									0.27	
v/s Ratio Perm					0.04					c0.33		0.18
v/c Ratio		0.39			0.20					0.51	0.41	0.28
Uniform Delay, d1		27.8			26.7					7.3	6.7	6.0
Progression Factor		1.00			1.11					1.00	1.00	1.00
Incremental Delay, d2		1.1			0.5					1.6	0.5	0.7
Delay (s)		28.9			30.2					8.9	7.2	6.7
Level of Service		C			C					A	A	A
Approach Delay (s)		28.9			30.2			0.0			7.6	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	239	771	0	0	175	277	5	257	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.96		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.93	0.85		0.99				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4848			4469	1316		5049				
Flt Permitted	0.95	0.93			1.00	1.00		1.00				
Satd. Flow (perm)	1552	4536			4469	1316		5049				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	838	0	0	190	301	5	279	22	0	0	0
RTOR Reduction (vph)	0	0	0	0	123	122	0	11	0	0	0	0
Lane Group Flow (vph)	234	864	0	0	218	28	0	295	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	6%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	18.0	36.5			15.0	15.0		32.5				
Effective Green, g (s)	18.0	36.5			15.0	15.0		32.5				
Actuated g/C Ratio	0.22	0.46			0.19	0.19		0.41				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	349	2140			838	247		2051				
v/s Ratio Prot	c0.15	0.09			0.05							
v/s Ratio Perm		c0.09				0.02		0.06				
v/c Ratio	0.67	0.40			0.26	0.11		0.14				
Uniform Delay, d1	28.3	14.5			27.8	27.0		15.0				
Progression Factor	1.00	0.78			1.00	1.00		1.00				
Incremental Delay, d2	9.2	0.5			0.8	0.9		0.1				
Delay (s)	37.4	11.9			28.5	27.9		15.1				
Level of Service	D	B			C	C		B				
Approach Delay (s)		17.3			28.3			15.1			0.0	
Approach LOS		B			C			B			A	

Intersection Summary

HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/23/2012



Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑			↑↑			↑↑	
Volume (vph)	0	209	1022	0	939	106	54	4	82	13	186	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.88			0.98			0.91			1.00	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		3053			3538			3198			3481	
Flt Permitted		1.00			1.00			0.98			1.00	
Satd. Flow (perm)		3053			3538			3198			3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	227	1111	0	1021	115	59	4	89	14	202	5
RTOR Reduction (vph)	0	529	0	0	13	0	0	81	0	0	2	0
Lane Group Flow (vph)	0	809	0	0	1123	0	0	71	0	0	219	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	1%	1%	2%	0%	0%	1%	1%	1%	0%	3%	7%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1550			1796			295			750	
v/s Ratio Prot		0.27			c0.32			c0.02			c0.06	
v/s Ratio Perm												
v/c Ratio		0.52			0.63			0.24			0.29	
Uniform Delay, d1		10.7			11.5			27.4			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			1.7			1.9			1.0	
Delay (s)		12.0			13.2			29.3			22.3	
Level of Service		B			B			C			C	
Approach Delay (s)		12.0			13.2			29.3			22.3	
Approach LOS		B			B			C			C	

Intersection Summary

HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	41	201	20	77	280	42	54	212	61	101	225	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.98	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5111	1541	1754	3517		1787	1881	1570	1787	1881	1570
Flt Permitted		0.85	1.00	0.58	1.00		0.49	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)		4372	1541	1076	3517		922	1881	1570	967	1881	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	218	22	84	304	46	59	230	66	110	245	25
RTOR Reduction (vph)	0	0	9	0	14	0	0	0	37	0	0	14
Lane Group Flow (vph)	0	263	13	84	336	0	59	230	29	110	245	11
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.60	0.60	0.60	0.60		0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2623	925	646	2110		260	531	443	273	531	443
v/s Ratio Prot					c0.10			0.12			c0.13	
v/s Ratio Perm		0.06	0.01	0.08			0.06		0.02	0.11		0.01
v/c Ratio		0.10	0.01	0.13	0.16		0.23	0.43	0.07	0.40	0.46	0.02
Uniform Delay, d1		7.2	6.9	7.4	7.5		23.4	24.9	22.3	24.7	25.2	22.0
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	0.4	0.2		2.0	2.6	0.3	4.4	2.9	0.1
Delay (s)		7.3	6.9	7.8	7.7		25.4	27.5	22.6	29.1	28.0	22.1
Level of Service		A	A	A	A		C	C	C	C	C	C
Approach Delay (s)		7.3			7.7			26.2			27.9	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↖	↗				↖	↗	↖
Volume (vph)	87	260	349	0	914	601	0	0	0	685	0	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.96			1.00	0.98				1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.98	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3128			3309	1336				3467		1560
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3128			3309	1336				3467		1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	283	379	0	993	653	0	0	0	745	0	313
RTOR Reduction (vph)	0	174	0	0	15	0	0	0	0	0	0	135
Lane Group Flow (vph)	95	488	0	0	1135	496	0	0	0	745	0	178
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	2%	3%	1%	8%	0%	0%	0%	1%	7%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	3.7	32.3			24.6	59.6				19.3		19.3
Effective Green, g (s)	3.7	32.3			24.6	59.6				19.3		19.3
Actuated g/C Ratio	0.06	0.54			0.41	1.00				0.32		0.32
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	111	1695			1366	1336				1123		505
v/s Ratio Prot	c0.05	0.16			c0.34					c0.21		
v/s Ratio Perm						0.37						0.11
v/c Ratio	0.86	0.29			0.83	0.37				0.66		0.35
Uniform Delay, d1	27.7	7.4			15.6	0.0				17.4		15.4
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	43.7	0.1			4.4	0.8				1.5		0.4
Delay (s)	71.4	7.5			20.1	0.8				18.8		15.8
Level of Service	E	A			C	A				B		B
Approach Delay (s)		15.5			14.3			0.0			17.9	
Approach LOS		B			B			A			B	

Intersection Summary		
HCM Average Control Delay	15.7	HCM Level of Service B
HCM Volume to Capacity ratio	0.76	
Actuated Cycle Length (s)	59.6	Sum of lost time (s) 12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	78	604	0	0	659	292	464	1	881	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.86	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1805	5136			5085	1552	1618	1454	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1805	5136			5085	1552	1618	1454	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	657	0	0	716	317	504	1	958	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	225	0	94	94	0	0	0
Lane Group Flow (vph)	85	657	0	0	716	92	454	417	404	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	0%	1%	0%	0%	2%	1%	6%	0%	2%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	3.6	23.0			15.4	15.4	21.9	21.9	21.9			
Effective Green, g (s)	3.6	23.0			15.4	15.4	21.9	21.9	21.9			
Actuated g/C Ratio	0.07	0.43			0.29	0.29	0.41	0.41	0.41			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	123	2233			1480	452	670	602	623			
v/s Ratio Prot	c0.05	0.13			c0.14		0.28	c0.29	0.27			
v/s Ratio Perm						0.06						
v/c Ratio	0.69	0.29			0.48	0.20	0.68	0.69	0.65			
Uniform Delay, d1	24.1	9.7			15.5	14.1	12.6	12.7	12.4			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	15.4	0.1			0.3	0.2	2.7	3.5	2.3			
Delay (s)	39.5	9.8			15.7	14.4	15.4	16.2	14.8			
Level of Service	D	A			B	B	B	B	B			
Approach Delay (s)		13.2			15.3			15.4			0.0	
Approach LOS		B			B			B			A	

Intersection Summary		
HCM Average Control Delay	14.9	HCM Level of Service
HCM Volume to Capacity ratio	0.61	B
Actuated Cycle Length (s)	52.9	Sum of lost time (s)
Intersection Capacity Utilization	56.2%	ICU Level of Service
Analysis Period (min)	15	B
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	342	813	397	92	578	80	301	30	92	72	42	274
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3467	3364	1417	1805	3539	1615	1681	1706	1615		1842	2716
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3467	3364	1417	1805	3539	1615	1681	1706	1615		1842	2716
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	372	884	432	100	628	87	327	33	100	78	46	298
RTOR Reduction (vph)	0	4	238	0	0	55	0	0	89	0	0	243
Lane Group Flow (vph)	372	923	151	100	628	32	180	180	11	0	124	55
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	1%	2%	1%	0%	2%	0%	2%	0%	0%	0%	0%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	13.5	25.7	25.7	5.1	17.3	17.3	7.2	7.2	7.2		12.3	12.3
Effective Green, g (s)	13.5	25.7	25.7	5.1	17.3	17.3	7.2	7.2	7.2		12.3	12.3
Actuated g/C Ratio	0.20	0.39	0.39	0.08	0.26	0.26	0.11	0.11	0.11		0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	706	1304	549	139	923	421	183	185	175		342	504
v/s Ratio Prot	c0.11	c0.27		0.06	0.18	0.02	c0.11	0.11	0.01		c0.07	
v/s Ratio Perm			0.11									0.02
v/c Ratio	0.53	0.71	0.27	0.72	0.68	0.07	0.98	0.97	0.06		0.36	0.11
Uniform Delay, d1	23.6	17.1	13.9	29.9	22.0	18.5	29.5	29.5	26.5		23.6	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	1.8	0.3	16.3	2.1	0.1	61.3	57.9	0.1		0.7	0.1
Delay (s)	24.3	18.9	14.2	46.2	24.1	18.5	90.8	87.3	26.7		24.2	22.5
Level of Service	C	B	B	D	C	B	F	F	C		C	C
Approach Delay (s)		19.0			26.2			75.5			23.0	
Approach LOS		B			C			E			C	

Intersection Summary

HCM Average Control Delay	28.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	169	525	207	77	423	31	141	127	24	27	182	66
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3347		1787	3495		1787	1831		1805	1863	1567
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.65	1.00	1.00
Satd. Flow (perm)	1770	3347		1787	3495		1787	1831		1241	1863	1567
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	184	571	225	84	460	34	153	138	26	29	198	72
RTOR Reduction (vph)	0	57	0	0	8	0	0	10	0	0	0	46
Lane Group Flow (vph)	184	739	0	84	486	0	153	154	0	29	198	26
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	2%	1%	1%	2%	0%	1%	1%	0%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	7.2	19.8		5.3	17.9		6.1	18.8		14.9	14.9	22.1
Effective Green, g (s)	7.2	19.8		5.3	17.9		6.1	18.8		14.9	14.9	22.1
Actuated g/C Ratio	0.12	0.32		0.09	0.29		0.10	0.30		0.24	0.24	0.36
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	205	1067		153	1007		176	554		318	447	659
v/s Ratio Prot	c0.10	c0.22		0.05	0.14		c0.09	0.08		0.00	c0.11	0.00
v/s Ratio Perm										0.02		0.01
v/c Ratio	0.90	0.69		0.55	0.48		0.87	0.28		0.09	0.44	0.04
Uniform Delay, d1	27.1	18.5		27.3	18.3		27.6	16.5		18.4	20.1	13.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	35.7	2.0		4.0	0.4		33.6	0.3		0.1	0.7	0.0
Delay (s)	62.8	20.4		31.2	18.6		61.2	16.8		18.5	20.8	13.1
Level of Service	E	C		C	B		E	B		B	C	B
Approach Delay (s)		28.4			20.5			38.2			18.7	
Approach LOS		C			C			D			B	

Intersection Summary

HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	62.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗		↘	↗	↗	↘	↗	↗	↘	↗	↗
Volume (vph)	69	214	186	160	676	29	191	873	63	70	1313	46
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3272		1805	3574	1577	1787	3574	1578	1805	3471	1517
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3272		1805	3574	1577	1787	3574	1578	1805	3471	1517
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	233	202	174	735	32	208	949	68	76	1427	50
RTOR Reduction (vph)	0	160	0	0	0	8	0	0	13	0	0	6
Lane Group Flow (vph)	75	275	0	174	735	24	208	949	55	76	1427	44
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	2%	1%	0%	1%	0%	1%	1%	0%	0%	4%	4%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	5.2	20.8		11.4	27.0	27.0	15.4	44.6	44.6	8.2	37.4	37.4
Effective Green, g (s)	5.2	20.8		11.4	27.0	27.0	15.4	44.6	44.6	8.2	37.4	37.4
Actuated g/C Ratio	0.05	0.21		0.11	0.27	0.27	0.15	0.45	0.45	0.08	0.37	0.37
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	681		206	965	426	275	1594	704	148	1298	567
v/s Ratio Prot	0.04	0.08		c0.10	c0.21		c0.12	0.27		0.04	c0.41	
v/s Ratio Perm						0.02			0.04			0.03
v/c Ratio	0.82	0.40		0.84	0.76	0.06	0.76	0.60	0.08	0.51	1.10	0.08
Uniform Delay, d1	46.9	34.2		43.4	33.5	27.1	40.5	20.9	15.9	44.0	31.3	20.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	40.4	0.4		25.8	3.6	0.1	11.2	1.6	0.2	3.0	56.8	0.3
Delay (s)	87.3	34.6		69.2	37.1	27.1	51.7	22.5	16.1	47.0	88.1	20.4
Level of Service	F	C		E	D	C	D	C	B	D	F	C
Approach Delay (s)		42.4			42.7			27.1			83.9	
Approach LOS		D			D			C			F	

Intersection Summary		
HCM Average Control Delay	53.3	HCM Level of Service D
HCM Volume to Capacity ratio	0.90	
Actuated Cycle Length (s)	100.0	Sum of lost time (s) 10.5
Intersection Capacity Utilization	84.9%	ICU Level of Service E
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↗↘		↗	↗↘	
Volume (vph)	55	291	2	64	374	16	165	385	13	50	766	17
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3536		1805	3551		1805	3590		1805	3527	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3536		1805	3551		1805	3590		1805	3527	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	316	2	70	407	17	179	418	14	54	833	18
RTOR Reduction (vph)	0	1	0	0	3	0	0	2	0	0	1	0
Lane Group Flow (vph)	60	317	0	70	421	0	179	430	0	54	850	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	2%	0%	0%	1%	0%	0%	0%	0%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	6.7	15.9		7.0	16.2		13.1	37.0		4.8	28.7	
Effective Green, g (s)	6.7	15.9		7.0	16.2		13.1	37.0		4.8	28.7	
Actuated g/C Ratio	0.09	0.20		0.09	0.21		0.17	0.47		0.06	0.36	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	151	714		161	731		300	1688		110	1286	
v/s Ratio Prot	0.03	0.09		c0.04	c0.12		c0.10	0.12		0.03	c0.24	
v/s Ratio Perm												
v/c Ratio	0.40	0.44		0.43	0.58		0.60	0.25		0.49	0.66	
Uniform Delay, d1	34.1	27.5		34.0	28.2		30.4	12.6		35.8	20.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.4		1.9	1.1		3.2	0.1		3.4	1.3	
Delay (s)	35.8	28.0		35.9	29.3		33.5	12.6		39.2	22.2	
Level of Service	D	C		D	C		C	B		D	C	
Approach Delay (s)		29.2			30.2			18.8			23.2	
Approach LOS		C			C			B			C	

Intersection Summary

HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	11.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/23/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	254	263	243	1696	1141	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	3467	1564		5155	4974	
Flt Permitted	0.95	1.00		0.64	1.00	
Satd. Flow (perm)	3467	1564		3299	4974	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	286	264	1843	1240	248
RTOR Reduction (vph)	0	47	0	0	33	0
Lane Group Flow (vph)	276	239	0	2107	1455	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	2%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	27.0	27.0		55.0	55.0	
Effective Green, g (s)	27.0	27.0		55.0	55.0	
Actuated g/C Ratio	0.30	0.30		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1040	469		2016	3040	
v/s Ratio Prot	0.08				0.29	
v/s Ratio Perm		c0.15		c0.64		
v/c Ratio	0.27	0.51		1.74dl	0.48	
Uniform Delay, d1	24.0	26.0		17.5	9.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.9		33.0	0.5	
Delay (s)	24.6	30.0		50.5	10.2	
Level of Service	C	C		D	B	
Approach Delay (s)	27.3			50.5	10.2	
Approach LOS	C			D	B	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Volume (vph)	461	805	292	80	613	41	56	149	51	55	266	161
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3328		1787	3501		1805	3407		1770	1863	1495
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3328		1787	3501		1805	3407		1770	1863	1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	501	875	317	87	666	45	61	162	55	60	289	175
RTOR Reduction (vph)	0	38	0	0	6	0	0	38	0	0	0	140
Lane Group Flow (vph)	501	1154	0	87	705	0	61	179	0	60	289	35
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	2%	3%	2%	1%	2%	1%	0%	1%	1%	2%	2%	8%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	23.6	39.8		7.0	23.2		3.8	16.7		3.8	16.7	16.7
Effective Green, g (s)	23.6	39.8		7.0	23.2		3.8	16.7		3.8	16.7	16.7
Actuated g/C Ratio	0.28	0.48		0.08	0.28		0.05	0.20		0.05	0.20	0.20
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	501	1590		150	975		82	683		81	373	300
v/s Ratio Prot	c0.28	c0.35		0.05	0.20		0.03	0.05		c0.03	c0.16	
v/s Ratio Perm												0.02
v/c Ratio	1.00	0.73		0.58	0.72		0.74	0.26		0.74	0.77	0.12
Uniform Delay, d1	29.8	17.4		36.7	27.2		39.3	28.1		39.3	31.5	27.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	40.2	1.7		5.4	2.7		30.1	0.2		30.1	9.7	0.2
Delay (s)	70.1	19.1		42.1	29.8		69.4	28.3		69.3	41.2	27.4
Level of Service	E	B		D	C		E	C		E	D	C
Approach Delay (s)		34.2			31.2			37.3			39.8	
Approach LOS		C			C			D			D	

Intersection Summary

HCM Average Control Delay	34.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	83.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	124	658	185	44	696	91	137	720	37	161	1151	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1746	3394			3267		1805	3574	1555	1787	3471	1518
Flt Permitted	0.22	1.00			0.86		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	399	3394			2815		1805	3574	1555	1787	3471	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	135	715	201	48	757	99	149	783	40	175	1251	171
RTOR Reduction (vph)	0	39	0	0	14	0	0	0	11	0	0	28
Lane Group Flow (vph)	135	877	0	0	890	0	149	783	29	175	1251	143
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	3%	2%	3%	0%	1%	0%	0%	1%	0%	1%	4%	3%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	30.6	30.6			30.6		5.1	18.5	18.5	7.2	20.6	20.6
Effective Green, g (s)	30.6	30.6			30.6		5.1	18.5	18.5	7.2	20.6	20.6
Actuated g/C Ratio	0.45	0.45			0.45		0.07	0.27	0.27	0.11	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	179	1521			1261		135	968	421	188	1047	458
v/s Ratio Prot		0.26					c0.08	0.22		0.10	c0.36	
v/s Ratio Perm	c0.34				0.32				0.02			0.09
v/c Ratio	0.75	0.58			0.71		1.10	0.81	0.07	0.93	1.19	0.31
Uniform Delay, d1	15.7	14.0			15.2		31.6	23.2	18.5	30.3	23.8	18.4
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.4	0.5			1.8		108.0	5.1	0.1	46.1	97.2	0.4
Delay (s)	32.1	14.6			17.0		139.6	28.3	18.6	76.4	121.0	18.8
Level of Service	C	B			B		F	C	B	E	F	B
Approach Delay (s)		16.8			17.0			45.0			105.2	
Approach LOS		B			B			D			F	

Intersection Summary

HCM Average Control Delay	54.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	68.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/23/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↶	↶↶	↶↶		↶↶	↶↶
Volume (vph)	70	319	966	69	348	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3570		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3570		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	347	1050	75	378	425
RTOR Reduction (vph)	0	309	6	0	0	0
Lane Group Flow (vph)	76	38	1119	0	378	425
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	6.0	6.0	26.0		11.2	34.2
Effective Green, g (s)	6.0	6.0	26.0		11.2	34.2
Actuated g/C Ratio	0.11	0.11	0.47		0.20	0.62
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	196	303	1682		711	2237
v/s Ratio Prot	c0.04	0.01	c0.31		c0.11	0.12
v/s Ratio Perm						
v/c Ratio	0.39	0.12	0.67		0.53	0.19
Uniform Delay, d1	22.9	22.2	11.2		19.7	4.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.3	0.2	1.0		0.8	0.0
Delay (s)	24.2	22.4	12.3		20.4	4.6
Level of Service	C	C	B		C	A
Approach Delay (s)	22.7		12.3			12.0
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	380	164	96	24	213	50	116	900	48	59	439	357
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3610	1571	1805	3490		1805	3575		1787	3574	1573
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3610	1571	1805	3490		1805	3575		1787	3574	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	413	178	104	26	232	54	126	978	52	64	477	388
RTOR Reduction (vph)	0	0	74	0	27	0	0	4	0	0	0	252
Lane Group Flow (vph)	413	178	30	26	259	0	126	1026	0	64	477	136
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Effective Green, g (s)	7.4	19.6	19.6	3.0	15.2		5.3	25.9		3.1	23.7	23.7
Actuated g/C Ratio	0.11	0.29	0.29	0.04	0.22		0.08	0.38		0.05	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	383	1047	455	80	785		142	1370		82	1253	551
v/s Ratio Prot	c0.12	0.05		0.01	c0.07		0.07	c0.29		c0.04	0.13	
v/s Ratio Perm			0.02									0.09
v/c Ratio	1.08	0.17	0.07	0.33	0.33		0.89	0.75		0.78	0.38	0.25
Uniform Delay, d1	30.1	17.9	17.4	31.3	21.9		30.9	18.0		31.9	16.5	15.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	68.5	0.1	0.1	2.4	0.2		43.4	2.3		37.0	0.2	0.2
Delay (s)	98.6	18.0	17.4	33.7	22.2		74.3	20.3		68.9	16.6	15.8
Level of Service	F	B	B	C	C		E	C		E	B	B
Approach Delay (s)		65.8			23.1			26.2			19.9	
Approach LOS		E			C			C			B	

Intersection Summary		
HCM Average Control Delay	32.9	HCM Level of Service C
HCM Volume to Capacity ratio	0.67	
Actuated Cycle Length (s)	67.6	Sum of lost time (s) 16.0
Intersection Capacity Utilization	70.2%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	118	22	56	144	257	99	776	88	188	258	48
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3449		1805	3205		3502	3610	1579	3502	3610	1577
Flt Permitted	0.44	1.00		0.66	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	830	3449		1246	3205		3502	3610	1579	3502	3610	1577
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	128	24	61	157	279	108	843	96	204	280	52
RTOR Reduction (vph)	0	18	0	0	169	0	0	0	46	0	0	29
Lane Group Flow (vph)	87	134	0	61	267	0	108	843	50	204	280	23
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	12.2	12.2		12.2	12.2		3.9	19.2	19.2	6.5	21.8	21.8
Effective Green, g (s)	12.2	12.2		12.2	12.2		3.9	19.2	19.2	6.5	21.8	21.8
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.08	0.38	0.38	0.13	0.44	0.44
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	843		305	784		274	1389	608	456	1577	689
v/s Ratio Prot		0.04			0.08		0.03	c0.23		c0.06	0.08	
v/s Ratio Perm	c0.10			0.05					0.03			0.01
v/c Ratio	0.43	0.16		0.20	0.34		0.39	0.61	0.08	0.45	0.18	0.03
Uniform Delay, d1	15.9	14.8		15.0	15.5		21.9	12.3	9.8	20.0	8.6	8.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.5	0.1		0.3	0.3		0.9	0.8	0.1	0.7	0.1	0.0
Delay (s)	17.4	14.9		15.3	15.8		22.8	13.1	9.8	20.7	8.6	8.0
Level of Service	B	B		B	B		C	B	A	C	A	A
Approach Delay (s)		15.8			15.7			13.8			13.2	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

46: Maritime Street & Burma Road

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	1	46	64	10	151	84	244	29	185	487	427
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.86		1.00	0.98		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1504	818		912	1017		1211	2395		1719	2665	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1504	818		912	1017		1211	2395		1719	2665	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	199	1	50	70	11	164	91	265	32	201	529	464
RTOR Reduction (vph)	0	41	0	0	141	0	0	10	0	0	170	0
Lane Group Flow (vph)	199	10	0	70	34	0	91	287	0	201	823	0
Heavy Vehicles (%)	20%	100%	98%	98%	100%	58%	49%	50%	34%	5%	40%	10%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	13.1	13.4		10.6	10.9		8.2	23.4		13.2	28.4	
Effective Green, g (s)	13.1	13.4		10.6	10.9		8.2	23.4		13.2	28.4	
Actuated g/C Ratio	0.17	0.17		0.14	0.14		0.11	0.31		0.17	0.37	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	257	143		126	145		130	732		296	988	
v/s Ratio Prot	c0.13	0.01		0.08	c0.03		0.08	0.12		c0.12	c0.31	
v/s Ratio Perm												
v/c Ratio	0.77	0.07		0.56	0.24		0.70	0.39		0.68	0.83	
Uniform Delay, d1	30.3	26.4		30.8	29.2		33.0	21.0		29.7	21.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.5	0.2		5.2	0.8		15.2	0.3		6.1	6.1	
Delay (s)	43.9	26.6		36.0	30.0		48.2	21.3		35.8	28.1	
Level of Service	D	C		D	C		D	C		D	C	
Approach Delay (s)		40.3			31.7			27.6			29.4	
Approach LOS		D			C			C			C	

Intersection Summary

HCM Average Control Delay	30.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	76.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 47: 14th Street & Maritime Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕↔		↗	↕↔	
Volume (vph)	1	0	0	10	0	40	7	443	67	98	229	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		1.00			0.89		1.00	0.98		1.00	0.99	
Flt Protected		0.95			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1805			1378		1805	2254		1736	2056	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1900			1392		1805	2254		1736	2056	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	0	0	11	0	43	8	482	73	107	249	12
RTOR Reduction (vph)	0	0	0	0	40	0	0	20	0	0	5	0
Lane Group Flow (vph)	0	1	0	0	14	0	8	535	0	107	256	0
Heavy Vehicles (%)	0%	0%	0%	60%	0%	12%	0%	64%	11%	4%	78%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6								
Actuated Green, G (s)		2.0			2.0		0.5	13.0		3.8	16.3	
Effective Green, g (s)		2.0			2.0		0.5	13.0		3.8	16.3	
Actuated g/C Ratio		0.06			0.06		0.02	0.42		0.12	0.53	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		123			90		29	951		214	1088	
v/s Ratio Prot							0.00	c0.24		c0.06	c0.12	
v/s Ratio Perm		0.00			c0.01							
v/c Ratio		0.01			0.15		0.28	0.56		0.50	0.24	
Uniform Delay, d1		13.5			13.6		15.0	6.7		12.6	3.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			0.8		5.1	0.8		1.8	0.1	
Delay (s)		13.5			14.4		20.1	7.5		14.4	4.0	
Level of Service		B			B		C	A		B	A	
Approach Delay (s)		13.5			14.4			7.7			7.0	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	30.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway/Maritime Street

4/23/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	↑
Volume (vph)	130	194	150	134	215	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1973	864	965	1920	1014	1056
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1973	864	965	1920	1014	1056
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	211	163	146	234	554
RTOR Reduction (vph)	0	169	0	0	0	357
Lane Group Flow (vph)	141	42	163	146	234	197
Heavy Vehicles (%)	83%	87%	87%	88%	78%	53%
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	10.9	10.9	12.3	27.2	19.5	19.5
Effective Green, g (s)	10.9	10.9	12.3	27.2	19.5	19.5
Actuated g/C Ratio	0.20	0.20	0.22	0.50	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	393	172	217	955	361	376
v/s Ratio Prot	c0.07		c0.17	0.08	c0.23	
v/s Ratio Perm		0.05				0.19
v/c Ratio	0.36	0.24	0.75	0.15	0.65	0.53
Uniform Delay, d1	18.9	18.4	19.8	7.5	14.7	13.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.7	13.6	0.1	4.0	1.3
Delay (s)	19.4	19.2	33.4	7.6	18.7	15.3
Level of Service	B	B	C	A	B	B
Approach Delay (s)	19.3			21.2	16.3	
Approach LOS	B			C	B	

Intersection Summary

HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	54.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	130	194	215	510	150	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	986	1930	2028	1056	1873	859
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	986	1930	2028	1056	1873	859
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	211	234	554	163	146
RTOR Reduction (vph)	0	0	0	0	0	117
Lane Group Flow (vph)	141	211	234	554	163	29
Heavy Vehicles (%)	83%	87%	78%	53%	87%	88%
Turn Type	Prot	NA	NA	Free	NA	Perm
Protected Phases	5	2	6		7	
Permitted Phases				Free		7
Actuated Green, G (s)	8.6	20.6	8.0	35.8	7.2	7.2
Effective Green, g (s)	8.6	20.6	8.0	35.8	7.2	7.2
Actuated g/C Ratio	0.24	0.58	0.22	1.00	0.20	0.20
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	237	1111	453	1056	377	173
v/s Ratio Prot	0.14	0.11	0.12		0.09	
v/s Ratio Perm				c0.52		0.03
v/c Ratio	0.59	0.19	0.52	0.52	0.43	0.17
Uniform Delay, d1	12.1	3.6	12.2	0.0	12.5	11.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	0.1	1.0	1.9	0.8	0.5
Delay (s)	16.0	3.7	13.2	1.9	13.3	12.3
Level of Service	B	A	B	A	B	B
Approach Delay (s)		8.6	5.2		12.8	
Approach LOS		A	A		B	

Intersection Summary


















HCM Average Control Delay	7.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	35.8	Sum of lost time (s)	0.0
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

49: W. Truck Services & Burma Road

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	66	0	154	262	127	0	0	41	123	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	72	0	167	285	138	0	0	45	134	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					788							
pX, platoon unblocked												
vC, conflicting volume	423			72			760	829	36	769	760	354
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	423			72			760	829	36	769	760	354
tC, single (s)	4.1			4.2			7.5	6.5	7.0	8.6	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.0	4.0	3.3
p0 queue free %	100			89			100	100	96	28	100	100
cM capacity (veh/h)	1147			1512			273	274	1019	185	300	648
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2						
Volume Total	48	24	590	45	89	45						
Volume Left	0	0	167	0	89	45						
Volume Right	0	0	138	45	0	0						
cSH	1700	1700	1512	1019	185	185						
Volume to Capacity	0.03	0.01	0.11	0.04	0.48	0.24						
Queue Length 95th (ft)	0	0	9	3	58	23						
Control Delay (s)	0.0	0.0	3.0	8.7	41.3	30.5						
Lane LOS			A	A	E	D						
Approach Delay (s)	0.0		3.0	8.7	37.7							
Approach LOS				A	E							
Intersection Summary												
Average Delay			8.6									
Intersection Capacity Utilization			53.5%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	104	217	239	250	728	226	282	261	230	148	370	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	2700		1656	3505	1553	1641	2693		1752	2690	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	2700		1656	3505	1553	1641	2693		1752	2690	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	236	260	272	791	246	307	284	250	161	402	165
RTOR Reduction (vph)	0	195	0	0	0	165	0	175	0	0	49	0
Lane Group Flow (vph)	113	301	0	272	791	81	307	359	0	161	518	0
Confl. Peds. (#/hr)			10									
Heavy Vehicles (%)	2%	5%	37%	9%	3%	4%	10%	34%	14%	3%	40%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	8.2	21.6		15.2	28.6	28.6	17.1	23.0		10.6	16.5	
Effective Green, g (s)	8.2	21.6		15.2	28.6	28.6	17.1	23.0		10.6	16.5	
Actuated g/C Ratio	0.09	0.25		0.17	0.33	0.33	0.20	0.26		0.12	0.19	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	167	671		290	1154	511	323	713		214	511	
v/s Ratio Prot	0.06	0.11		c0.16	c0.23		c0.19	0.13		0.09	c0.19	
v/s Ratio Perm						0.05						
v/c Ratio	0.68	0.45		0.94	0.69	0.16	0.95	0.50		0.75	1.01	
Uniform Delay, d1	38.1	27.6		35.4	25.3	20.6	34.5	27.1		36.9	35.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.8	0.8		36.6	2.0	0.3	37.2	0.7		14.3	43.1	
Delay (s)	48.8	28.4		72.0	27.3	20.9	71.7	27.8		51.2	78.3	
Level of Service	D	C		E	C	C	E	C		D	E	
Approach Delay (s)		32.2			35.4			43.8			72.3	
Approach LOS		C			D			D			E	

Intersection Summary

HCM Average Control Delay	44.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	86.9	Sum of lost time (s)	11.5
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	453	269	214	729	28	705	23	471	74	13	57
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1583	3574	1051	1480	3434		1406	1430	1346	1687	1493	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1583	3574	1051	1480	3434		1406	1430	1346	1687	1493	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	492	292	233	792	30	766	25	512	80	14	62
RTOR Reduction (vph)	0	0	217	0	2	0	0	0	331	0	56	0
Lane Group Flow (vph)	18	492	75	233	820	0	398	393	181	80	20	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	14%	1%	50%	22%	4%	16%	22%	0%	17%	7%	50%	3%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	2.9	26.3	26.3	21.3	44.7		28.5	28.5	28.5	10.3	10.3	
Effective Green, g (s)	2.9	26.3	26.3	21.3	44.7		28.5	28.5	28.5	10.3	10.3	
Actuated g/C Ratio	0.03	0.26	0.26	0.21	0.43		0.28	0.28	0.28	0.10	0.10	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	45	913	269	306	1492		389	396	373	169	149	
v/s Ratio Prot	0.01	0.14		c0.16	c0.24		c0.28	0.27		c0.05	0.01	
v/s Ratio Perm			0.07						0.13			
v/c Ratio	0.40	0.54	0.28	0.76	0.55		1.02	0.99	0.48	0.47	0.14	
Uniform Delay, d1	49.1	33.1	30.7	38.4	21.6		37.2	37.1	31.1	43.7	42.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.7	1.0	1.0	10.7	0.6		51.7	43.1	1.4	2.1	0.4	
Delay (s)	54.9	34.0	31.7	49.1	22.3		88.9	80.2	32.4	45.8	42.7	
Level of Service	D	C	C	D	C		F	F	C	D	D	
Approach Delay (s)		33.6			28.2			64.1			44.3	
Approach LOS		C			C			E			D	

Intersection Summary

HCM Average Control Delay	44.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	102.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	130	514	347	212	612	212	216	406	440	68	254	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.92		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1597	3175		1626	3374	1583	1626	2644		1703	2776	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1597	3175		1626	3374	1583	1626	2644		1703	2776	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	559	377	230	665	230	235	441	478	74	276	51
RTOR Reduction (vph)	0	148	0	0	0	159	0	231	0	0	19	0
Lane Group Flow (vph)	141	788	0	230	665	71	235	688	0	74	308	0
Heavy Vehicles (%)	13%	2%	14%	11%	7%	2%	11%	42%	11%	6%	32%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.7	24.0		11.0	24.3	24.3	14.6	19.1		7.6	12.1	
Effective Green, g (s)	10.7	24.0		11.0	24.3	24.3	14.6	19.1		7.6	12.1	
Actuated g/C Ratio	0.14	0.31		0.14	0.31	0.31	0.19	0.24		0.10	0.15	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	219	974		229	1048	492	304	646		166	430	
v/s Ratio Prot	0.09	c0.25		c0.14	0.20		c0.14	c0.26		0.04	0.11	
v/s Ratio Perm						0.05						
v/c Ratio	0.64	0.81		1.00	0.63	0.15	0.77	1.06		0.45	0.72	
Uniform Delay, d1	31.9	25.0		33.6	23.1	19.5	30.2	29.6		33.3	31.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.6	5.6		60.6	1.6	0.2	11.9	53.9		2.2	5.8	
Delay (s)	38.6	30.6		94.2	24.7	19.7	42.1	83.4		35.6	37.3	
Level of Service	D	C		F	C	B	D	F		D	D	
Approach Delay (s)		31.6			37.9			75.0			36.9	
Approach LOS		C			D			E			D	

Intersection Summary

HCM Average Control Delay	47.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	78.2	Sum of lost time (s)	16.5
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑	↑↑						↑↑	
Volume (vph)	0	974	59	220	772	0	0	0	0	80	142	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.93	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		4943		1800	3374						3178	
Flt Permitted		1.00		0.23	1.00						0.99	
Satd. Flow (perm)		4943		437	3374						3178	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1059	64	239	839	0	0	0	0	87	154	214
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	88	0
Lane Group Flow (vph)	0	1119	0	239	839	0	0	0	0	0	367	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	9%	4%	2%	0%	7%	1%	1%	3%	0%	1%	0%	7%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		47.4		47.4	47.4						14.1	
Effective Green, g (s)		47.4		47.4	47.4						14.1	
Actuated g/C Ratio		0.66		0.66	0.66						0.20	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		3277		290	2237						627	
v/s Ratio Prot		0.23			0.25							
v/s Ratio Perm				c0.55							0.12	
v/c Ratio		0.34		0.82	0.38						0.58	
Uniform Delay, d1		5.2		9.0	5.4						26.0	
Progression Factor		1.00		0.68	0.41						1.00	
Incremental Delay, d2		0.0		15.9	0.0						0.9	
Delay (s)		5.3		22.0	2.2						26.9	
Level of Service		A		C	A						C	
Approach Delay (s)		5.3			6.6			0.0			26.9	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM Average Control Delay			9.5		HCM Level of Service					A		
HCM Volume to Capacity ratio			0.77									
Actuated Cycle Length (s)			71.5		Sum of lost time (s)				10.0			
Intersection Capacity Utilization			60.9%		ICU Level of Service					B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	228	826	0	0	881	27	111	153	159	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			1.00			0.94				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5027			5059			3271				
Flt Permitted		0.66			1.00			0.99				
Satd. Flow (perm)		3376			5059			3271				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	248	898	0	0	958	29	121	166	173	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	75	0	0	0	0
Lane Group Flow (vph)	0	1146	0	0	985	0	0	385	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		47.4			47.4			14.1				
Effective Green, g (s)		47.4			47.4			14.1				
Actuated g/C Ratio		0.66			0.66			0.20				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		2238			3354			645				
v/s Ratio Prot					0.19							
v/s Ratio Perm		c0.34						0.12				
v/c Ratio		0.51			0.29			0.60				
Uniform Delay, d1		6.1			5.0			26.1				
Progression Factor		0.39			1.00			1.00				
Incremental Delay, d2		0.1			0.0			1.0				
Delay (s)		2.5			5.1			27.1				
Level of Service		A			A			C				
Approach Delay (s)		2.5			5.1			27.1			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	71.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔			↔↕↔			↔↕			↔↕	
Volume (vph)	35	782	103	63	402	62	66	660	75	121	711	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.98			0.98			0.99			0.99	
Flt Protected		1.00			0.99			1.00			0.99	
Satd. Flow (prot)		4954			4827			3536			3539	
Flt Permitted		0.90			0.78			0.55			0.53	
Satd. Flow (perm)		4473			3764			1948			1889	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	850	112	68	437	67	72	717	82	132	773	73
RTOR Reduction (vph)	0	10	0	0	13	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	990		0	559		0	861		0	971	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	0%	6%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5			48.5			23.0			23.0	
Effective Green, g (s)		48.5			48.5			23.0			23.0	
Actuated g/C Ratio		0.61			0.61			0.29			0.29	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2712			2282			560			543	
v/s Ratio Prot												
v/s Ratio Perm		c0.22			0.15			0.44			c0.51	
v/c Ratio		0.36			0.24			1.54			1.79	
Uniform Delay, d1		8.0			7.3			28.5			28.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			0.3			250.8			362.0	
Delay (s)		8.3			7.5			279.3			390.5	
Level of Service		A			A			F			F	
Approach Delay (s)		8.3			7.5			279.3			390.5	
Approach LOS		A			A			F			F	

Intersection Summary

HCM Average Control Delay	186.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	115.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕↕	↗
Volume (vph)	77	939	189	84	665	54	134	253	96	45	179	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3495	1517		3322	1547	1690	1810	1431		1849	1559
Flt Permitted		0.80	1.00		0.69	1.00	0.38	1.00	1.00		0.67	1.00
Satd. Flow (perm)		2819	1517		2321	1547	676	1810	1431		1246	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	1021	205	91	723	59	146	275	104	49	195	40
RTOR Reduction (vph)	0	0	66	0	0	15	0	0	60	0	0	31
Lane Group Flow (vph)	0	1105	139	0	814	44	146	275	44	0	244	9
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	3%	2%	16%	7%	0%	6%	5%	10%	0%	2%	1%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		61.0	61.0		61.0	61.0	20.0	20.0	20.0		20.0	20.0
Effective Green, g (s)		61.0	61.0		61.0	61.0	20.0	20.0	20.0		20.0	20.0
Actuated g/C Ratio		0.68	0.68		0.68	0.68	0.22	0.22	0.22		0.22	0.22
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1911	1028		1573	1049	150	402	318		277	346
v/s Ratio Prot								0.15				
v/s Ratio Perm		c0.39	0.09		0.35	0.03	c0.22		0.03		0.20	0.01
v/c Ratio		0.58	0.14		0.52	0.04	0.97	0.68	0.14		0.88	0.03
Uniform Delay, d1		7.7	5.1		7.2	4.8	34.7	32.1	28.1		33.8	27.4
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		1.3	0.3		1.2	0.1	64.8	3.8	0.1		25.5	0.0
Delay (s)		9.0	5.4		8.4	4.9	99.5	35.9	28.2		59.4	27.4
Level of Service		A	A		A	A	F	D	C		E	C
Approach Delay (s)		8.4			8.2			52.1			54.9	
Approach LOS		A			A			D			D	

Intersection Summary		
HCM Average Control Delay	20.4	HCM Level of Service
HCM Volume to Capacity ratio	0.68	C
Actuated Cycle Length (s)	90.0	Sum of lost time (s)
Intersection Capacity Utilization	92.4%	ICU Level of Service
Analysis Period (min)	15	F
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↘	↕↕	↗	↘	↕↕		↘	↕↕	
Volume (vph)	69	901	68	25	688	69	118	538	30	152	398	144
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3498	1510	1800	3343	1540	1744	3446		1761	3419	
Flt Permitted		0.83	1.00	0.20	1.00	1.00	0.33	1.00		0.32	1.00	
Satd. Flow (perm)		2931	1510	373	3343	1540	614	3446		585	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	979	74	27	748	75	128	585	33	165	433	157
RTOR Reduction (vph)	0	0	27	0	0	29	0	7	0	0	47	0
Lane Group Flow (vph)	0	1054	47	27	748	46	128	611	0	165	543	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	0%	3%	4%	0%	8%	2%	3%	4%	0%	2%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		47.0	47.0	47.0	47.0	47.0	28.5	28.5		28.5	28.5	
Effective Green, g (s)		47.0	47.0	47.0	47.0	47.0	28.5	28.5		28.5	28.5	
Actuated g/C Ratio		0.55	0.55	0.55	0.55	0.55	0.34	0.34		0.34	0.34	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1621	835	206	1848	852	206	1155		196	1146	
v/s Ratio Prot					0.22			0.18				0.16
v/s Ratio Perm		c0.36	0.03	0.07		0.03	0.21			c0.28		
v/c Ratio		0.65	0.06	0.13	0.40	0.05	0.62	0.53		0.84	0.47	
Uniform Delay, d1		13.3	8.8	9.2	10.9	8.8	23.7	22.8		26.2	22.3	
Progression Factor		1.00	1.00	0.51	0.74	0.27	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.0	0.1	1.3	0.6	0.1	8.0	0.8		27.4	0.4	
Delay (s)		15.3	8.9	5.9	8.7	2.5	31.7	23.7		53.6	22.8	
Level of Service		B	A	A	A	A	C	C		D	C	
Approach Delay (s)		14.9			8.1			25.0			29.5	
Approach LOS		B			A			C			C	

Intersection Summary

HCM Average Control Delay	18.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	↗
Volume (vph)	69	910	14	26	752	10	37	197	287	37	88	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		0.99	
Satd. Flow (prot)	1800	3505	1579	1766	3438	1579		3578	1490		3289	
Flt Permitted	0.31	1.00	1.00	0.25	1.00	1.00		0.87	1.00		0.87	
Satd. Flow (perm)	595	3505	1579	465	3438	1579		3141	1490		2894	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	989	15	28	817	11	40	214	312	40	96	123
RTOR Reduction (vph)	0	0	3	0	0	3	0	0	47	0	77	0
Lane Group Flow (vph)	75	989	12	28	817	8	0	254	265	0	182	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	2%	5%	0%	0%	0%	6%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	55.4	55.4	55.4	55.4	55.4	55.4		21.1	21.1		21.1	
Effective Green, g (s)	55.4	55.4	55.4	55.4	55.4	55.4		21.1	21.1		21.1	
Actuated g/C Ratio	0.65	0.65	0.65	0.65	0.65	0.65		0.25	0.25		0.25	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	388	2284	1029	303	2241	1029		780	370		718	
v/s Ratio Prot		c0.28			0.24							
v/s Ratio Perm	0.13		0.01	0.06		0.00		0.08	c0.18		0.06	
v/c Ratio	0.19	0.43	0.01	0.09	0.36	0.01		0.33	0.72		0.25	
Uniform Delay, d1	5.9	7.2	5.2	5.5	6.8	5.2		26.1	29.2		25.6	
Progression Factor	0.93	0.81	1.09	1.05	1.30	1.08		1.00	1.00		1.00	
Incremental Delay, d2	0.9	0.5	0.0	0.5	0.4	0.0		0.1	5.4		0.1	
Delay (s)	6.3	6.3	5.7	6.2	9.2	5.6		26.2	34.7		25.7	
Level of Service	A	A	A	A	A	A		C	C		C	
Approach Delay (s)		6.3			9.0			30.9			25.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	14.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	572	1024	745	431	159	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.97	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1770	3505	3438	1524	3335	1369
Flt Permitted	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (perm)	1770	3505	3438	1524	3335	1369
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	622	1113	810	468	173	145
RTOR Reduction (vph)	0	0	0	233	35	87
Lane Group Flow (vph)	622	1113	810	235	183	13
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	3%	5%	2%	2%	4%
Bus Blockages (#/hr)	0	0	0	2	0	1
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	31.6	65.6	30.0	30.0	11.4	11.4
Effective Green, g (s)	31.6	65.6	30.0	30.0	11.4	11.4
Actuated g/C Ratio	0.37	0.77	0.35	0.35	0.13	0.13
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	658	2705	1213	538	447	184
v/s Ratio Prot	c0.35	0.32	c0.24		c0.05	
v/s Ratio Perm				0.15		0.01
v/c Ratio	0.95	0.41	0.67	0.44	0.41	0.07
Uniform Delay, d1	25.9	3.2	23.3	21.0	33.7	32.2
Progression Factor	0.89	1.06	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.6	0.4	2.9	2.6	0.2	0.1
Delay (s)	44.6	3.9	26.2	23.6	33.9	32.2
Level of Service	D	A	C	C	C	C
Approach Delay (s)		18.5	25.3		33.4	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	173	539	172	311	529	105	48	1618	738	95	614	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		0.99	1.00
Satd. Flow (prot)	3502	3610	1514	3502	3610	1529		5123	1577		5108	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.88	1.00		0.66	1.00
Satd. Flow (perm)	3502	3610	1514	3502	3610	1529		4501	1577		3413	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	188	586	187	338	575	114	52	1759	802	103	667	79
RTOR Reduction (vph)	0	0	41	0	0	25	0	0	0	0	0	42
Lane Group Flow (vph)	188	586	146	338	575	89	0	1811	802	0	770	37
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	0%	1%	0%	0%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	10.2	33.1	33.1	12.0	34.9	34.9		34.9	95.0		34.9	34.9
Effective Green, g (s)	10.2	33.1	33.1	12.0	34.9	34.9		34.9	95.0		34.9	34.9
Actuated g/C Ratio	0.11	0.35	0.35	0.13	0.37	0.37		0.37	1.00		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	376	1258	528	442	1326	562		1654	1577		1254	562
v/s Ratio Prot	0.05	0.16		c0.10	0.16							
v/s Ratio Perm			0.10			0.06		c0.40	c0.51		0.23	0.02
v/c Ratio	0.50	0.47	0.28	0.76	0.43	0.16		1.09	0.51		1.29dl	0.07
Uniform Delay, d1	40.0	24.1	22.3	40.1	22.6	20.2		30.1	0.0		24.5	19.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	1.2	1.3	7.7	1.0	0.6		52.9	1.2		0.9	0.0
Delay (s)	41.0	25.3	23.6	47.8	23.6	20.8		82.9	1.2		25.4	19.5
Level of Service	D	C	C	D	C	C		F	A		C	B
Approach Delay (s)		28.1			31.3			57.8			24.9	
Approach LOS		C			C			E			C	

Intersection Summary

HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	100.9%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑		↑	↑↑			↑↑	
Volume (vph)	1	586	45	141	350	7	34	0	184	16	2	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			0.99	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.96	
Satd. Flow (prot)		2214	837	970	2072		945	1753			2454	
Flt Permitted		0.95	1.00	0.95	1.00		0.95	1.00			0.78	
Satd. Flow (perm)		2114	837	970	2072		945	1753			1980	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	637	49	153	380	8	37	0	200	17	2	2
RTOR Reduction (vph)	0	0	27	0	0	0	0	160	0	0	2	0
Lane Group Flow (vph)	0	638	22	153	388	0	37	40	0	0	19	0
Confl. Peds. (#/hr)						5			5			
Heavy Vehicles (%)	100%	63%	93%	86%	74%	57%	91%	0%	72%	31%	100%	50%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Actuated Green, G (s)		38.5	38.5	20.4	62.9		6.0	17.8			7.8	
Effective Green, g (s)		38.5	38.5	20.4	62.9		6.0	17.8			7.8	
Actuated g/C Ratio		0.43	0.43	0.23	0.70		0.07	0.20			0.09	
Clearance Time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		907	359	221	1453		63	348			172	
v/s Ratio Prot				c0.16	0.19		c0.04	c0.02				
v/s Ratio Perm		c0.30	0.03								0.01	
v/c Ratio		0.70	0.06	0.69	0.27		0.59	0.11			8.50dl	
Uniform Delay, d1		20.9	15.0	31.8	4.9		40.6	29.5			37.8	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		2.5	0.1	9.0	0.1		13.2	0.1			0.3	
Delay (s)		23.4	15.1	40.8	5.0		53.9	29.6			38.0	
Level of Service		C	B	D	A		D	C			D	
Approach Delay (s)		22.8			15.1			33.4			38.0	
Approach LOS		C			B			C			D	

Intersection Summary

HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	51.8%	ICU Level of Service	A
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/23/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	440	352	273	575	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	2042		2968	2051		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	2042		2968	2051		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	478	383	297	625	0	0
RTOR Reduction (vph)	84	0	0	0	0	0
Lane Group Flow (vph)	777	0	297	625	0	0
Heavy Vehicles (%)	61%	70%	18%	76%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	18.5		6.0	32.5		
Effective Green, g (s)	18.5		6.0	32.5		
Actuated g/C Ratio	0.57		0.18	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	1162		548	2051		
v/s Ratio Prot	c0.38		c0.10	0.30		
v/s Ratio Perm						
v/c Ratio	0.67		0.54	0.30		
Uniform Delay, d1	4.9		12.0	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	1.5		1.1	0.1		
Delay (s)	6.3		13.1	0.1		
Level of Service	A		B	A		
Approach Delay (s)	6.3			4.3	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	5.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	32.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	294	146	0	0	122	149	204	306	109	206	0	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1037	2735			2951		893	3071		1770		1921
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1037	2735			2951		893	3071		1770		1921
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	320	159	0	0	133	162	222	333	118	224	0	403
RTOR Reduction (vph)	0	0	0	0	135	0	0	33	0	0	0	324
Lane Group Flow (vph)	320	159	0	0	160	0	200	440	0	224	0	79
Heavy Vehicles (%)	74%	32%	0%	0%	26%	1%	84%	6%	0%	2%	0%	48%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	10.1	25.4			11.3		16.2	16.2		13.0		13.0
Effective Green, g (s)	10.1	25.4			11.3		16.2	16.2		13.0		13.0
Actuated g/C Ratio	0.15	0.38			0.17		0.24	0.24		0.20		0.20
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	157	1043			501		217	747		345		375
v/s Ratio Prot	c0.31	0.06			c0.05		c0.22	0.14		c0.13		0.04
v/s Ratio Perm												
v/c Ratio	2.04	0.15			0.32		0.92	0.59		0.65		0.21
Uniform Delay, d1	28.2	13.5			24.3		24.6	22.3		24.7		22.5
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	488.7	0.1			0.4		39.9	1.2		4.2		0.3
Delay (s)	517.0	13.6			24.7		64.5	23.5		28.9		22.8
Level of Service	F	B			C		E	C		C		C
Approach Delay (s)		349.9			24.7		35.7				25.0	
Approach LOS		F			C		D				C	

Intersection Summary

HCM Average Control Delay	103.4	HCM Level of Service	F
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	31	532	15	7	294	25	14	15	10	44	17	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		0.99	
Frt		1.00			0.99			1.00	0.85		0.96	
Flt Protected		1.00			1.00			0.98	1.00		0.98	
Satd. Flow (prot)		3273			3184			1846	1577		1756	
Flt Permitted		0.92			0.94			0.89	1.00		0.86	
Satd. Flow (perm)		3020			3007			1684	1577		1548	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	578	16	8	320	27	15	16	11	48	18	28
RTOR Reduction (vph)	0	2	0	0	7	0	0	0	8	0	17	0
Lane Group Flow (vph)	0	626	0	0	348	0	0	31	3	0	77	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	5%	10%	0%	0%	13%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm		NA
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		59.0			59.0			23.0	23.0			23.0
Effective Green, g (s)		59.0			59.0			23.0	23.0			23.0
Actuated g/C Ratio		0.66			0.66			0.26	0.26			0.26
Clearance Time (s)		4.0			4.0			4.0	4.0			4.0
Lane Grp Cap (vph)		1980			1971			430	403			396
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.12			0.02	0.00			c0.05
v/c Ratio		0.32			0.18			0.07	0.01			0.19
Uniform Delay, d1		6.7			6.0			25.4	25.0			26.2
Progression Factor		1.00			1.41			1.00	1.00			1.00
Incremental Delay, d2		0.4			0.2			0.3	0.0			1.1
Delay (s)		7.2			8.7			25.7	25.0			27.3
Level of Service		A			A			C	C			C
Approach Delay (s)		7.2			8.7			25.5				27.3
Approach LOS		A			A			C				C

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	602	13	112	428	50	18	54	96	68	75	38
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.98			0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1787		1805	3351			1708		1791	1790	
Flt Permitted	0.95	1.00		0.95	1.00			0.95		0.35	1.00	
Satd. Flow (perm)	1805	1787		1805	3351			1639		667	1790	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	654	14	122	465	54	20	59	104	74	82	41
RTOR Reduction (vph)	0	1	0	0	5	0	0	70	0	0	27	0
Lane Group Flow (vph)	60	667	0	122	514	0	0	113	0	74	96	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	0%	6%	4%	0%	0%	0%	0%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	55.1		12.6	62.9			11.3		11.3	11.3	
Effective Green, g (s)	4.8	55.1		12.6	62.9			11.3		11.3	11.3	
Actuated g/C Ratio	0.05	0.61		0.14	0.70			0.13		0.13	0.13	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	96	1094		253	2342			206		84	225	
v/s Ratio Prot	0.03	c0.37		c0.07	0.15							0.05
v/s Ratio Perm								0.07		c0.11		
v/c Ratio	0.62	0.61		0.48	0.22			0.55		0.88	0.43	
Uniform Delay, d1	41.7	10.8		35.7	4.8			37.0		38.7	36.4	
Progression Factor	0.89	0.80		1.42	0.19			1.00		1.00	1.00	
Incremental Delay, d2	8.6	2.5		0.5	0.2			1.6		59.1	0.5	
Delay (s)	45.6	11.1		51.1	1.1			38.6		97.8	36.8	
Level of Service	D	B		D	A			D		F	D	
Approach Delay (s)		14.0			10.6			38.6			59.7	
Approach LOS		B			B			D			E	

Intersection Summary

HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↖	↗		↕	
Volume (vph)	29	790	10	61	559	24	39	76	156	9	5	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00	1.00		0.99	
Frt	1.00	1.00		1.00	0.99			1.00	0.85		0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.98	
Satd. Flow (prot)	1787	3400		1764	3383			1860	1484		1754	
Flt Permitted	0.34	1.00		0.22	1.00			0.92	1.00		0.92	
Satd. Flow (perm)	639	3400		418	3383			1735	1484		1646	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	859	11	66	608	26	42	83	170	10	5	7
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	46	0	4	0
Lane Group Flow (vph)	32	869	0	66	631	0	0	125	124	0	18	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	2%	6%	2%	0%	0%	6%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2		2		2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	291	1549		190	1541			790	676		750	
v/s Ratio Prot		c0.26			0.19							
v/s Ratio Perm	0.05			0.16				0.07	c0.08		0.01	
v/c Ratio	0.11	0.56		0.35	0.41			0.16	0.18		0.02	
Uniform Delay, d1	14.0	17.9		15.8	16.4			14.4	14.6		13.5	
Progression Factor	1.32	1.34		0.76	0.79			1.00	1.00		1.00	
Incremental Delay, d2	0.7	1.3		4.5	0.7			0.4	0.6		0.1	
Delay (s)	19.2	25.4		16.6	13.7			14.8	15.2		13.5	
Level of Service	B	C		B	B			B	B		B	
Approach Delay (s)		25.2			13.9			15.0			13.5	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	↖
Volume (vph)	78	575	52	42	897	64	39	83	53	35	64	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.94			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.99	
Satd. Flow (prot)	1803	3382		1133	3438	1484	1456	2321			3090	
Flt Permitted	0.24	1.00		0.36	1.00	1.00	0.65	1.00			0.87	
Satd. Flow (perm)	451	3382		425	3438	1484	992	2321			2724	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	625	57	46	975	70	42	90	58	38	70	58
RTOR Reduction (vph)	0	8	0	0	0	28	0	40	0	0	40	0
Lane Group Flow (vph)	85	674	0	46	975	42	42	108	0	0	126	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	8%	59%	5%	7%	23%	33%	64%	0%	20%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Effective Green, g (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.31	0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	271	2029		255	2063	890	309	722			847	
v/s Ratio Prot		0.20			c0.28			c0.05				
v/s Ratio Perm	0.19			0.11		0.03	0.04				0.05	
v/c Ratio	0.31	0.33		0.18	0.47	0.05	0.14	0.15			0.15	
Uniform Delay, d1	8.9	9.0		8.1	10.0	7.4	22.3	22.4			22.4	
Progression Factor	0.31	0.29		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	2.6	0.4		1.5	0.8	0.1	0.9	0.4			0.4	
Delay (s)	5.4	3.0		9.6	10.8	7.5	23.2	22.8			22.8	
Level of Service	A	A		A	B	A	C	C			C	
Approach Delay (s)		3.2			10.6			22.9			22.8	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	90.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	77	440	84	109	764	41	124	73	66	125	205	77
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1526	4496		1798	4539		1742	1845	1582	1774	3574	1352
Flt Permitted	0.27	1.00		0.42	1.00		0.61	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	438	4496		788	4539		1123	1845	1582	1317	3574	1352
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	84	478	91	118	830	45	135	79	72	136	223	84
RTOR Reduction (vph)	0	33	0	0	7	0	0	0	41	0	0	48
Lane Group Flow (vph)	84	536	0	118	868	0	135	79	31	136	223	36
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	18%	14%	3%	0%	14%	0%	3%	3%	0%	1%	1%	17%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Effective Green, g (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Actuated g/C Ratio	0.46	0.46		0.46	0.46		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	201	2063		362	2083		482	792	679	566	1535	581
v/s Ratio Prot		0.12			0.19			0.04				0.06
v/s Ratio Perm	c0.19			0.15			c0.12		0.02	0.10		0.03
v/c Ratio	0.42	0.26		0.33	0.42		0.28	0.10	0.05	0.24	0.15	0.06
Uniform Delay, d1	15.4	14.1		14.6	15.4		15.7	14.5	14.1	15.4	14.8	14.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.3	0.3		0.2	0.0		1.4	0.3	0.1	1.0	0.2	0.2
Delay (s)	21.7	14.4		14.8	15.4		17.2	14.7	14.2	16.4	15.0	14.4
Level of Service	C	B		B	B		B	B	B	B	B	B
Approach Delay (s)		15.4			15.4			15.8			15.3	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	15.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	226	675	0	0	0	0	0	1213	1475	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.94	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4820						4578	1375			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4820						4578	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	246	734	0	0	0	0	0	1318	1603	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	147	84	0	0	0
Lane Group Flow (vph)	0	980	0	0	0	0	0	1973	717	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	6%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						16.0	34.7			
Effective Green, g (s)		34.0						16.0	34.7			
Actuated g/C Ratio		0.57						0.27	0.58			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2731						1221	795			
v/s Ratio Prot								c0.43				
v/s Ratio Perm		0.20							c0.52			
v/c Ratio		0.36						1.62	0.90			
Uniform Delay, d1		7.1						22.0	11.1			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.4						281.1	13.4			
Delay (s)		7.4						303.1	24.5			
Level of Service		A						F	C			
Approach Delay (s)		7.4			0.0			226.7			0.0	
Approach LOS		A			A			F			A	

Intersection Summary

HCM Average Control Delay	171.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	86.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	53	934	827	0	0	0	0	331	56	29	311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					1.00			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.96	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			1.00	
Satd. Flow (prot)		4468	1355					1836			1840	
Flt Permitted		1.00	1.00					1.00			0.95	
Satd. Flow (perm)		4468	1355					1836			1748	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	1015	899	0	0	0	0	360	61	32	338	0
RTOR Reduction (vph)	0	136	0	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	1387	449	0	0	0	0	412	0	0	370	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	5%	5%	1%	0%	0%	0%	0%	1%	1%	0%	3%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)		27.5	60.0					23.5			23.5	
Effective Green, g (s)		27.5	60.0					23.5			23.5	
Actuated g/C Ratio		0.46	1.00					0.39			0.39	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		2048	1355					719			685	
v/s Ratio Prot								c0.22				
v/s Ratio Perm		0.31	0.33								0.21	
v/c Ratio		0.68	0.33					0.57			0.54	
Uniform Delay, d1		12.8	0.0					14.3			14.1	
Progression Factor		0.48	1.00					0.86			1.00	
Incremental Delay, d2		0.2	0.2					3.2			3.0	
Delay (s)		6.4	0.2					15.5			17.1	
Level of Service		A	A					B			B	
Approach Delay (s)		5.0			0.0			15.5			17.1	
Approach LOS		A			A			B			B	

Intersection Summary

HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↗	↖	↗			↖	↗
Volume (vph)	0	0	0	11	440	78	345	331	0	0	220	1199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1810	1517	1785	1881			1570	1477
Flt Permitted				0.95	1.00	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)				1730	1810	1517	353	1881			1570	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	12	478	85	375	360	0	0	239	1303
RTOR Reduction (vph)	0	0	0	0	0	64	0	0	0	0	26	0
Lane Group Flow (vph)	0	0	0	12	478	21	375	360	0	0	760	756
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	5%	0%	1%	1%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	437	367	203	1082			903	1477
v/s Ratio Prot					c0.26			0.19			0.48	
v/s Ratio Perm				0.01		0.01	c1.06					0.51
v/c Ratio				0.03	1.09	0.06	1.85	0.33			0.84	0.51
Uniform Delay, d1				17.4	22.8	17.5	12.8	6.7			10.5	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.97	1.00
Incremental Delay, d2				0.1	70.8	0.3	399.7	0.8			8.8	1.2
Delay (s)				17.5	93.6	17.8	412.5	7.5			19.0	1.2
Level of Service				B	F	B	F	A			B	A
Approach Delay (s)		0.0			80.8			214.1			10.3	
Approach LOS		A			F			F			B	

Intersection Summary

HCM Average Control Delay	77.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↕		↖	↕			↕	
Volume (vph)	29	151	26	305	64	19	16	279	636	5	48	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90			0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1854		1612	3470		1796	3041			3473	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.90	
Satd. Flow (perm)	1805	1854		1612	3470		1796	3041			3122	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	332	70	21	17	303	691	5	52	7
RTOR Reduction (vph)	0	8	0	0	13	0	0	432	0	0	5	0
Lane Group Flow (vph)	32	184	0	332	78	0	17	562	0	0	59	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	12%	0%	0%	0%	5%	5%	0%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	2.6	16.2		8.9	22.5		0.5	20.8			16.3	
Effective Green, g (s)	2.6	16.2		8.9	22.5		0.5	20.8			16.3	
Actuated g/C Ratio	0.04	0.28		0.15	0.39		0.01	0.36			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	81	519		248	1348		16	1092			879	
v/s Ratio Prot	0.02	c0.10		c0.21	0.02		0.01	c0.18				
v/s Ratio Perm											0.02	
v/c Ratio	0.40	0.35		1.34	0.06		1.06	0.51			0.07	
Uniform Delay, d1	26.9	16.7		24.5	11.1		28.7	14.6			15.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	3.2	0.4		177.1	0.0		246.4	0.4			0.0	
Delay (s)	30.0	17.1		201.6	11.1		275.1	15.0			15.3	
Level of Service	C	B		F	B		F	B			B	
Approach Delay (s)		18.9			160.6			19.4			15.3	
Approach LOS		B			F			B			B	

Intersection Summary

HCM Average Control Delay	53.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	57.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	50	770	63	24	151	13	174	176	275	138	108	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.91		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1805	3360		1805	3561		1805	1842		1643	2312	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (perm)	1805	3360		1805	3561		1805	1842		1643	2312	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	837	68	26	164	14	189	191	299	150	117	36
RTOR Reduction (vph)	0	4	0	0	5	0	0	234	0	0	15	0
Lane Group Flow (vph)	54	901	0	26	173	0	189	256	0	100	188	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	5%	19%	0%	0%	0%	0%	53%	90%	0%	75%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	5.0	31.1		2.7	29.3		17.7	17.7		13.5	13.5	
Effective Green, g (s)	5.0	31.1		2.7	29.3		17.7	17.7		13.5	13.5	
Actuated g/C Ratio	0.06	0.38		0.03	0.36		0.22	0.22		0.17	0.17	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	111	1290		60	1288		394	403		274	385	
v/s Ratio Prot	c0.03	c0.27		0.01	0.05		0.10	c0.14		0.06	c0.08	
v/s Ratio Perm												
v/c Ratio	0.49	0.70		0.43	0.13		0.48	0.64		0.36	0.49	
Uniform Delay, d1	36.8	21.0		38.4	17.3		27.6	28.7		29.9	30.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	1.8		5.0	0.1		1.3	3.7		1.1	1.3	
Delay (s)	40.1	22.8		43.4	17.4		28.9	32.4		31.1	31.9	
Level of Service	D	C		D	B		C	C		C	C	
Approach Delay (s)		23.8			20.7			31.4			31.7	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	30	117	178	56	631	0	0	496	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3566	1581	1796	1124			2735	1579
Flt Permitted					0.99	1.00	0.45	1.00			1.00	1.00
Satd. Flow (perm)					3566	1581	853	1124			2735	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	127	193	61	686	0	0	539	59
RTOR Reduction (vph)	0	0	0	0	0	145	0	0	0	0	0	14
Lane Group Flow (vph)	0	0	0	0	160	48	61	686	0	0	539	45
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	21%	92%	0%	0%	0%	0%	69%	79%	0%	32%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					12.8	12.8	67.7	67.7			67.7	67.7
Effective Green, g (s)					12.8	12.8	67.7	67.7			67.7	67.7
Actuated g/C Ratio					0.14	0.14	0.75	0.75			0.75	0.75
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					507	225	642	845			2057	1188
v/s Ratio Prot								c0.61			0.20	
v/s Ratio Perm					0.04	0.03	0.07					0.03
v/c Ratio					0.32	0.21	0.10	0.81			0.26	0.04
Uniform Delay, d1					34.7	34.1	3.0	7.1			3.4	2.8
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.4	0.5	0.3	8.4			0.3	0.1
Delay (s)					35.0	34.6	3.3	15.5			3.8	2.9
Level of Service					D	C	A	B			A	A
Approach Delay (s)		0.0			34.8			14.5			3.7	
Approach LOS		A			C			B			A	

Intersection Summary

HCM Average Control Delay	14.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	56.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/23/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	792	470	167	385	350	0	567	451
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.93			1.00	1.00
Flt Protected	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2708	1568	4634			1752	1881
Flt Permitted	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2708	1568	4634			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	861	511	182	418	380	0	616	490
RTOR Reduction (vph)	0	0	43	0	0	0	0	0
Lane Group Flow (vph)	448	924	139	798	0	0	616	490
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	45%	3%	1%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	32.4	32.4	32.4	22.6			21.5	47.6
Effective Green, g (s)	32.4	32.4	32.4	22.6			21.5	47.6
Actuated g/C Ratio	0.36	0.36	0.36	0.25			0.24	0.53
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	591	975	564	1164			419	995
v/s Ratio Prot				c0.17			c0.35	0.26
v/s Ratio Perm	0.27	0.34	0.09					
v/c Ratio	0.76	0.95	0.25	0.96dr			1.47	0.49
Uniform Delay, d1	25.3	28.0	20.2	30.5			34.2	13.5
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	4.9	17.2	0.1	3.3			224.2	0.1
Delay (s)	30.3	45.2	20.3	33.8			258.5	13.6
Level of Service	C	D	C	C			F	B
Approach Delay (s)		38.0		33.8				150.0
Approach LOS		D		C				F

Intersection Summary

HCM Average Control Delay	72.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		





















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	84	12	36	143	105	60	340	158	36	114	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	91	13	39	155	114	65	370	172	39	124	36
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	140	13	195	114	250	357	101	98				
Volume Left (vph)	49	0	39	0	65	0	39	0				
Volume Right (vph)	0	13	0	114	0	172	0	36				
Hadj (s)	0.17	-0.70	0.25	-0.67	1.10	1.05	1.01	0.58				
Departure Headway (s)	7.6	6.7	7.4	6.5	7.5	7.4	8.0	7.6				
Degree Utilization, x	0.30	0.02	0.40	0.21	0.52	0.73	0.23	0.21				
Capacity (veh/h)	448	499	465	527	465	475	428	450				
Control Delay (s)	12.5	8.7	14.0	9.9	17.0	26.9	12.1	11.4				
Approach Delay (s)	12.2		12.5		22.8		11.8					
Approach LOS	B		B		C		B					
Intersection Summary												
Delay			17.3									
HCM Level of Service			C									
Intersection Capacity Utilization			54.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕		↗	↕	↗
Volume (veh/h)	13	367	15	11	146	14	42	20	39	34	23	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	399	16	12	159	15	46	22	42	37	25	58
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	179			420			690	635	409	673	636	169
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	179			420			690	635	409	673	636	169
tC, single (s)	4.1			4.6			7.5	7.3	6.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.9	4.7	3.3	3.5	4.8	3.3
p0 queue free %	99			99			83	93	93	88	92	93
cM capacity (veh/h)	1403			919			265	298	641	317	296	868

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	413	16	171	15	110	37	17	66
Volume Left	14	0	12	0	46	37	0	0
Volume Right	0	16	0	15	42	0	0	58
cSH	1403	1700	919	1700	353	317	296	697
Volume to Capacity	0.01	0.01	0.01	0.01	0.31	0.12	0.06	0.09
Queue Length 95th (ft)	1	0	1	0	33	10	4	8
Control Delay (s)	0.4	0.0	0.7	0.0	19.8	17.8	17.9	10.7
Lane LOS	A		A		C	C	C	B
Approach Delay (s)	0.3		0.7		19.8	13.9		
Approach LOS					C	B		

Intersection Summary

Average Delay		4.9						
Intersection Capacity Utilization		49.2%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/23/2012






















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	154	12	12	125	0	0	0	0	26	123	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.97	
Flt Protected		1.00	1.00		1.00						0.99	
Satd. Flow (prot)		3610	1550		3587						3443	
Flt Permitted		1.00	1.00		0.94						0.99	
Satd. Flow (perm)		3610	1550		3372						3443	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	167	13	13	136	0	0	0	0	28	134	34
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	28	0
Lane Group Flow (vph)	0	167	9	0	149	0	0	0	0	0	168	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	1%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		55.2	55.2		55.2						12.8	
Effective Green, g (s)		55.2	55.2		55.2						12.8	
Actuated g/C Ratio		0.72	0.72		0.72						0.17	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2605	1118		2433						576	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.05	
v/c Ratio		0.06	0.01		0.06						0.29	
Uniform Delay, d1		3.1	3.0		3.1						27.9	
Progression Factor		1.00	1.00		0.24						1.00	
Incremental Delay, d2		0.0	0.0		0.0						0.3	
Delay (s)		3.2	3.0		0.8						28.2	
Level of Service		A	A		A						C	
Approach Delay (s)		3.1			0.8			0.0			28.2	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 270: Mandela Parkway & 14th Street

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 				
Volume (vph)	13	141	0	0	137	40	5	162	51	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.97				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		3518			3539	1520		3412				
Flt Permitted		0.94			1.00	1.00		1.00				
Satd. Flow (perm)		3309			3539	1520		3412				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	153	0	0	149	43	5	176	55	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	12	0	46	0	0	0	0
Lane Group Flow (vph)	0	167	0	0	149	31	0	190	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		55.2			55.2	55.2		12.8				
Effective Green, g (s)		55.2			55.2	55.2		12.8				
Actuated g/C Ratio		0.72			0.72	0.72		0.17				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2388			2554	1097		571				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.05				0.02		0.06				
v/c Ratio		0.07			0.06	0.03		0.33				
Uniform Delay, d1		3.1			3.1	3.0		28.1				
Progression Factor		0.54			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.3				
Delay (s)		1.7			3.1	3.1		28.4				
Level of Service		A			A	A		C				
Approach Delay (s)		1.7			3.1			28.4			0.0	
Approach LOS		A			A			C			A	
Intersection Summary												
HCM Average Control Delay			12.8				HCM Level of Service		B			
HCM Volume to Capacity ratio			0.12									
Actuated Cycle Length (s)			76.5				Sum of lost time (s)		8.5			
Intersection Capacity Utilization			34.7%				ICU Level of Service		A			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/23/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↘	↘↘	↑	↑↑↑	↘	↗	↘	↗
Volume (vph)	89	155	0	293	48	0	1064	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1697	3335		5187	1341		1681	1696
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1697	3335		5187	1341		1681	1696
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	168	0	318	52	0	1157	83
RTOR Reduction (vph)	39	0	0	0	0	0	0	0
Lane Group Flow (vph)	58	168	0	318	52	0	613	627
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	5%	5%	6%	0%	17%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	11.2	11.2		10.9	10.9		48.9	48.9
Effective Green, g (s)	11.2	11.2		10.9	10.9		48.9	48.9
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	224	439		665	172		967	976
v/s Ratio Prot				c0.06			0.36	c0.37
v/s Ratio Perm	0.03	c0.05			0.04			
v/c Ratio	0.26	0.38		0.48	0.30		0.63	0.64
Uniform Delay, d1	33.2	33.7		34.4	33.6		12.1	12.2
Progression Factor	0.57	0.72		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.5		0.5	1.0		3.2	3.2
Delay (s)	19.6	24.8		35.0	34.6		15.2	15.4
Level of Service	B	C		C	C		B	B
Approach Delay (s)			22.9	34.9				15.3
Approach LOS			C	C				B

Intersection Summary

HCM Average Control Delay	20.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/23/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	293	895	53	1541	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.91	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3042	1455	1537	1524	4571
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3042	1455	1537	1524	4571
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	318	973	58	1675	0
RTOR Reduction (vph)	0	0	29	0	0
Lane Group Flow (vph)	805	486	23	843	838
Heavy Vehicles (%)	7%	1%	1%	1%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	47.0	47.0	28.5	28.5	28.5
Effective Green, g (s)	47.0	47.0	28.5	28.5	28.5
Actuated g/C Ratio	0.55	0.55	0.34	0.34	0.34
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1682	805	515	511	1533
v/s Ratio Prot	0.26		0.01	c0.55	0.18
v/s Ratio Perm		c0.33			
v/c Ratio	0.48	0.60	0.04	1.65	1.46dl
Uniform Delay, d1	11.6	12.8	19.1	28.2	23.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	3.3	0.0	301.1	0.4
Delay (s)	12.5	16.1	19.1	329.3	23.4
Level of Service	B	B	B	F	C
Approach Delay (s)	13.9				172.1
Approach LOS	B				F

Intersection Summary

HCM Average Control Delay	104.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	561	24	10	205	0	0	0	0	302	284	206
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5146			5172					1805	3539	1570
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5146			4698					1805	3539	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	610	26	11	223	0	0	0	0	328	309	224
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	118
Lane Group Flow (vph)	0	630	0	0	234	0	0	0	0	328	309	106
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		30.0			30.0					38.0	38.0	38.0
Effective Green, g (s)		30.0			30.0					38.0	38.0	38.0
Actuated g/C Ratio		0.38			0.38					0.48	0.48	0.48
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1930			1762					857	1681	746
v/s Ratio Prot		c0.12									0.09	
v/s Ratio Perm					0.05					c0.18		0.07
v/c Ratio		0.33			0.13					0.38	0.18	0.14
Uniform Delay, d1		17.8			16.4					13.5	12.1	11.8
Progression Factor		1.00			0.21					1.00	1.00	1.00
Incremental Delay, d2		0.5			0.1					1.3	0.2	0.4
Delay (s)		18.3			3.6					14.8	12.3	12.2
Level of Service		B			A					B	B	B
Approach Delay (s)		18.3			3.6			0.0			13.2	
Approach LOS		B			A			A			B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↶↶↶			↶↶↶	↶		↶↶↶				
Volume (vph)	408	468	0	0	216	859	13	943	81	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.97		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.90	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4831			4297	1334		4993				
Flt Permitted	0.95	0.67			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3284			4297	1334		4993				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	443	509	0	0	235	934	14	1025	88	0	0	0
RTOR Reduction (vph)	0	0	0	0	16	16	0	12	0	0	0	0
Lane Group Flow (vph)	230	722	0	0	686	451	0	1115	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	2%	7%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	12.0	42.0			26.5	26.5		27.0				
Effective Green, g (s)	12.0	42.0			26.5	26.5		27.0				
Actuated g/C Ratio	0.15	0.52			0.33	0.33		0.34				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	233	1956			1423	442		1685				
v/s Ratio Prot	c0.15	0.06			0.16							
v/s Ratio Perm		0.14				c0.34		0.22				
v/c Ratio	0.99	1.00dl			0.92dr	1.02		0.66				
Uniform Delay, d1	33.9	11.2			21.3	26.8		22.6				
Progression Factor	1.02	1.94			1.00	1.00		1.00				
Incremental Delay, d2	54.5	0.5			1.2	48.0		2.1				
Delay (s)	89.2	22.2			22.5	74.8		24.7				
Level of Service	F	C			C	E		C				
Approach Delay (s)		38.4			43.4			24.7			0.0	
Approach LOS		D			D			C			A	

Intersection Summary

















HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

- dl Defacto Left Lane. Recode with 1 though lane as a left lane.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/23/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	472	1077	0	990	173	105	35	171	21	162	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.90			0.98			0.92			0.99	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3127			3504			3149			3488	
Flt Permitted		1.00			1.00			0.98			0.99	
Satd. Flow (perm)		3127			3504			3149			3488	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	513	1171	0	1076	188	114	38	186	23	176	22
RTOR Reduction (vph)	0	471	0	0	22	0	0	169	0	0	13	0
Lane Group Flow (vph)	0	1213	0	0	1242	0	0	169	0	0	208	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	1%	2%	1%	2%	0%	0%	1%	3%	5%	0%	1%	1%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1588			1779			291			751	
v/s Ratio Prot		c0.39			0.35			c0.05			c0.06	
v/s Ratio Perm												
v/c Ratio		0.91dr			0.70			0.58			0.28	
Uniform Delay, d1		12.9			12.2			28.3			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.5			2.3			8.2			0.9	
Delay (s)		16.4			14.5			36.5			22.2	
Level of Service		B			B			D			C	
Approach Delay (s)		16.4			14.5			36.5			22.2	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM Average Control Delay			18.0				HCM Level of Service				B	
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			65.0				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			80.9%				ICU Level of Service				D	
Analysis Period (min)			15									
dr Defacto Right Lane. Recode with 1 though lane as a right lane.												
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	86	611	22	113	368	150	40	319	86	190	234	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5142	1528	1772	3385		1771	1863	1556	1793	1881	1572
Flt Permitted		0.80	1.00	0.34	1.00		0.50	1.00	1.00	0.36	1.00	1.00
Satd. Flow (perm)		4163	1528	641	3385		925	1863	1556	679	1881	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	664	24	123	400	163	43	347	93	207	254	68
RTOR Reduction (vph)	0	0	10	0	55	0	0	0	36	0	0	41
Lane Group Flow (vph)	0	757	14	123	508	0	43	347	57	207	254	27
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	0%	1%	1%	1%	0%	1%	2%	1%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		4	4			2			2	
Permitted Phases	4								2	2		2
Actuated Green, G (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.58	0.58	0.58	0.58		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2394	879	369	1946		278	559	467	204	564	472
v/s Ratio Prot					0.15			0.19			0.14	
v/s Ratio Perm		0.18	0.01	c0.19			0.05		0.04	c0.30		0.02
v/c Ratio		0.32	0.02	0.33	0.26		0.15	0.62	0.12	1.01	0.45	0.06
Uniform Delay, d1		8.8	7.3	8.9	8.5		20.6	24.1	20.3	28.0	22.7	19.9
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.3	0.0	2.4	0.3		1.2	5.1	0.5	66.9	2.6	0.2
Delay (s)		9.2	7.3	11.4	8.8		21.7	29.2	20.9	94.9	25.2	20.2
Level of Service		A	A	B	A		C	C	C	F	C	C
Approach Delay (s)		9.1			9.3			26.9			51.8	
Approach LOS		A			A			C			D	

Intersection Summary

HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	410	596	0	618	1612	0	0	0	555	0	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.95			0.98	0.98				1.00		0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.92	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3098			3003	1375				3433		1537
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3098			3003	1375				3433		1537
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	446	648	0	672	1752	0	0	0	603	0	295
RTOR Reduction (vph)	0	224	0	0	246	0	0	0	0	0	0	222
Lane Group Flow (vph)	263	870	0	0	1302	876	0	0	0	603	0	73
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	1%	4%	1%	5%	0%	0%	0%	2%	14%	2%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	14.1	54.2			36.1	82.8				20.6		20.6
Effective Green, g (s)	14.1	54.2			36.1	82.8				20.6		20.6
Actuated g/C Ratio	0.17	0.65			0.44	1.00				0.25		0.25
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	304	2028			1309	1375				854		382
v/s Ratio Prot	c0.15	0.28			c0.43					0.18		
v/s Ratio Perm						c0.64						0.05
v/c Ratio	0.87	0.43			0.99	0.64				0.71		0.19
Uniform Delay, d1	33.4	6.9			23.3	0.0				28.3		24.5
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	21.7	0.1			23.5	2.3				2.7		0.2
Delay (s)	55.1	7.0			46.7	2.3				31.0		24.8
Level of Service	E	A			D	A				C		C
Approach Delay (s)		16.3			30.6			0.0			29.0	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	134	717	0	0	1429	354	379	81	761	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.89	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5036	1550	1649	1497	1504			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5036	1550	1649	1497	1504			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	779	0	0	1553	385	412	88	827	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	230	0	127	127	0	0	0
Lane Group Flow (vph)	146	779	0	0	1553	155	371	358	344	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	3%	1%	4%	3%	2%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	5.3	32.4			23.1	23.1	16.8	16.8	16.8			
Effective Green, g (s)	5.3	32.4			23.1	23.1	16.8	16.8	16.8			
Actuated g/C Ratio	0.09	0.57			0.40	0.40	0.29	0.29	0.29			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	166	2909			2034	626	484	440	442			
v/s Ratio Prot	c0.08	0.15			c0.31		0.23	c0.24	0.23			
v/s Ratio Perm						0.10						
v/c Ratio	0.88	0.27			0.76	0.25	0.77	0.81	0.78			
Uniform Delay, d1	25.6	6.3			14.7	11.3	18.4	18.7	18.5			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	37.2	0.0			1.8	0.2	7.1	11.0	8.4			
Delay (s)	62.8	6.4			16.4	11.5	25.5	29.7	26.9			
Level of Service	E	A			B	B	C	C	C			
Approach Delay (s)		15.3			15.5			27.5			0.0	
Approach LOS		B			B			C			A	






























Intersection Summary

HCM Average Control Delay	19.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/23/2012

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	 	 			 			 			 	 	
Volume (vph)	393	749	571	156	1008	125	403	42	160	143	67	615	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88	
Frbp, ped/bikes	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.97	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00	
Satd. Flow (prot)	3433	3283	1411	1805	3505	1615	1698	1721	1599		1838	2704	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00	
Satd. Flow (perm)	3433	3283	1411	1805	3505	1615	1698	1721	1599		1838	2704	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	427	814	621	170	1096	136	438	46	174	155	73	668	
RTOR Reduction (vph)	0	18	285	0	0	42	0	0	150	0	0	255	
Lane Group Flow (vph)	427	982	150	170	1096	94	241	243	24	0	228	413	
Confl. Peds. (#/hr)			20									20	
Heavy Vehicles (%)	2%	2%	1%	0%	3%	0%	1%	0%	1%	0%	0%	2%	
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm	
Protected Phases	5	2		1	6	6	8	8	8	7	7		
Permitted Phases			2									7	
Actuated Green, G (s)	10.1	29.7	29.7	8.6	28.2	28.2	12.1	12.1	12.1		19.9	19.9	
Effective Green, g (s)	10.1	29.7	29.7	8.6	28.2	28.2	12.1	12.1	12.1		19.9	19.9	
Actuated g/C Ratio	0.12	0.34	0.34	0.10	0.33	0.33	0.14	0.14	0.14		0.23	0.23	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	402	1130	486	180	1145	528	238	241	224		424	624	
v/s Ratio Prot	c0.12	0.30		0.09	c0.31	0.06	c0.14	0.14	0.02		0.12		
v/s Ratio Perm			0.11									c0.15	
v/c Ratio	1.06	0.87	0.31	0.94	0.96	0.18	1.01	1.01	0.11		0.54	0.66	
Uniform Delay, d1	38.1	26.5	20.8	38.6	28.5	20.8	37.1	37.1	32.4		29.2	30.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	62.3	7.3	0.4	50.7	17.1	0.2	61.6	60.1	0.2		1.3	2.6	
Delay (s)	100.4	33.8	21.1	89.3	45.6	20.9	98.7	97.2	32.6		30.5	32.8	
Level of Service	F	C	C	F	D	C	F	F	C		C	C	
Approach Delay (s)		46.1			48.5			80.7			32.2		
Approach LOS		D			D			F			C		
Intersection Summary													
HCM Average Control Delay			48.9									HCM Level of Service	D
HCM Volume to Capacity ratio			0.85										
Actuated Cycle Length (s)			86.3									Sum of lost time (s)	12.0
Intersection Capacity Utilization			73.9%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	714	143	64	530	64	430	421	59	85	261	232
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3418		1787	3435		1787	1807		1805	1863	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.47	1.00	1.00
Satd. Flow (perm)	1752	3418		1787	3435		1787	1807		894	1863	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	776	155	70	576	70	467	458	64	92	284	252
RTOR Reduction (vph)	0	18	0	0	10	0	0	6	0	0	0	48
Lane Group Flow (vph)	159	913	0	70	636	0	467	516	0	92	284	204
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	3%	2%	1%	1%	3%	0%	1%	3%	1%	0%	2%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	9.0	25.0		3.9	19.9		24.1	34.4		18.1	18.1	27.1
Effective Green, g (s)	9.0	25.0		3.9	19.9		24.1	34.4		18.1	18.1	27.1
Actuated g/C Ratio	0.10	0.29		0.04	0.23		0.28	0.39		0.21	0.21	0.31
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	181	981		80	785		494	714		267	387	546
v/s Ratio Prot	c0.09	c0.27		0.04	0.19		c0.26	c0.29		0.03	c0.15	0.04
v/s Ratio Perm										0.04		0.09
v/c Ratio	0.88	0.93		0.88	0.81		0.95	0.72		0.34	0.73	0.37
Uniform Delay, d1	38.5	30.2		41.4	31.8		30.9	22.3		30.5	32.2	23.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	34.8	14.8		60.2	6.3		27.1	3.6		0.8	7.0	0.4
Delay (s)	73.3	45.1		101.6	38.2		58.0	25.9		31.2	39.3	23.8
Level of Service	E	D		F	D		E	C		C	D	C
Approach Delay (s)		49.2			44.4			41.1			31.9	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	42.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	87.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	204	693	153	100	316	46	172	951	113	171	814	78
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3463		1805	3539	1579	1787	3471	1580	1805	3574	1476
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3463		1805	3539	1579	1787	3471	1580	1805	3574	1476
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	753	166	109	343	50	187	1034	123	186	885	85
RTOR Reduction (vph)	0	21	0	0	0	29	0	0	27	0	0	21
Lane Group Flow (vph)	222	898	0	109	343	21	187	1034	96	186	885	64
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	1%	1%	0%	2%	0%	1%	4%	0%	0%	1%	7%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	25.8		7.5	23.8	23.8	12.0	31.4	31.4	10.3	29.7	29.7
Effective Green, g (s)	9.5	25.8		7.5	23.8	23.8	12.0	31.4	31.4	10.3	29.7	29.7
Actuated g/C Ratio	0.11	0.29		0.08	0.26	0.26	0.13	0.35	0.35	0.11	0.33	0.33
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	993		150	936	418	238	1211	551	207	1179	487
v/s Ratio Prot	c0.13	c0.26		0.06	0.10		0.10	c0.30		c0.10	0.25	
v/s Ratio Perm						0.01			0.06			0.04
v/c Ratio	1.20	0.90		0.73	0.37	0.05	0.79	0.85	0.17	0.90	0.75	0.13
Uniform Delay, d1	40.2	30.9		40.2	27.0	24.7	37.8	27.2	20.3	39.3	26.9	21.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	130.3	11.4		16.0	0.2	0.0	15.6	7.8	0.7	35.6	4.4	0.6
Delay (s)	170.6	42.3		56.3	27.2	24.7	53.3	34.9	21.0	75.0	31.3	21.7
Level of Service	F	D		E	C	C	D	C	C	E	C	C
Approach Delay (s)		67.3			33.3			36.2			37.6	
Approach LOS		E			C			D			D	

Intersection Summary		
HCM Average Control Delay	44.8	HCM Level of Service D
HCM Volume to Capacity ratio	0.82	
Actuated Cycle Length (s)	90.0	Sum of lost time (s) 6.0
Intersection Capacity Utilization	79.7%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	136	587	8	112	276	25	140	838	22	63	648	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3566		1805	3495		1805	3525		1805	3554	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1787	3566		1805	3495		1805	3525		1805	3554	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	148	638	9	122	300	27	152	911	24	68	704	24
RTOR Reduction (vph)	0	1	0	0	6	0	0	1	0	0	2	0
Lane Group Flow (vph)	148	646	0	122	321	0	152	934	0	68	726	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	1%	1%	0%	0%	2%	0%	0%	2%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	12.2	23.3		11.2	22.3		12.3	33.3		7.4	28.4	
Effective Green, g (s)	12.2	23.3		11.2	22.3		12.3	33.3		7.4	28.4	
Actuated g/C Ratio	0.14	0.26		0.13	0.25		0.14	0.37		0.08	0.32	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	244	931		227	874		249	1316		150	1132	
v/s Ratio Prot	c0.08	c0.18		0.07	0.09		c0.08	c0.26		0.04	0.20	
v/s Ratio Perm												
v/c Ratio	0.61	0.69		0.54	0.37		0.61	0.71		0.45	0.64	
Uniform Delay, d1	36.2	29.7		36.6	27.6		36.2	23.8		39.0	26.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	2.3		2.4	0.3		4.4	1.8		2.2	1.3	
Delay (s)	40.5	32.0		39.0	27.9		40.6	25.6		41.1	27.3	
Level of Service	D	C		D	C		D	C		D	C	
Approach Delay (s)		33.6			30.9			27.7			28.5	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	29.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/23/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↔↔↔	↔↔↔	
Volume (vph)	513	516	195	2109	1480	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	1553		5110	4990	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	3433	1553		3226	4990	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	558	561	212	2292	1609	291
RTOR Reduction (vph)	0	21	0	0	21	0
Lane Group Flow (vph)	558	540	0	2504	1879	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	2%	0%	2%	1%	1%	1%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	37.0	37.0		75.0	75.0	
Effective Green, g (s)	37.0	37.0		75.0	75.0	
Actuated g/C Ratio	0.31	0.31		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1059	479		2016	3119	
v/s Ratio Prot	0.16				0.38	
v/s Ratio Perm		c0.35		c0.78		
v/c Ratio	0.53	1.13		2.55dl	0.60	
Uniform Delay, d1	34.3	41.5		22.5	13.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	80.5		113.3	0.9	
Delay (s)	36.1	122.0		135.8	14.4	
Level of Service	D	F		F	B	
Approach Delay (s)	79.2			135.8	14.4	
Approach LOS	E			F	B	

Intersection Summary

HCM Average Control Delay	82.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	275	676	103	91	709	48	136	364	70	120	184	489
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3389		1787	3497		1719	3445		1787	1881	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1719	3389		1787	3497		1719	3445		1787	1881	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	299	735	112	99	771	52	148	396	76	130	200	532
RTOR Reduction (vph)	0	15	0	0	6	0	0	21	0	0	0	216
Lane Group Flow (vph)	299	832	0	99	817	0	148	451	0	130	200	316
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	5%	4%	2%	1%	2%	3%	5%	2%	0%	1%	1%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	29.3		6.7	23.9		7.1	18.4		6.1	17.4	17.4
Effective Green, g (s)	12.1	29.3		6.7	23.9		7.1	18.4		6.1	17.4	17.4
Actuated g/C Ratio	0.16	0.38		0.09	0.31		0.09	0.24		0.08	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	272	1298		157	1093		160	829		142	428	357
v/s Ratio Prot	c0.17	0.25		0.06	c0.23		c0.09	0.13		0.07	0.11	
v/s Ratio Perm												c0.20
v/c Ratio	1.10	0.64		0.63	0.75		0.93	0.54		0.92	0.47	0.88
Uniform Delay, d1	32.2	19.3		33.7	23.6		34.4	25.4		34.9	25.5	28.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	83.8	1.1		8.0	2.8		49.2	0.7		50.5	0.8	21.9
Delay (s)	116.0	20.4		41.7	26.4		83.7	26.1		85.4	26.4	50.5
Level of Service	F	C		D	C		F	C		F	C	D
Approach Delay (s)		45.3			28.1			39.9			50.2	
Approach LOS		D			C			D			D	

Intersection Summary

HCM Average Control Delay	41.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	676	248	80	595	110	206	994	115	231	874	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1712	3404			3238		1770	3471	1524	1805	3539	1547
Flt Permitted	0.24	1.00			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	436	3404			2252		1770	3471	1524	1805	3539	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	735	270	87	647	120	224	1080	125	251	950	118
RTOR Reduction (vph)	0	55	0	0	19	0	0	0	22	0	0	23
Lane Group Flow (vph)	145	950	0	0	835	0	224	1080	103	251	950	95
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	5%	1%	1%	0%	1%	1%	2%	4%	2%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	31.7	31.7			31.7		5.1	17.4	17.4	8.2	20.5	20.5
Effective Green, g (s)	31.7	31.7			31.7		5.1	17.4	17.4	8.2	20.5	20.5
Actuated g/C Ratio	0.46	0.46			0.46		0.07	0.25	0.25	0.12	0.30	0.30
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	199	1557			1030		130	872	383	214	1047	458
v/s Ratio Prot		0.28					c0.13	c0.31		0.14	c0.27	
v/s Ratio Perm	0.33				c0.37				0.07			0.06
v/c Ratio	0.73	0.61			0.81		1.72	1.24	0.27	1.17	0.91	0.21
Uniform Delay, d1	15.3	14.2			16.2		32.1	25.9	20.8	30.5	23.5	18.3
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.5	0.7			4.9		355.6	117.2	0.4	116.1	11.2	0.2
Delay (s)	27.8	14.9			21.1		387.7	143.1	21.2	146.6	34.6	18.5
Level of Service	C	B			C		F	F	C	F	C	B
Approach Delay (s)		16.5			21.1			170.8			54.5	
Approach LOS		B			C			F			D	

Intersection Summary

HCM Average Control Delay	74.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/23/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	258	503	464	162	279	894
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3428		3502	3610
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3428		3502	3610
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	547	504	176	303	972
RTOR Reduction (vph)	0	430	41	0	0	0
Lane Group Flow (vph)	280	117	639	0	303	972
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	0%	0%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	11.6	11.6	20.1		10.4	28.8
Effective Green, g (s)	11.6	11.6	20.1		10.4	28.8
Actuated g/C Ratio	0.21	0.21	0.37		0.19	0.53
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	387	598	1274		673	1922
v/s Ratio Prot	c0.16	0.04	0.19		c0.09	c0.27
v/s Ratio Perm						
v/c Ratio	0.72	0.20	0.50		0.45	0.51
Uniform Delay, d1	19.8	17.4	13.1		19.3	8.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.6	0.2	0.3		0.5	0.2
Delay (s)	26.3	17.6	13.4		19.8	8.3
Level of Service	C	B	B		B	A
Approach Delay (s)	20.5		13.4			11.0
Approach LOS	C		B			B

Intersection Summary

HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	223	201	83	91	286	63	149	463	101	170	752	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	0.99		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3467	3610	1571	1805	3462		1805	3494		1787	3610	1574
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3467	3610	1571	1805	3462		1805	3494		1787	3610	1574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	242	218	90	99	311	68	162	503	110	185	817	407
RTOR Reduction (vph)	0	0	70	0	26	0	0	21	0	0	0	222
Lane Group Flow (vph)	242	218	20	99	353	0	162	592	0	185	817	185
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	0%	0%	0%	1%	1%	0%	0%	0%	1%	0%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	5.1	14.6	14.6	5.4	14.9		7.2	20.0		11.0	23.8	23.8
Effective Green, g (s)	5.1	14.6	14.6	5.4	14.9		7.2	20.0		11.0	23.8	23.8
Actuated g/C Ratio	0.08	0.22	0.22	0.08	0.22		0.11	0.30		0.16	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	264	787	342	145	770		194	1043		293	1282	559
v/s Ratio Prot	c0.07	0.06		0.05	c0.10		c0.09	0.17		0.10	c0.23	
v/s Ratio Perm			0.01									0.12
v/c Ratio	0.92	0.28	0.06	0.68	0.46		0.84	0.57		0.63	0.64	0.33
Uniform Delay, d1	30.7	21.8	20.8	30.0	22.6		29.3	19.8		26.1	18.0	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	33.8	0.2	0.1	12.5	0.4		25.5	0.7		4.4	1.0	0.3
Delay (s)	64.5	22.0	20.8	42.4	23.0		54.8	20.6		30.5	19.1	16.1
Level of Service	E	C	C	D	C		D	C		C	B	B
Approach Delay (s)		40.5			27.0			27.7			19.7	
Approach LOS		D			C			C			B	

Intersection Summary		
HCM Average Control Delay	26.3	HCM Level of Service C
HCM Volume to Capacity ratio	0.59	
Actuated Cycle Length (s)	67.0	Sum of lost time (s) 12.0
Intersection Capacity Utilization	67.0%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	207	58	68	177	187	65	370	38	200	943	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3448		1805	3277		3467	3574	1579	3502	3610	1577
Flt Permitted	0.48	1.00		0.58	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	900	3448		1093	3277		3467	3574	1579	3502	3610	1577
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	225	63	74	192	203	71	402	41	217	1025	29
RTOR Reduction (vph)	0	41	0	0	152	0	0	0	24	0	0	9
Lane Group Flow (vph)	92	247	0	74	243	0	71	402	17	217	1025	20
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	1%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	12.9	12.9		12.9	12.9		2.5	20.7	20.7	5.6	23.8	23.8
Effective Green, g (s)	12.9	12.9		12.9	12.9		2.5	20.7	20.7	5.6	23.8	23.8
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.05	0.40	0.40	0.11	0.46	0.46
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	227	869		275	826		169	1445	638	383	1678	733
v/s Ratio Prot		0.07			0.07		0.02	0.11		c0.06	c0.28	
v/s Ratio Perm	c0.10			0.07					0.01			0.01
v/c Ratio	0.41	0.28		0.27	0.29		0.42	0.28	0.03	0.57	0.61	0.03
Uniform Delay, d1	16.0	15.4		15.4	15.5		23.6	10.2	9.2	21.6	10.2	7.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.2		0.5	0.2		1.7	0.1	0.0	1.9	0.7	0.0
Delay (s)	17.1	15.6		15.9	15.7		25.3	10.3	9.2	23.6	10.9	7.4
Level of Service	B	B		B	B		C	B	A	C	B	A
Approach Delay (s)		16.0			15.7			12.3			13.0	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	51.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

46: Maritime Street & Burma Road

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	488	0	71	71	5	304	20	319	9	69	380	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.85		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1070		1020	1245		902	2685		1570	2394	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	1070		1020	1245		902	2685		1570	2394	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	530	0	77	77	5	330	22	347	10	75	413	266
RTOR Reduction (vph)	0	56	0	0	286	0	0	2	0	0	117	0
Lane Group Flow (vph)	530	21	0	77	49	0	22	355	0	75	562	0
Heavy Vehicles (%)	8%	0%	51%	77%	100%	29%	100%	32%	100%	15%	58%	17%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	26.7	21.9		15.3	10.5		1.7	17.8		7.6	23.7	
Effective Green, g (s)	26.7	21.9		15.3	10.5		1.7	17.8		7.6	23.7	
Actuated g/C Ratio	0.34	0.28		0.19	0.13		0.02	0.23		0.10	0.30	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	568	298		199	166		20	608		152	722	
v/s Ratio Prot	c0.32	0.02		0.08	c0.04		c0.02	0.13		0.05	c0.23	
v/s Ratio Perm												
v/c Ratio	0.93	0.07		0.39	0.30		1.10	0.58		0.49	0.78	
Uniform Delay, d1	25.1	20.9		27.6	30.7		38.4	27.1		33.7	25.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	22.5	0.1		1.3	1.0		234.8	1.4		2.5	5.3	
Delay (s)	47.6	21.0		28.8	31.7		273.2	28.5		36.2	30.4	
Level of Service	D	C		C	C		F	C		D	C	
Approach Delay (s)		44.2			31.2			42.7			31.0	
Approach LOS		D			C			D			C	

Intersection Summary

HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
47: 14th Street & Maritime Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Volume (vph)	14	0	6	41	0	73	2	279	17	31	335	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.91		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1758			1565		1805	2077		1656	2195	
Flt Permitted		0.91			0.87		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1653			1388		1805	2077		1656	2195	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	0	7	45	0	79	2	303	18	34	364	5
RTOR Reduction (vph)	0	6	0	0	67	0	0	8	0	0	2	0
Lane Group Flow (vph)	0	16	0	0	57	0	2	313	0	34	367	0
Heavy Vehicles (%)	0%	0%	0%	16%	0%	5%	0%	74%	44%	9%	65%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6								
Actuated Green, G (s)		3.7			3.7		0.4	8.6		0.4	8.6	
Effective Green, g (s)		3.7			3.7		0.4	8.6		0.4	8.6	
Actuated g/C Ratio		0.15			0.15		0.02	0.35		0.02	0.35	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		248			208		29	723		27	764	
v/s Ratio Prot							0.00	0.15		c0.02	c0.17	
v/s Ratio Perm		0.01			c0.04							
v/c Ratio		0.06			0.27		0.07	0.43		1.26	0.48	
Uniform Delay, d1		9.0			9.3		12.0	6.2		12.2	6.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1			0.7		1.0	0.4		261.3	0.5	
Delay (s)		9.1			10.0		13.0	6.6		273.4	6.8	
Level of Service		A			B		B	A		F	A	
Approach Delay (s)		9.1			10.0			6.6			29.3	
Approach LOS		A			B			A			C	

Intersection Summary

HCM Average Control Delay	17.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	24.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway/Maritime Street

4/23/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Volume (vph)	87	191	394	169	153	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1900	878	1165	1994	1068	897
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1900	878	1165	1994	1068	897
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	208	428	184	166	216
RTOR Reduction (vph)	0	177	0	0	0	166
Lane Group Flow (vph)	95	31	428	184	166	50
Heavy Vehicles (%)	90%	84%	55%	81%	69%	80%
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	9.9	9.9	29.4	43.3	15.4	15.4
Effective Green, g (s)	9.9	9.9	29.4	43.3	15.4	15.4
Actuated g/C Ratio	0.15	0.15	0.44	0.65	0.23	0.23
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	282	130	514	1294	247	207
v/s Ratio Prot	c0.05		c0.37	0.09	c0.16	
v/s Ratio Perm		0.04				0.06
v/c Ratio	0.34	0.24	0.83	0.14	0.67	0.24
Uniform Delay, d1	25.5	25.1	16.5	4.5	23.4	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.9	11.1	0.1	7.0	0.6
Delay (s)	26.2	26.0	27.5	4.6	30.4	21.5
Level of Service	C	C	C	A	C	C
Approach Delay (s)	26.1			20.6	25.4	
Approach LOS	C			C	C	

Intersection Summary

HCM Average Control Delay	23.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	66.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	87	191	153	199	394	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	950	1962	2136	897	2259	892
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	950	1962	2136	897	2259	892
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	208	166	216	428	184
RTOR Reduction (vph)	0	0	0	0	0	127
Lane Group Flow (vph)	95	208	166	216	428	57
Heavy Vehicles (%)	90%	84%	69%	80%	55%	81%
Turn Type	Prot	NA	NA	Free	NA	Perm
Protected Phases	5	2	6		7	
Permitted Phases				Free		7
Actuated Green, G (s)	4.8	15.7	6.9	34.3	10.6	10.6
Effective Green, g (s)	4.8	15.7	6.9	34.3	10.6	10.6
Actuated g/C Ratio	0.14	0.46	0.20	1.00	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	133	898	430	897	698	276
v/s Ratio Prot	c0.10	0.11	c0.08		c0.19	
v/s Ratio Perm				0.24		0.06
v/c Ratio	0.71	0.23	0.39	0.24	0.61	0.21
Uniform Delay, d1	14.1	5.6	11.9	0.0	10.1	8.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.6	0.1	0.6	0.6	1.6	0.4
Delay (s)	30.7	5.8	12.4	0.6	11.7	9.1
Level of Service	C	A	B	A	B	A
Approach Delay (s)		13.6	5.8		10.9	
Approach LOS		B	A		B	

Intersection Summary





















HCM Average Control Delay	10.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	34.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

49: W. Truck Services & Burma Road

4/23/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	226	0	23	58	177	0	0	107	242	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	246	0	25	63	192	0	0	116	263	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					788							
pX, platoon unblocked												
vC, conflicting volume	255			246			455	551	123	448	455	159
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	255			246			455	551	123	448	455	159
tC, single (s)	4.1			4.3			7.5	6.5	7.0	8.1	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	100			98			100	100	87	30	100	100
cM capacity (veh/h)	1321			1275			486	436	899	375	494	864
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2						
Volume Total	164	82	280	116	175	88						
Volume Left	0	0	25	0	175	88						
Volume Right	0	0	192	116	0	0						
cSH	1700	1700	1275	899	375	375						
Volume to Capacity	0.10	0.05	0.02	0.13	0.47	0.23						
Queue Length 95th (ft)	0	0	1	11	60	22						
Control Delay (s)	0.0	0.0	0.9	9.6	22.7	17.5						
Lane LOS			A	A	C	C						
Approach Delay (s)	0.0		0.9	9.6	21.0							
Approach LOS				A	C							
Intersection Summary												
Average Delay			7.6									
Intersection Capacity Utilization			44.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	294	146	0	0	122	149	204	306	109	206	0	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.96		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1037	2735			2951		893	3071		1770		1921
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1037	2735			2951		893	3071		1770		1921
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	320	159	0	0	133	162	222	333	118	224	0	403
RTOR Reduction (vph)	0	0	0	0	145	0	0	36	0	0	0	342
Lane Group Flow (vph)	320	159	0	0	150	0	200	437	0	224	0	61
Heavy Vehicles (%)	74%	32%	0%	0%	26%	1%	84%	6%	0%	2%	0%	48%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	26.0	38.6			8.6		20.2	20.2		12.6		12.6
Effective Green, g (s)	26.0	38.6			8.6		20.2	20.2		12.6		12.6
Actuated g/C Ratio	0.31	0.46			0.10		0.24	0.24		0.15		0.15
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	323	1266			304		216	744		267		290
v/s Ratio Prot	c0.31	0.06			c0.05		c0.22	0.14		c0.13		0.03
v/s Ratio Perm												
v/c Ratio	0.99	0.13			0.49		0.93	0.59		0.84		0.21
Uniform Delay, d1	28.6	12.8			35.3		30.9	27.9		34.4		31.0
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	47.4	0.0			1.3		40.8	1.2		20.0		0.4
Delay (s)	76.0	12.8			36.6		71.7	29.1		54.4		31.4
Level of Service	E	B			D		E	C		D		C
Approach Delay (s)		55.0			36.6			41.8			39.6	
Approach LOS		E			D			D			D	

Intersection Summary

HCM Average Control Delay	43.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/23/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑	↑	↑	↑↑↑
Volume (vph)	293	895	53	1541	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.91	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3042	1455	1537	1524	4571
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3042	1455	1537	1524	4571
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	318	973	58	1675	0
RTOR Reduction (vph)	0	0	24	0	0
Lane Group Flow (vph)	805	486	28	843	838
Heavy Vehicles (%)	7%	1%	1%	1%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	29.5	29.5	46.0	46.0	46.0
Effective Green, g (s)	29.5	29.5	46.0	46.0	46.0
Actuated g/C Ratio	0.35	0.35	0.54	0.54	0.54
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1056	505	832	825	2474
v/s Ratio Prot	0.26		0.02	c0.55	0.18
v/s Ratio Perm		c0.33			
v/c Ratio	0.92dr	0.96	0.03	1.02	0.90dl
Uniform Delay, d1	24.6	27.2	9.1	19.5	11.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.2	31.7	0.0	36.8	0.1
Delay (s)	29.9	58.9	9.1	56.3	11.0
Level of Service	C	E	A	E	B
Approach Delay (s)	40.8				33.0
Approach LOS	D				C

Intersection Summary

HCM Average Control Delay	36.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	676	248	80	595	110	206	994	115	231	874	109
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			0.99		1.00	1.00	0.95	1.00	1.00	0.96
Flpb, ped/bikes	0.99	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1710	3397			3235		1770	3471	1507	1805	3539	1533
Flt Permitted	0.21	1.00			0.62		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	385	3397			2031		1770	3471	1507	1805	3539	1533
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	735	270	87	647	120	224	1080	125	251	950	118
RTOR Reduction (vph)	0	38	0	0	13	0	0	0	23	0	0	25
Lane Group Flow (vph)	145	967	0	0	841	0	224	1080	102	251	950	93
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	5%	1%	1%	0%	1%	1%	2%	4%	2%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	42.3	42.3			42.3		14.5	31.0	31.0	14.0	30.5	30.5
Effective Green, g (s)	42.3	42.3			42.3		14.5	31.0	31.0	14.0	30.5	30.5
Actuated g/C Ratio	0.43	0.43			0.43		0.15	0.31	0.31	0.14	0.31	0.31
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	164	1447			865		258	1084	470	254	1087	471
v/s Ratio Prot		0.28					0.13	c0.31		0.14	c0.27	
v/s Ratio Perm	0.38				c0.41				0.07			0.06
v/c Ratio	0.88	0.67			0.97		0.87	1.00	0.22	0.99	0.87	0.20
Uniform Delay, d1	26.2	22.9			27.9		41.5	34.1	25.2	42.6	32.6	25.4
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	38.8	1.2			23.8		25.1	26.2	0.2	52.6	8.0	0.2
Delay (s)	65.0	24.1			51.7		66.5	60.3	25.4	95.2	40.6	25.6
Level of Service	E	C			D		E	E	C	F	D	C
Approach Delay (s)		29.2			51.7			58.3			49.6	
Approach LOS		C			D			E			D	

Intersection Summary

HCM Average Control Delay	47.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	99.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	644	272	271	1183	62	37	16	107	25	20	10
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3539	989	1570	3534		1649	1103	789	1504	1730	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.98	1.00	0.95	1.00	
Satd. Flow (perm)	1719	3539	989	1570	3534		1649	1103	789	1504	1730	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	700	296	295	1286	67	40	17	116	27	22	11
RTOR Reduction (vph)	0	0	194	0	2	0	0	0	101	0	10	0
Lane Group Flow (vph)	32	700	102	295	1351	0	28	29	15	27	23	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	5%	2%	60%	15%	1%	6%	4%	100%	100%	20%	0%	7%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	4.5	31.1	31.1	25.6	52.2		11.4	11.4	11.4	5.8	5.8	
Effective Green, g (s)	4.5	31.1	31.1	25.6	52.2		11.4	11.4	11.4	5.8	5.8	
Actuated g/C Ratio	0.05	0.34	0.34	0.28	0.58		0.13	0.13	0.13	0.06	0.06	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	86	1218	340	445	2041		208	139	99	96	111	
v/s Ratio Prot	0.02	0.20		c0.19	c0.38		0.02	c0.03		c0.02	0.01	
v/s Ratio Perm			0.10						0.02			
v/c Ratio	0.37	0.57	0.30	0.66	0.66		0.13	0.21	0.15	0.28	0.20	
Uniform Delay, d1	41.6	24.2	21.7	28.6	13.1		35.1	35.5	35.2	40.3	40.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	0.9	0.9	3.7	1.0		0.4	1.0	0.9	1.6	0.9	
Delay (s)	44.3	25.2	22.5	32.3	14.0		35.5	36.5	36.1	41.9	41.0	
Level of Service	D	C	C	C	B		D	D	D	D	D	
Approach Delay (s)		25.0			17.3			36.1			41.4	
Approach LOS		C			B			D			D	

Intersection Summary

HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	11.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	86	515	190	333	1047	322	277	191	423	238	271	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	0.90		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3357		1467	3505	1553	1787	2913		1736	3277	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3357		1467	3505	1553	1787	2913		1736	3277	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	560	207	362	1138	350	301	208	460	259	295	127
RTOR Reduction (vph)	0	60	0	0	0	204	0	238	0	0	74	0
Lane Group Flow (vph)	93	707	0	362	1138	146	301	430	0	259	348	0
Confl. Peds. (#/hr)			5									
Heavy Vehicles (%)	0%	3%	2%	23%	3%	4%	1%	7%	13%	4%	7%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	4.5	23.7		7.5	26.7	26.7	7.1	9.1		7.0	9.0	
Effective Green, g (s)	4.5	23.7		7.5	26.7	26.7	7.1	9.1		7.0	9.0	
Actuated g/C Ratio	0.07	0.37		0.12	0.42	0.42	0.11	0.14		0.11	0.14	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	127	1247		172	1467	650	199	415		190	462	
v/s Ratio Prot	0.05	0.21		c0.25	c0.32		c0.17	0.15		c0.15	0.11	
v/s Ratio Perm						0.09						
v/c Ratio	0.73	0.57		2.10	0.78	0.23	1.51	1.04dr		1.36	0.75	
Uniform Delay, d1	29.1	16.0		28.1	16.0	11.9	28.3	27.3		28.4	26.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	20.0	0.9		516.3	3.0	0.3	254.8	53.6		193.5	7.1	
Delay (s)	49.1	16.8		544.4	18.9	12.2	283.2	80.9		221.9	33.4	
Level of Service	D	B		F	B	B	F	F		F	C	
Approach Delay (s)		20.3			120.5			143.8			105.1	
Approach LOS		C			F			F			F	

Intersection Summary

HCM Average Control Delay	103.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	16.5
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑	↑↑						↑↑	
Volume (vph)	0	1138	71	202	1221	0	0	0	0	128	216	387
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.92	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		4986		1801	3471						3083	
Flt Permitted		1.00		0.16	1.00						0.99	
Satd. Flow (perm)		4986		310	3471						3083	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1237	77	220	1327	0	0	0	0	139	235	421
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	19	0
Lane Group Flow (vph)	0	1308	0	220	1327	0	0	0	0	0	776	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	7%	3%	2%	0%	4%	2%	3%	1%	0%	5%	5%	6%
Turn Type		NA		Perm	NA						Perm	NA
Protected Phases		4			8							6
Permitted Phases				8						6		
Actuated Green, G (s)		47.3		47.3	47.3						26.1	
Effective Green, g (s)		47.3		47.3	47.3						26.1	
Actuated g/C Ratio		0.57		0.57	0.57						0.31	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		2828		176	1969						965	
v/s Ratio Prot		0.26			0.38							
v/s Ratio Perm				0.71							0.25	
v/c Ratio		0.46		1.25	0.67						0.80	
Uniform Delay, d1		10.6		18.1	12.6						26.3	
Progression Factor		1.00		0.39	0.25						1.00	
Incremental Delay, d2		0.0		145.9	0.6						4.7	
Delay (s)		10.6		153.0	3.7						31.0	
Level of Service		B		F	A						C	
Approach Delay (s)		10.6			24.9			0.0			31.0	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM Average Control Delay			21.1		HCM Level of Service					C		
HCM Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			83.4		Sum of lost time (s)			10.0				
Intersection Capacity Utilization			70.2%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	189	1077	0	0	1358	113	65	91	106	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.94				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5047			5016			3256				
Flt Permitted		0.65			1.00			0.99				
Satd. Flow (perm)		3282			5016			3256				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	205	1171	0	0	1476	123	71	99	115	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	29	0	0	0	0
Lane Group Flow (vph)	0	1376	0	0	1591	0	0	256	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		47.3			47.3			26.1				
Effective Green, g (s)		47.3			47.3			26.1				
Actuated g/C Ratio		0.57			0.57			0.31				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1861			2845			1019				
v/s Ratio Prot					0.32							
v/s Ratio Perm		c0.42						0.08				
v/c Ratio		1.80dl			0.56			0.25				
Uniform Delay, d1		13.5			11.4			21.4				
Progression Factor		0.45			1.00			1.00				
Incremental Delay, d2		1.2			0.1			0.0				
Delay (s)		7.3			11.6			21.4				
Level of Service		A			B			C				
Approach Delay (s)		7.3			11.6			21.4			0.0	
Approach LOS		A			B			C			A	

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔			↔↕↔			↔↕			↔↕	
Volume (vph)	56	925	55	39	1163	31	196	630	34	44	147	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.99			0.98	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		4926			4987			3539			3317	
Flt Permitted		0.80			0.87			0.81			0.61	
Satd. Flow (perm)		3940			4334			2886			2044	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	1005	60	42	1264	34	213	685	37	48	160	30
RTOR Reduction (vph)	0	8	0	0	3	0	0	4	0	0	14	0
Lane Group Flow (vph)	0	1118	0	0	1337	0	0	932	0	0	224	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	9%	17%	3%	0%	0%	0%	0%	0%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		47.5			47.5			24.0			24.0	
Effective Green, g (s)		47.5			47.5			24.0			24.0	
Actuated g/C Ratio		0.59			0.59			0.30			0.30	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2339			2573			866			613	
v/s Ratio Prot												
v/s Ratio Perm		0.28			0.31			0.32			0.11	
v/c Ratio		0.48			0.52			1.08			0.37	
Uniform Delay, d1		9.2			9.5			28.0			22.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			0.8			53.0			1.7	
Delay (s)		9.9			10.3			81.0			23.7	
Level of Service		A			B			F			C	
Approach Delay (s)		9.9			10.3			81.0			23.7	
Approach LOS		A			B			F			C	

Intersection Summary

HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	118.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗		↕↕	↗	↖	↕	↗		↖	↗
Volume (vph)	66	916	217	91	848	39	279	248	82	23	1003	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)		3497	1488		3429	1547	1752	1845	1574		1776	1528
Flt Permitted		0.74	1.00		0.64	1.00	0.12	1.00	1.00		0.99	1.00
Satd. Flow (perm)		2604	1488		2218	1547	217	1845	1574		1759	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	996	236	99	922	42	303	270	89	25	1090	261
RTOR Reduction (vph)	0	0	10	0	0	13	0	0	51	0	0	47
Lane Group Flow (vph)	0	1068	226	0	1021	29	303	270	38	0	1115	214
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	3%	4%	21%	3%	0%	3%	3%	0%	0%	7%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Effective Green, g (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Actuated g/C Ratio		0.52	0.52		0.52	0.52	0.38	0.38	0.38		0.38	0.38
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1360	777		1158	808	82	697	595		665	577
v/s Ratio Prot								0.15				
v/s Ratio Perm		0.41	0.15		0.46	0.02	0.14		0.02		0.63	0.14
v/c Ratio		0.79	0.29		0.88	0.04	3.70	0.39	0.06		1.68	0.37
Uniform Delay, d1		17.4	12.1		19.0	10.5	28.0	20.4	17.9		28.0	20.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		4.6	0.9		9.8	0.1	1242.2	0.1	0.0		311.1	0.1
Delay (s)		22.0	13.1		28.8	10.5	1270.2	20.5	17.9		339.1	20.4
Level of Service		C	B		C	B	F	C	B		F	C
Approach Delay (s)		20.4			28.1			592.1			278.6	
Approach LOS		C			C			F			F	

Intersection Summary

HCM Average Control Delay	188.9	HCM Level of Service	F
HCM Volume to Capacity ratio	2.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	139.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	61	720	264	28	836	90	57	574	28	214	814	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3483	1525	1798	3505	1540	1748	3514		1711	3426	
Flt Permitted		0.76	1.00	0.23	1.00	1.00	0.19	1.00		0.34	1.00	
Satd. Flow (perm)		2650	1525	443	3505	1540	353	3514		612	3426	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	66	783	287	30	909	98	62	624	30	233	885	76
RTOR Reduction (vph)	0	0	55	0	0	38	0	5	0	0	8	0
Lane Group Flow (vph)	0	849	232	30	909	60	62	649	0	233	953	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	6%	3%	3%	0%	3%	2%	3%	2%	0%	5%	4%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2				6
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		38.4	38.4	38.4	38.4	38.4	37.1	37.1		37.1	37.1	
Effective Green, g (s)		38.4	38.4	38.4	38.4	38.4	37.1	37.1		37.1	37.1	
Actuated g/C Ratio		0.45	0.45	0.45	0.45	0.45	0.44	0.44		0.44	0.44	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1197	689	200	1583	696	154	1534		267	1495	
v/s Ratio Prot					0.26			0.18				0.28
v/s Ratio Perm		c0.32	0.15	0.07		0.04	0.18			c0.38		
v/c Ratio		0.71	0.34	0.15	0.57	0.09	0.40	0.42		0.87	0.64	
Uniform Delay, d1		18.8	15.1	13.7	17.2	13.3	16.4	16.6		21.8	18.7	
Progression Factor		1.00	1.00	1.34	1.02	1.75	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.6	1.3	1.5	1.4	0.2	3.6	0.4		26.0	1.0	
Delay (s)		22.4	16.4	19.9	19.0	23.5	19.9	17.0		47.8	19.7	
Level of Service		C	B	B	B	C	B	B		D	B	
Approach Delay (s)		20.9			19.5			17.2			25.2	
Approach LOS		C			B			B			C	

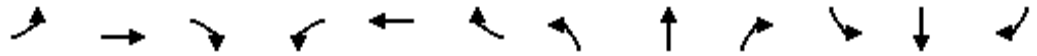
Intersection Summary

HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	52	933	40	27	1029	36	36	85	117	28	135	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	1802	3505	1579	1748	3505	1579		3551	1436		3288	
Flt Permitted	0.23	1.00	1.00	0.26	1.00	1.00		0.74	1.00		0.92	
Satd. Flow (perm)	434	3505	1579	479	3505	1579		2663	1436		3035	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	1014	43	29	1118	39	39	92	127	30	147	175
RTOR Reduction (vph)	0	0	9	0	0	8	0	0	93	0	74	0
Lane Group Flow (vph)	57	1014	34	29	1118	31	0	131	34	0	278	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	3%	3%	0%	0%	0%	10%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	62.5	62.5	62.5	62.5	62.5	62.5		14.0	14.0		14.0	
Effective Green, g (s)	62.5	62.5	62.5	62.5	62.5	62.5		14.0	14.0		14.0	
Actuated g/C Ratio	0.74	0.74	0.74	0.74	0.74	0.74		0.16	0.16		0.16	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	319	2577	1161	352	2577	1161		439	237		500	
v/s Ratio Prot		0.29			c0.32							
v/s Ratio Perm	0.13		0.02	0.06		0.02		0.05	0.02		c0.09	
v/c Ratio	0.18	0.39	0.03	0.08	0.43	0.03		0.30	0.14		0.56	
Uniform Delay, d1	3.4	4.2	3.0	3.2	4.4	3.0		31.2	30.4		32.6	
Progression Factor	0.65	0.82	0.34	1.91	2.65	2.41		1.00	1.00		1.00	
Incremental Delay, d2	0.9	0.3	0.0	0.0	0.0	0.0		0.1	0.1		0.8	
Delay (s)	3.1	3.8	1.1	6.1	11.6	7.3		31.3	30.5		33.4	
Level of Service	A	A	A	A	B	A		C	C		C	
Approach Delay (s)		3.6			11.4			30.9			33.4	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	341	586	1219	60	645	241
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3438	3505	1521	3427	1415
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3438	3505	1521	3427	1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	371	637	1325	65	701	262
RTOR Reduction (vph)	0	0	0	20	4	172
Lane Group Flow (vph)	371	637	1325	45	723	64
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	5%	3%	3%	2%	1%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	24.5	54.1	25.6	25.6	22.9	22.9
Effective Green, g (s)	24.5	54.1	25.6	25.6	22.9	22.9
Actuated g/C Ratio	0.29	0.64	0.30	0.30	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	510	2188	1056	458	923	381
v/s Ratio Prot	c0.21	0.19	c0.38		c0.21	
v/s Ratio Perm				0.03		0.04
v/c Ratio	0.73	0.29	1.25	0.10	0.78	0.17
Uniform Delay, d1	27.2	6.9	29.7	21.4	28.8	23.8
Progression Factor	0.81	1.62	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1	0.3	122.5	0.4	4.1	0.1
Delay (s)	26.1	11.5	152.2	21.8	32.8	23.8
Level of Service	C	B	F	C	C	C
Approach Delay (s)		16.9	146.1		30.6	
Approach LOS		B	F		C	

Intersection Summary

HCM Average Control Delay	74.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↕	↖	↖↗	↕	↖		↖↗↕	↖		↖↗↕	↖
Volume (vph)	59	261	169	484	964	124	146	921	331	8	1180	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	1.00
Satd. Flow (prot)	3502	3574	1473	3502	3610	1517		5090	1517		5134	1532
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.65	1.00		0.93	1.00
Satd. Flow (perm)	3502	3574	1473	3502	3610	1517		3352	1517		4764	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	284	184	526	1048	135	159	1001	360	9	1283	125
RTOR Reduction (vph)	0	0	4	0	0	45	0	0	228	0	0	42
Lane Group Flow (vph)	64	284	180	526	1048	90	0	1160	132	0	1292	83
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	0%	1%	4%	0%	0%	1%	2%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		2	6		6
Actuated Green, G (s)	6.0	30.2	30.2	11.8	36.0	36.0		33.0	33.0		33.0	33.0
Effective Green, g (s)	6.0	30.2	30.2	11.8	36.0	36.0		33.0	33.0		33.0	33.0
Actuated g/C Ratio	0.07	0.34	0.34	0.13	0.40	0.40		0.37	0.37		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	233	1199	494	459	1444	607		1229	556		1747	562
v/s Ratio Prot	0.02	0.08		c0.15	c0.29							
v/s Ratio Perm			c0.12			0.06		c0.35	0.09		0.27	0.05
v/c Ratio	0.27	0.24	0.36	1.15	0.73	0.15		1.92dl	0.24		0.74	0.15
Uniform Delay, d1	39.9	21.6	22.6	39.1	22.8	17.2		27.6	19.8		24.8	19.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	0.5	2.1	88.5	3.2	0.5		14.2	0.2		1.7	0.1
Delay (s)	40.6	22.0	24.7	127.6	26.0	17.7		41.8	20.0		26.4	19.2
Level of Service	D	C	C	F	C	B		D	B		C	B
Approach Delay (s)		25.2			56.7			36.7			25.8	
Approach LOS		C			E			D			C	

Intersection Summary

HCM Average Control Delay	39.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗	↖	↖	↗↗		↖	↗↗	
Volume (vph)	85	118	30	69	124	149	19	137	72	79	114	35
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	902	1910	795	981	2087	1139	902	1753		1020	2009	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	902	1910	795	981	2087	1139	902	1753		1020	2009	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	128	33	75	135	162	21	149	78	86	124	38
RTOR Reduction (vph)	0	0	26	0	0	130	0	42	0	0	16	0
Lane Group Flow (vph)	92	128	7	75	135	32	21	185	0	86	146	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	100%	89%	100%	84%	73%	39%	100%	96%	91%	77%	95%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						
Actuated Green, G (s)	11.3	15.7	15.7	9.6	14.0	14.0	3.0	17.5		10.2	24.7	
Effective Green, g (s)	11.3	15.7	15.7	9.6	14.0	14.0	3.0	17.5		10.2	24.7	
Actuated g/C Ratio	0.16	0.22	0.22	0.14	0.20	0.20	0.04	0.25		0.15	0.35	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	146	428	178	135	417	228	39	438		149	709	
v/s Ratio Prot	c0.10	c0.07		0.08	0.06		0.02	c0.11		c0.08	0.07	
v/s Ratio Perm			0.01			0.03						
v/c Ratio	0.63	0.30	0.04	0.56	0.32	0.14	0.54	0.42		0.58	0.21	
Uniform Delay, d1	27.4	22.6	21.3	28.2	24.0	23.1	32.8	22.0		27.9	15.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.6	0.4	0.1	4.9	0.5	0.3	13.5	0.7		5.3	0.1	
Delay (s)	35.9	23.0	21.4	33.1	24.4	23.3	46.4	22.7		33.2	16.0	
Level of Service	D	C	C	C	C	C	D	C		C	B	
Approach Delay (s)		27.5			25.7			24.7			21.9	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	82	81	250	621	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.93		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1831		3400	2270		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1831		3400	2270		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	89	88	272	675	0	0
RTOR Reduction (vph)	50	0	0	0	0	0
Lane Group Flow (vph)	127	0	272	675	0	0
Heavy Vehicles (%)	75%	90%	3%	59%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	9.3		4.0	21.3		
Effective Green, g (s)	9.3		4.0	21.3		
Actuated g/C Ratio	0.44		0.19	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	799		638	2270		
v/s Ratio Prot	0.07		0.08	c0.30		
v/s Ratio Perm						
v/c Ratio	0.16		0.43	0.30		
Uniform Delay, d1	3.6		7.6	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.1		0.5	0.1		
Delay (s)	3.7		8.1	0.1		
Level of Service	A		A	A		
Approach Delay (s)	3.7			2.4	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	2.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	21.3	Sum of lost time (s)	0.0
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	30	0	0	153	371	277	316	91	99	0	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.89		1.00	0.97		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (prot)	1014	2075			2879		1002	3079		1770		2472
Flt Permitted	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (perm)	1014	2075			2879		1002	3079		1770		2472
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	33	0	0	166	403	301	343	99	108	0	304
RTOR Reduction (vph)	0	0	0	0	314	0	0	25	0	0	0	258
Lane Group Flow (vph)	37	33	0	0	255	0	247	471	0	108	0	46
Heavy Vehicles (%)	78%	74%	0%	0%	39%	1%	64%	2%	0%	2%	0%	15%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	2.6	19.0			12.4		16.7	16.7		8.4		8.4
Effective Green, g (s)	2.6	19.0			12.4		16.7	16.7		8.4		8.4
Actuated g/C Ratio	0.05	0.34			0.22		0.30	0.30		0.15		0.15
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	47	703			636		298	917		265		370
v/s Ratio Prot	c0.04	0.02			c0.09		c0.25	0.15		c0.06		0.02
v/s Ratio Perm												
v/c Ratio	0.79	0.05			0.40		0.83	0.51		0.41		0.12
Uniform Delay, d1	26.5	12.5			18.7		18.4	16.3		21.6		20.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	57.7	0.0			0.4		17.1	0.5		1.0		0.2
Delay (s)	84.1	12.5			19.1		35.4	16.8		22.6		20.8
Level of Service	F	B			B		D	B		C		C
Approach Delay (s)		50.4			19.1			23.0			21.3	
Approach LOS		D			B			C			C	

Intersection Summary

HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	19	383	14	4	552	38	45	10	5	41	14	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			0.99	1.00		0.99	
Frt		1.00			0.99			1.00	0.85		0.96	
Flt Protected		1.00			1.00			0.96	1.00		0.97	
Satd. Flow (prot)		3046			3146			1809	1575		1755	
Flt Permitted		0.91			0.95			0.76	1.00		0.84	
Satd. Flow (perm)		2791			3000			1432	1575		1513	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	416	15	4	600	41	49	11	5	45	15	24
RTOR Reduction (vph)	0	2	0	0	5	0	0	0	4	0	15	0
Lane Group Flow (vph)	0	450	0	0	640	0	0	60	1	0	69	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	16%	0%	0%	12%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	6	12	0	0	10	0	0	0	0	0	0	8
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		69.0			69.0			23.0	23.0		23.0	
Effective Green, g (s)		69.0			69.0			23.0	23.0		23.0	
Actuated g/C Ratio		0.69			0.69			0.23	0.23		0.23	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		1926			2070			329	362		348	
v/s Ratio Prot												
v/s Ratio Perm		0.16			0.21			0.04	0.00		0.05	
v/c Ratio		0.23			0.31			0.18	0.00		0.20	
Uniform Delay, d1		5.7			6.1			30.9	29.7		31.1	
Progression Factor		1.00			0.51			1.00	1.00		1.00	
Incremental Delay, d2		0.3			0.4			1.2	0.0		1.3	
Delay (s)		6.0			3.5			32.2	29.7		32.4	
Level of Service		A			A			C	C		C	
Approach Delay (s)		6.0			3.5			32.0			32.4	
Approach LOS		A			A			C			C	

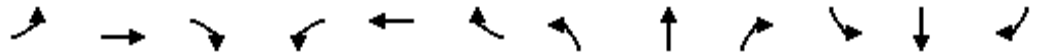
Intersection Summary

HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	659	21	172	531	56	12	47	59	90	89	32
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.99			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1801		1805	3301			1731		1639	1793	
Flt Permitted	0.95	1.00		0.95	1.00			0.96		0.49	1.00	
Satd. Flow (perm)	1805	1801		1805	3301			1676		844	1793	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	716	23	187	577	61	13	51	64	98	97	35
RTOR Reduction (vph)	0	1	0	0	6	0	0	41	0	0	15	0
Lane Group Flow (vph)	53	738	0	187	632	0	0	87	0	98	117	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	5%	0%	0%	8%	3%	0%	0%	0%	9%	0%	4%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	60.8		14.6	70.6			13.6		13.6	13.6	
Effective Green, g (s)	4.8	60.8		14.6	70.6			13.6		13.6	13.6	
Actuated g/C Ratio	0.05	0.61		0.15	0.71			0.14		0.14	0.14	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	87	1095		264	2331			228		115	244	
v/s Ratio Prot	0.03	c0.41		c0.10	0.19						0.07	
v/s Ratio Perm								0.05		c0.12		
v/c Ratio	0.61	0.67		0.71	0.27			0.38		0.85	0.48	
Uniform Delay, d1	46.7	13.0		40.7	5.3			39.4		42.2	39.9	
Progression Factor	0.93	0.90		0.59	3.27			1.00		1.00	1.00	
Incremental Delay, d2	8.0	3.3		5.8	0.2			0.4		40.8	0.5	
Delay (s)	51.6	15.0		29.8	17.7			39.7		83.0	40.5	
Level of Service	D	B		C	B			D		F	D	
Approach Delay (s)		17.5			20.5			39.7			58.6	
Approach LOS		B			C			D			E	

Intersection Summary

HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	695	60	283	820	21	14	41	112	11	47	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1800	3375		1784	3362			1874	1585		1823	
Flt Permitted	0.21	1.00		0.25	1.00			0.95	1.00		0.97	
Satd. Flow (perm)	390	3375		461	3362			1797	1585		1784	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	755	65	308	891	23	15	45	122	12	51	17
RTOR Reduction (vph)	0	6	0	0	2	0	0	0	64	0	9	0
Lane Group Flow (vph)	26	814	0	308	912	0	0	60	58	0	71	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	1%	7%	2%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1		1	1			2		2	2	
Permitted Phases	1			1			2		2	2		2
Actuated Green, G (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	179	1553		212	1547			827	729		821	
v/s Ratio Prot		0.24			0.27							
v/s Ratio Perm	0.07			c0.67				0.03	0.04		c0.04	
v/c Ratio	0.15	0.52		1.45	0.59			0.07	0.08		0.09	
Uniform Delay, d1	15.6	19.2		27.0	20.0			15.1	15.1		15.2	
Progression Factor	0.69	0.70		0.78	0.81			1.00	1.00		1.00	
Incremental Delay, d2	1.3	1.0		227.6	1.6			0.2	0.2		0.2	
Delay (s)	12.2	14.5		248.6	17.8			15.3	15.4		15.4	
Level of Service	B	B		F	B			B	B		B	
Approach Delay (s)		14.4			76.0			15.3			15.4	
Approach LOS		B			E			B			B	

Intersection Summary

HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	↖
Volume (vph)	100	933	60	60	782	117	33	180	75	28	24	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96			0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1733	3369		1061	3438	1527	1277	1979			3016	
Flt Permitted	0.29	1.00		0.21	1.00	1.00	0.69	1.00			0.82	
Satd. Flow (perm)	532	3369		238	3438	1527	933	1979			2526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1014	65	65	850	127	36	196	82	30	26	36
RTOR Reduction (vph)	0	5	0	0	0	46	0	46	0	0	26	0
Lane Group Flow (vph)	109	1074	0	65	850	81	36	232	0	0	66	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	4%	5%	23%	70%	5%	4%	40%	67%	88%	0%	30%	3%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Effective Green, g (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.28	0.28			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	340	2156		152	2200	977	261	554			707	
v/s Ratio Prot		c0.32			0.25			c0.12				
v/s Ratio Perm	0.20			0.27		0.05	0.04				0.03	
v/c Ratio	0.32	0.50		0.43	0.39	0.08	0.14	0.42			0.09	
Uniform Delay, d1	8.2	9.5		8.9	8.6	6.8	27.0	29.4			26.6	
Progression Factor	0.30	0.28		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	2.4	0.8		8.6	0.5	0.2	1.1	2.3			0.3	
Delay (s)	4.8	3.4		17.5	9.1	7.0	28.1	31.7			26.9	
Level of Service	A	A		B	A	A	C	C			C	
Approach Delay (s)		3.6			9.4			31.3			26.9	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑	↗	↗	↑↑	↗
Volume (vph)	269	863	16	50	547	27	137	72	96	246	281	129
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1697	4431		1802	4868		1711	1845	1584	1775	3505	1342
Flt Permitted	0.39	1.00		0.24	1.00		0.57	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	699	4431		462	4868		1019	1845	1584	1320	3505	1342
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	292	938	17	54	595	29	149	78	104	267	305	140
RTOR Reduction (vph)	0	3	0	0	7	0	0	0	41	0	0	80
Lane Group Flow (vph)	292	952	0	54	617	0	149	78	63	267	305	60
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	6%	17%	1%	0%	6%	0%	5%	3%	0%	1%	3%	18%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	33.3	33.3		33.3	33.3		32.2	32.2	32.2	32.2	32.2	32.2
Effective Green, g (s)	33.3	33.3		33.3	33.3		32.2	32.2	32.2	32.2	32.2	32.2
Actuated g/C Ratio	0.44	0.44		0.44	0.44		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	310	1967		205	2161		437	792	680	567	1505	576
v/s Ratio Prot		0.21			0.13			0.04				0.09
v/s Ratio Perm	c0.42			0.12			0.15		0.04	c0.20		0.04
v/c Ratio	0.94	0.48		0.26	0.29		0.34	0.10	0.09	0.47	0.20	0.10
Uniform Delay, d1	19.9	14.8		13.1	13.3		14.3	12.8	12.7	15.3	13.4	12.8
Progression Factor	1.00	1.00		1.00	1.00		1.02	1.08	1.22	1.00	1.00	1.00
Incremental Delay, d2	35.6	0.1		0.3	0.0		1.9	0.2	0.3	2.8	0.3	0.4
Delay (s)	55.5	14.8		13.4	13.3		16.5	14.0	15.7	18.1	13.7	13.1
Level of Service	E	B		B	B		B	B	B	B	B	B
Approach Delay (s)		24.4			13.3			15.7			15.2	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	283	370	0	0	0	0	0	1199	1351	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		0.99						1.00	1.00			
Frt		1.00						0.95	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4579						4591	1375			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4579						4591	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	308	402	0	0	0	0	0	1303	1468	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	170	179	0	0	0
Lane Group Flow (vph)	0	705	0	0	0	0	0	1867	555	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	4%	15%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		27.0						23.0	28.7			
Effective Green, g (s)		27.0						23.0	28.7			
Actuated g/C Ratio		0.45						0.38	0.48			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2061						1760	658			
v/s Ratio Prot								c0.41				
v/s Ratio Perm		0.15							c0.40			
v/c Ratio		0.34						1.06	0.84			
Uniform Delay, d1		10.7						18.5	13.7			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.5						39.7	9.7			
Delay (s)		11.2						58.2	23.3			
Level of Service		B						E	C			
Approach Delay (s)		11.2			0.0			49.0			0.0	
Approach LOS		B			A			D			A	

Intersection Summary

HCM Average Control Delay	41.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	26	649	946	0	0	0	0	307	69	44	142	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.94	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			0.99	
Satd. Flow (prot)		4307	1355					1803			1791	
Flt Permitted		1.00	1.00					1.00			0.86	
Satd. Flow (perm)		4307	1355					1803			1566	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	705	1028	0	0	0	0	334	75	48	154	0
RTOR Reduction (vph)	0	309	0	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	938	514	0	0	0	0	400	0	0	202	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	4%	9%	1%	0%	0%	0%	0%	2%	3%	0%	6%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)			20.5	60.0				30.5			30.5	
Effective Green, g (s)			20.5	60.0				30.5			30.5	
Actuated g/C Ratio			0.34	1.00				0.51			0.51	
Clearance Time (s)			5.0					4.0			4.0	
Vehicle Extension (s)			2.0					2.0			2.0	
Lane Grp Cap (vph)		1472	1355					917			796	
v/s Ratio Prot								c0.22				
v/s Ratio Perm		0.22	0.38								0.13	
v/c Ratio		0.64	0.38					0.44			0.25	
Uniform Delay, d1		16.6	0.0					9.3			8.3	
Progression Factor		0.91	1.00					0.78			1.00	
Incremental Delay, d2		0.4	0.5					1.5			0.8	
Delay (s)		15.6	0.5					8.8			9.1	
Level of Service		B	A					A			A	
Approach Delay (s)		11.2			0.0			8.8			9.1	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	43	651	59	213	301	0	0	235	1102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.99	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frft				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1792	1445	1767	1863			1582	1477
Flt Permitted				0.95	1.00	1.00	0.22	1.00			1.00	1.00
Satd. Flow (perm)				1730	1792	1445	403	1863			1582	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	47	708	64	232	327	0	0	255	1198
RTOR Reduction (vph)	0	0	0	0	0	49	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	47	708	15	232	327	0	0	739	707
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	6%	5%	2%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	433	349	232	1071			910	1477
v/s Ratio Prot					c0.39			0.18			0.47	
v/s Ratio Perm				0.03		0.01	c0.58					0.48
v/c Ratio				0.11	1.64	0.04	1.00	0.31			0.81	0.48
Uniform Delay, d1				17.7	22.8	17.4	12.8	6.6			10.2	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.76	1.00
Incremental Delay, d2				0.5	296.1	0.2	59.1	0.7			7.5	1.1
Delay (s)				18.3	318.9	17.7	71.8	7.3			15.2	1.1
Level of Service				B	F	B	E	A			B	A
Approach Delay (s)		0.0			278.1			34.1			8.3	
Approach LOS		A			F			C			A	

Intersection Summary

HCM Average Control Delay	91.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘		↗	↕		↗	↕			↕	
Volume (vph)	3	102	29	553	157	25	38	163	784	3	328	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.88			0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1828		1703	3526		1805	2490			3521	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.79	
Satd. Flow (perm)	1805	1828		1703	3526		1805	2490			2773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	111	32	601	171	27	41	177	852	3	357	36
RTOR Reduction (vph)	0	10	0	0	10	0	0	598	0	0	7	0
Lane Group Flow (vph)	3	133	0	601	188	0	41	431	0	0	389	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	0%	0%	6%	0%	0%	0%	0%	30%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	1.1	17.2		29.5	45.6		2.2	21.9			15.7	
Effective Green, g (s)	1.1	17.2		29.5	45.6		2.2	21.9			15.7	
Actuated g/C Ratio	0.01	0.21		0.37	0.57		0.03	0.27			0.19	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	25	390		623	1995		49	677			540	
v/s Ratio Prot	0.00	c0.07		c0.35	0.05		0.02	c0.17				
v/s Ratio Perm												0.14
v/c Ratio	0.12	0.34		0.96	0.09		0.84	0.92dr			0.72	
Uniform Delay, d1	39.3	26.9		25.0	8.0		39.0	25.8			30.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.1	0.5		27.2	0.0		70.1	2.0			4.6	
Delay (s)	41.4	27.4		52.3	8.0		109.1	27.8			35.0	
Level of Service	D	C		D	A		F	C			C	
Approach Delay (s)		27.7			41.3			30.9			35.0	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	34.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↗↘		↗	↗↘	
Volume (vph)	22	598	170	131	452	30	76	45	84	73	161	175
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.90		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	2041		1805	3570		1805	1691		1643	2340	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	2041		1805	3570		1805	1691		1643	2340	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	650	185	142	491	33	83	49	91	79	175	190
RTOR Reduction (vph)	0	19	0	0	3	0	0	79	0	0	159	0
Lane Group Flow (vph)	24	816	0	142	521	0	83	61	0	71	214	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	86%	14%	0%	0%	0%	0%	82%	94%	0%	74%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	2.8	33.2		12.2	43.1		11.9	11.9		14.2	14.2	
Effective Green, g (s)	2.8	33.2		12.2	43.1		11.9	11.9		14.2	14.2	
Actuated g/C Ratio	0.03	0.38		0.14	0.49		0.14	0.14		0.16	0.16	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	58	774		252	1758		245	230		267	380	
v/s Ratio Prot	0.01	c0.40		c0.08	0.15		c0.05	0.04		0.04	c0.09	
v/s Ratio Perm												
v/c Ratio	0.41	1.05		0.56	0.30		0.34	0.27		0.27	0.56	
Uniform Delay, d1	41.5	27.1		35.2	13.2		34.2	33.9		32.1	33.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	47.8		2.9	0.1		1.1	0.9		0.7	2.3	
Delay (s)	46.3	74.9		38.0	13.3		35.4	34.7		32.8	36.1	
Level of Service	D	E		D	B		D	C		C	D	
Approach Delay (s)		74.1			18.6			35.0			35.6	
Approach LOS		E			B			C			D	

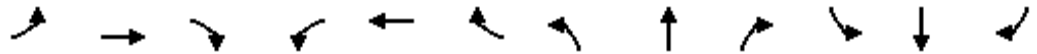
Intersection Summary

HCM Average Control Delay	45.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	87.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	101	222	200	36	370	0	0	455	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3546	1583	1797	1173			3034	1581
Flt Permitted					0.98	1.00	0.47	1.00			1.00	1.00
Satd. Flow (perm)					3546	1583	891	1173			3034	1581
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	110	241	217	39	402	0	0	495	286
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	97
Lane Group Flow (vph)	0	0	0	0	351	46	39	402	0	0	495	189
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	66%	86%	0%	0%	0%	0%	62%	86%	1%	19%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					15.9	15.9	49.6	49.6			49.6	49.6
Effective Green, g (s)					15.9	15.9	49.6	49.6			49.6	49.6
Actuated g/C Ratio					0.21	0.21	0.66	0.66			0.66	0.66
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					752	336	589	776			2006	1046
v/s Ratio Prot								c0.34			0.16	
v/s Ratio Perm					0.10	0.03	0.04					0.12
v/c Ratio					0.47	0.14	0.07	0.52			0.25	0.18
Uniform Delay, d1					25.8	24.0	4.5	6.5			5.1	4.9
Progression Factor					1.00	1.00	1.00	1.00			0.75	0.51
Incremental Delay, d2					0.5	0.2	0.2	2.5			0.3	0.4
Delay (s)					26.3	24.2	4.7	9.0			4.1	2.9
Level of Service					C	C	A	A			A	A
Approach Delay (s)		0.0			25.5			8.6			3.7	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	11.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	1018	179	149	252	361	0	368	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.91			1.00	1.00
Flt Protected	0.95	0.96	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2910	1568	4512			1770	1863
Flt Permitted	0.95	0.96	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2910	1568	4512			1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1107	195	162	274	392	0	400	511
RTOR Reduction (vph)	0	0	57	0	0	0	0	0
Lane Group Flow (vph)	553	749	105	666	0	0	400	511
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	56%	3%	2%	1%	0%	2%	2%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	22.5	22.5	22.5	21.5			17.5	42.5
Effective Green, g (s)	22.5	22.5	22.5	21.5			17.5	42.5
Actuated g/C Ratio	0.30	0.30	0.30	0.29			0.23	0.57
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	493	873	470	1293			413	1056
v/s Ratio Prot				c0.15			c0.23	0.27
v/s Ratio Perm	c0.34	0.26	0.07					
v/c Ratio	1.12	1.08dl	0.22	0.87dr			0.97	0.48
Uniform Delay, d1	26.2	24.7	19.7	22.4			28.5	9.7
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	78.3	8.1	0.1	1.5			35.5	0.1
Delay (s)	104.6	32.8	19.8	23.9			64.0	9.8
Level of Service	F	C	B	C			E	A
Approach Delay (s)		58.5		23.9				33.6
Approach LOS		E		C				C

Intersection Summary

HCM Average Control Delay	43.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.





















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	56	28	82	89	52	20	161	39	91	128	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	61	30	89	97	57	22	175	42	99	139	35
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	88	30	186	57	109	130	168	104				
Volume Left (vph)	27	0	89	0	22	0	99	0				
Volume Right (vph)	0	30	0	57	0	42	0	35				
Hadj (s)	0.15	-0.70	1.05	-0.55	1.33	1.36	0.85	0.66				
Departure Headway (s)	6.7	5.8	7.3	5.7	7.4	7.4	6.9	6.7				
Degree Utilization, x	0.16	0.05	0.38	0.09	0.22	0.27	0.32	0.19				
Capacity (veh/h)	505	575	471	594	469	467	502	515				
Control Delay (s)	9.7	7.9	13.5	8.1	11.3	11.9	11.9	10.1				
Approach Delay (s)	9.3		12.2		11.6		11.2					
Approach LOS	A		B		B		B					
Intersection Summary												
Delay			11.4									
HCM Level of Service			B									
Intersection Capacity Utilization			41.5%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗		↗	↕↗	
Volume (veh/h)	18	100	42	17	257	9	37	5	9	12	57	107
Sign Control		Free				Free			Stop		Stop	
Grade		0%				0%			0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	109	46	18	279	10	40	5	10	13	62	116
Pedestrians		5				5			5		5	
Lane Width (ft)		12.0				12.0			12.0		12.0	
Walking Speed (ft/s)		4.0				4.0			4.0		4.0	
Percent Blockage		0				0			0		0	
Right turn flare (veh)												
Median type		None				None						
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	294			159			621	484	119	487	520	289
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	294			159			621	484	119	487	520	289
tC, single (s)	4.1			4.7			8.0	7.3	7.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			4.3	4.8	4.2	3.5	4.8	3.3
p0 queue free %	98			98			81	99	99	97	82	84
cM capacity (veh/h)	1274			1132			209	366	718	464	347	746

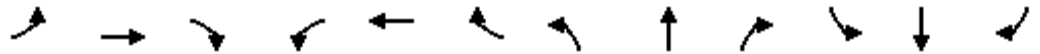
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	128	46	298	10	55	13	41	137
Volume Left	20	0	18	0	40	13	0	0
Volume Right	0	46	0	10	10	0	0	116
cSH	1274	1700	1132	1700	251	464	347	636
Volume to Capacity	0.02	0.03	0.02	0.01	0.22	0.03	0.12	0.22
Queue Length 95th (ft)	1	0	1	0	21	2	10	20
Control Delay (s)	1.3	0.0	0.7	0.0	23.4	13.0	16.8	12.2
Lane LOS	A		A		C	B	C	B
Approach Delay (s)	1.0		0.6		23.4	13.2		
Approach LOS					C	B		

Intersection Summary		
Average Delay		5.8
Intersection Capacity Utilization	42.6%	ICU Level of Service
Analysis Period (min)		15
		A

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	182	13	21	102	0	0	0	0	20	199	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		3610	1550		3566						3367	
Flt Permitted		1.00	1.00		0.91						1.00	
Satd. Flow (perm)		3610	1550		3258						3367	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	198	14	23	111	0	0	0	0	22	216	23
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	198	10	0	134	0	0	0	0	0	246	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	6%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.1	54.1		54.1						13.9	
Effective Green, g (s)		54.1	54.1		54.1						13.9	
Actuated g/C Ratio		0.71	0.71		0.71						0.18	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2553	1096		2304						612	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.07	
v/c Ratio		0.08	0.01		0.06						0.40	
Uniform Delay, d1		3.5	3.3		3.4						27.6	
Progression Factor		1.00	1.00		0.30						1.00	
Incremental Delay, d2		0.1	0.0		0.0						0.4	
Delay (s)		3.5	3.3		1.1						28.1	
Level of Service		A	A		A						C	
Approach Delay (s)		3.5			1.1			0.0			28.1	
Approach LOS		A			A			A			C	

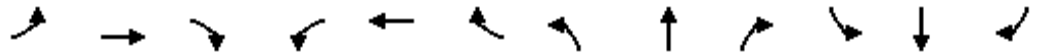
Intersection Summary

HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↑↑	↗		↔↔				
Volume (vph)	23	159	0	0	123	30	7	152	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		3506			3539	1520		3390				
Flt Permitted		0.92			1.00	1.00		1.00				
Satd. Flow (perm)		3250			3539	1520		3390				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	173	0	0	134	33	8	165	64	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	10	0	52	0	0	0	0
Lane Group Flow (vph)	0	198	0	0	134	23	0	185	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.1			54.1	54.1		13.9				
Effective Green, g (s)		54.1			54.1	54.1		13.9				
Actuated g/C Ratio		0.71			0.71	0.71		0.18				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2298			2503	1075		616				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.06				0.02		0.05				
v/c Ratio		0.09			0.05	0.02		0.30				
Uniform Delay, d1		3.5			3.4	3.3		27.1				
Progression Factor		0.43			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.3				
Delay (s)		1.6			3.4	3.4		27.4				
Level of Service		A			A	A		C				
Approach Delay (s)		1.6			3.4			27.4			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↘	↘↘	↑	↑↑↑	↘	↗	↘	↗
Volume (vph)	68	315	0	560	132	0	1889	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frpb, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1584	3127		5085	1289		1681	1692
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1584	3127		5085	1289		1681	1692
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	342	0	609	143	0	2053	88
RTOR Reduction (vph)	3	0	0	0	0	0	0	0
Lane Group Flow (vph)	71	342	0	609	143	0	1068	1073
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	12%	12%	5%	2%	21%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	17.8	17.8		19.2	19.2		64.0	64.0
Effective Green, g (s)	17.8	17.8		19.2	19.2		64.0	64.0
Actuated g/C Ratio	0.15	0.15		0.17	0.17		0.56	0.56
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	245	484		849	215		936	942
v/s Ratio Prot				c0.12			c0.64	0.63
v/s Ratio Perm	0.04	c0.11			0.11			
v/c Ratio	0.29	0.71		0.72	0.67		1.14	1.14
Uniform Delay, d1	43.0	46.1		45.3	44.9		25.5	25.5
Progression Factor	0.66	0.71		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	4.4		2.9	7.5		76.4	75.5
Delay (s)	29.1	37.2		48.2	52.4		101.9	101.0
Level of Service	C	D		D	D		F	F
Approach Delay (s)			35.7	49.0				101.5
Approach LOS			D	D				F

Intersection Summary

HCM Average Control Delay	81.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑	↑	↑	↑↑↑
Volume (vph)	426	535	37	1071	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.95	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3132	1470	1537	1509	4526
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3132	1470	1537	1509	4526
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	463	582	40	1164	0
RTOR Reduction (vph)	0	0	21	0	0
Lane Group Flow (vph)	719	326	15	586	582
Heavy Vehicles (%)	7%	0%	1%	2%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	64.0	64.0	41.5	41.5	41.5
Effective Green, g (s)	64.0	64.0	41.5	41.5	41.5
Actuated g/C Ratio	0.56	0.56	0.36	0.36	0.36
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1743	818	555	545	1633
v/s Ratio Prot	c0.23		0.01	c0.39	0.13
v/s Ratio Perm		0.22			
v/c Ratio	0.41	0.40	0.03	1.08	0.95dl
Uniform Delay, d1	14.7	14.5	23.7	36.8	27.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	1.5	0.0	60.3	0.1
Delay (s)	15.4	16.0	23.7	97.1	27.1
Level of Service	B	B	C	F	C
Approach Delay (s)	15.6				61.1
Approach LOS	B				E

Intersection Summary

HCM Average Control Delay	39.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	620	37	7	275	0	0	0	0	546	867	499
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5130			5179					1787	3539	1565
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5130			4729					1787	3539	1565
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	674	40	8	299	0	0	0	0	593	942	542
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	54
Lane Group Flow (vph)	0	706	0	0	307	0	0	0	0	593	942	488
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		16.0			16.0					52.0	52.0	52.0
Effective Green, g (s)		16.0			16.0					52.0	52.0	52.0
Actuated g/C Ratio		0.20			0.20					0.65	0.65	0.65
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1026			946					1162	2300	1017
v/s Ratio Prot		c0.14									0.27	
v/s Ratio Perm					0.06					c0.33		0.31
v/c Ratio		0.69			0.32					0.51	0.41	0.48
Uniform Delay, d1		29.7			27.4					7.3	6.7	7.1
Progression Factor		1.00			1.11					1.00	1.00	1.00
Incremental Delay, d2		3.8			0.8					1.6	0.5	1.6
Delay (s)		33.5			31.0					8.9	7.2	8.7
Level of Service		C			C					A	A	A
Approach Delay (s)		33.5			31.0			0.0			8.1	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	430	844	0	0	262	488	6	434	24	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.96		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.93	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4829			4431	1316		5032				
Flt Permitted	0.95	0.71			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3445			4431	1316		5032				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	467	917	0	0	285	530	7	472	26	0	0	0
RTOR Reduction (vph)	0	0	0	0	133	133	0	7	0	0	0	0
Lane Group Flow (vph)	336	1048	0	0	417	132	0	498	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	2%	4%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	18.0	36.5			15.0	15.0		32.5				
Effective Green, g (s)	18.0	36.5			15.0	15.0		32.5				
Actuated g/C Ratio	0.22	0.46			0.19	0.19		0.41				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	349	1883			831	247		2044				
v/s Ratio Prot	c0.22	0.13			0.09							
v/s Ratio Perm		c0.13				0.10		0.10				
v/c Ratio	0.96	0.56			0.50	0.53		0.24				
Uniform Delay, d1	30.7	15.9			29.1	29.3		15.7				
Progression Factor	0.84	0.73			1.00	1.00		1.00				
Incremental Delay, d2	35.7	1.0			2.2	8.0		0.3				
Delay (s)	61.4	12.6			31.3	37.4		15.9				
Level of Service	E	B			C	D		B				
Approach Delay (s)		24.4			33.3			15.9			0.0	
Approach LOS		C			C			B			A	

Intersection Summary

HCM Average Control Delay	25.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012



Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑			↑↑			↑↑	
Volume (vph)	0	379	1022	0	1658	106	57	3	95	12	186	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.89			0.99			0.91			0.97	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		3107			3501			3187			3363	
Flt Permitted		1.00			1.00			0.98			1.00	
Satd. Flow (perm)		3107			3501			3187			3363	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	412	1111	0	1802	115	62	3	103	13	202	43
RTOR Reduction (vph)	0	531	0	0	7	0	0	93	0	0	26	0
Lane Group Flow (vph)	0	992	0	0	1910	0	0	75	0	0	232	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	2%	1%	4%	2%	0%	1%	1%	1%	0%	4%	2%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1577			1777			294			724	
v/s Ratio Prot		0.32			c0.55			c0.02			c0.07	
v/s Ratio Perm												
v/c Ratio		0.63			1.07			0.25			0.32	
Uniform Delay, d1		11.6			16.0			27.4			21.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.9			44.7			2.1			1.2	
Delay (s)		13.5			60.7			29.5			22.7	
Level of Service		B			E			C			C	
Approach Delay (s)		13.5			60.7			29.5			22.7	
Approach LOS		B			E			C			C	

Intersection Summary

HCM Average Control Delay	38.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	37	429	34	74	288	42	89	211	93	275	566	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5105	1525	1764	3520		1805	1881	1555	1787	1845	1570
Flt Permitted		0.89	1.00	0.46	1.00		0.17	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)		4552	1525	846	3520		317	1881	1555	970	1845	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	466	37	80	313	46	97	229	101	299	615	73
RTOR Reduction (vph)	0	0	15	0	14	0	0	0	56	0	0	17
Lane Group Flow (vph)	0	506	22	80	345	0	97	229	45	299	615	56
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	1%	1%	1%	0%	0%	0%	1%	1%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.60	0.60	0.60	0.60		0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2731	915	508	2112		90	531	439	274	521	443
v/s Ratio Prot					0.10			0.12			c0.33	
v/s Ratio Perm		c0.11	0.01	0.09			0.31		0.03	0.31		0.04
v/c Ratio		0.19	0.02	0.16	0.16		1.08	0.43	0.10	1.09	1.18	0.13
Uniform Delay, d1		7.7	6.9	7.5	7.5		30.5	24.9	22.5	30.5	30.5	22.7
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	0.0	0.7	0.2		117.5	2.5	0.5	80.9	99.6	0.6
Delay (s)		7.8	6.9	8.2	7.7		148.0	27.5	23.0	111.4	130.1	23.3
Level of Service		A	A	A	A		F	C	C	F	F	C
Approach Delay (s)		7.7			7.8			53.8			116.5	
Approach LOS		A			A			D			F	

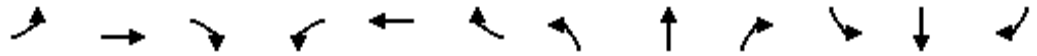
Intersection Summary

HCM Average Control Delay	60.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	260	345	0	910	593	0	0	0	685	0	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.96			1.00	0.98				1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.98	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1805	3144			3332	1388				3433		1560
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1805	3144			3332	1388				3433		1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	283	375	0	989	645	0	0	0	745	0	313
RTOR Reduction (vph)	0	173	0	0	15	0	0	0	0	0	0	134
Lane Group Flow (vph)	95	485	0	0	1122	497	0	0	0	745	0	179
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	0%	0%	2%	0%	1%	4%	0%	0%	0%	2%	6%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	3.7	32.0			24.3	59.5				19.5		19.5
Effective Green, g (s)	3.7	32.0			24.3	59.5				19.5		19.5
Actuated g/C Ratio	0.06	0.54			0.41	1.00				0.33		0.33
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	112	1691			1361	1388				1125		511
v/s Ratio Prot	c0.05	0.15			c0.34					c0.22		
v/s Ratio Perm						0.36						0.11
v/c Ratio	0.85	0.29			0.82	0.36				0.66		0.35
Uniform Delay, d1	27.6	7.5			15.7	0.0				17.2		15.2
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	41.5	0.1			4.2	0.7				1.5		0.4
Delay (s)	69.2	7.6			19.9	0.7				18.7		15.6
Level of Service	E	A			B	A				B		B
Approach Delay (s)		15.4			14.1			0.0			17.7	
Approach LOS		B			B			A			B	

Intersection Summary		
HCM Average Control Delay	15.5	HCM Level of Service B
HCM Volume to Capacity ratio	0.76	
Actuated Cycle Length (s)	59.5	Sum of lost time (s) 12.0
Intersection Capacity Utilization	66.2%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	69	623	0	0	748	246	456	1	942	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.86	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5136	1552	1649	1442	1490			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5136	1552	1649	1442	1490			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	677	0	0	813	267	496	1	1024	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	186	0	88	88	0	0	0
Lane Group Flow (vph)	75	677	0	0	813	81	446	455	444	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	4%	12%	3%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	2.6	22.6			16.0	16.0	22.2	22.2	22.2			
Effective Green, g (s)	2.6	22.6			16.0	16.0	22.2	22.2	22.2			
Actuated g/C Ratio	0.05	0.43			0.30	0.30	0.42	0.42	0.42			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	88	2198			1556	470	693	606	626			
v/s Ratio Prot	c0.04	0.13			c0.16		0.27	c0.32	0.30			
v/s Ratio Perm						0.05						
v/c Ratio	0.85	0.31			0.52	0.17	0.64	0.75	0.71			
Uniform Delay, d1	24.9	9.9			15.2	13.5	12.2	13.0	12.6			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	50.8	0.1			0.3	0.2	2.1	5.2	3.8			
Delay (s)	75.7	10.0			15.6	13.7	14.2	18.2	16.4			
Level of Service	E	B			B	B	B	B	B			
Approach Delay (s)		16.6			15.1			16.4			0.0	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	16.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	335	864	416	112	656	81	316	30	113	72	40	272
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3433	3332	1403	1770	3574	1599	1698	1719	1599		1829	2742
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3433	3332	1403	1770	3574	1599	1698	1719	1599		1829	2742
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	364	939	452	122	713	88	343	33	123	78	43	296
RTOR Reduction (vph)	0	4	245	0	0	48	0	0	110	0	0	242
Lane Group Flow (vph)	364	980	162	122	713	40	189	187	13	0	121	54
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	2%	3%	2%	2%	1%	1%	1%	0%	1%	1%	0%	1%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	12.9	26.8	26.8	5.1	19.0	19.0	7.1	7.1	7.1		12.3	12.3
Effective Green, g (s)	12.9	26.8	26.8	5.1	19.0	19.0	7.1	7.1	7.1		12.3	12.3
Actuated g/C Ratio	0.19	0.40	0.40	0.08	0.28	0.28	0.11	0.11	0.11		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	658	1327	559	134	1009	451	179	181	169		334	501
v/s Ratio Prot	0.11	c0.29		c0.07	0.20	0.02	c0.11	0.11	0.01		c0.07	
v/s Ratio Perm			0.12									0.02
v/c Ratio	0.55	0.74	0.29	0.91	0.71	0.09	1.06	1.03	0.08		0.36	0.11
Uniform Delay, d1	24.6	17.3	13.8	30.9	21.7	17.8	30.1	30.1	27.1		24.1	22.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	2.2	0.3	51.4	2.3	0.1	82.8	75.9	0.2		0.7	0.1
Delay (s)	25.6	19.5	14.1	82.3	23.9	17.9	112.9	106.0	27.3		24.7	23.0
Level of Service	C	B	B	F	C	B	F	F	C		C	C
Approach Delay (s)		19.5			31.1			89.2			23.5	
Approach LOS		B			C			F			C	

Intersection Summary

HCM Average Control Delay	32.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	67.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



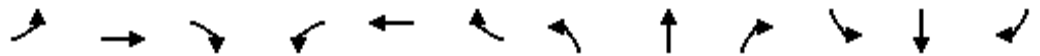
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	167	482	202	127	426	31	287	133	55	37	383	83
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3293		1770	3525		1787	1783		1770	1845	1547
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.63	1.00	1.00
Satd. Flow (perm)	1770	3293		1770	3525		1787	1783		1172	1845	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	182	524	220	138	463	34	312	145	60	40	416	90
RTOR Reduction (vph)	0	68	0	0	8	0	0	20	0	0	0	49
Lane Group Flow (vph)	182	676	0	138	489	0	312	185	0	40	416	41
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	3%	3%	2%	1%	1%	1%	1%	1%	2%	3%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	7.1	18.0		7.1	18.0		6.1	23.6		20.8	20.8	27.9
Effective Green, g (s)	7.1	18.0		7.1	18.0		6.1	23.6		20.8	20.8	27.9
Actuated g/C Ratio	0.10	0.26		0.10	0.26		0.09	0.35		0.31	0.31	0.41
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	185	872		185	933		160	619		388	564	726
v/s Ratio Prot	c0.10	c0.21		0.08	0.14		c0.17	0.10		0.01	c0.23	0.01
v/s Ratio Perm										0.03		0.02
v/c Ratio	0.98	0.78		0.75	0.52		1.95	0.30		0.10	0.74	0.06
Uniform Delay, d1	30.4	23.1		29.6	21.3		30.9	16.2		17.0	21.2	12.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	61.0	4.4		15.0	0.5		449.5	0.3		0.1	5.0	0.0
Delay (s)	91.4	27.5		44.6	21.9		480.4	16.4		17.1	26.2	12.1
Level of Service	F	C		D	C		F	B		B	C	B
Approach Delay (s)		40.1			26.8			296.4			23.2	
Approach LOS		D			C			F			C	

Intersection Summary

HCM Average Control Delay	83.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	197	192	154	733	29	250	880	69	91	1783	70
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3239		1805	3574	1577	1787	3539	1578	1787	3471	1547
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3239		1805	3574	1577	1787	3539	1578	1787	3471	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	214	209	167	797	32	272	957	75	99	1938	76
RTOR Reduction (vph)	0	163	0	0	0	7	0	0	14	0	0	8
Lane Group Flow (vph)	67	260	0	167	797	25	272	957	61	99	1938	68
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	2%	2%	0%	1%	0%	1%	2%	0%	1%	4%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	5.2	22.1		11.2	28.1	28.1	17.6	42.7	42.7	9.0	34.1	34.1
Effective Green, g (s)	5.2	22.1		11.2	28.1	28.1	17.6	42.7	42.7	9.0	34.1	34.1
Actuated g/C Ratio	0.05	0.22		0.11	0.28	0.28	0.18	0.43	0.43	0.09	0.34	0.34
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	92	716		202	1004	443	315	1511	674	161	1184	528
v/s Ratio Prot	0.04	0.08		c0.09	c0.22		c0.15	0.27		0.06	c0.56	
v/s Ratio Perm						0.02			0.04			0.04
v/c Ratio	0.73	0.36		0.83	0.79	0.06	0.86	0.63	0.09	0.61	1.64	0.13
Uniform Delay, d1	46.7	33.0		43.5	33.3	26.3	40.0	22.5	17.1	43.8	33.0	22.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.8	0.3		23.3	4.4	0.1	20.9	2.0	0.3	6.8	290.4	0.5
Delay (s)	71.5	33.3		66.8	37.7	26.3	61.0	24.5	17.3	50.6	323.4	23.2
Level of Service	E	C		E	D	C	E	C	B	D	F	C
Approach Delay (s)		38.5			42.2			31.7			299.8	
Approach LOS		D			D			C			F	

Intersection Summary		
HCM Average Control Delay	150.1	HCM Level of Service F
HCM Volume to Capacity ratio	1.12	
Actuated Cycle Length (s)	100.0	Sum of lost time (s) 10.5
Intersection Capacity Utilization	101.4%	ICU Level of Service G
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	249	66	64	366	16	230	385	13	46	1111	13
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3445		1805	3550		1787	3556		1736	3533	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3445		1805	3550		1787	3556		1736	3533	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	271	72	70	398	17	250	418	14	50	1208	14
RTOR Reduction (vph)	0	25	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	59	318	0	70	412	0	250	431	0	50	1221	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	1%	1%	0%	1%	0%	1%	1%	0%	4%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	7.0	16.1		7.5	16.6		14.2	49.2		5.3	40.3	
Effective Green, g (s)	7.0	16.1		7.5	16.6		14.2	49.2		5.3	40.3	
Actuated g/C Ratio	0.08	0.17		0.08	0.18		0.15	0.53		0.06	0.44	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	135	602		147	640		276	1900		100	1546	
v/s Ratio Prot	0.03	0.09		c0.04	c0.12		c0.14	0.12		0.03	c0.35	
v/s Ratio Perm												
v/c Ratio	0.44	0.53		0.48	0.64		0.91	0.23		0.50	0.79	
Uniform Delay, d1	40.7	34.6		40.4	35.0		38.3	11.4		42.1	22.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	0.8		2.4	2.2		30.6	0.1		3.9	2.8	
Delay (s)	42.9	35.4		42.8	37.2		68.9	11.4		46.0	25.1	
Level of Service	D	D		D	D		E	B		D	C	
Approach Delay (s)		36.5			38.0			32.5			25.9	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	31.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔↔	↔		↔↔↔	↔↔↔	
Volume (vph)	245	263	243	1721	1244	372
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	3467	1518		5155	4876	
Flt Permitted	0.95	1.00		0.64	1.00	
Satd. Flow (perm)	3467	1518		3316	4876	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	286	264	1871	1352	404
RTOR Reduction (vph)	0	36	0	0	60	0
Lane Group Flow (vph)	266	250	0	2135	1696	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	3%	0%	0%	2%	2%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	27.0	27.0		55.0	55.0	
Effective Green, g (s)	27.0	27.0		55.0	55.0	
Actuated g/C Ratio	0.30	0.30		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1040	455		2026	2980	
v/s Ratio Prot	0.08				0.35	
v/s Ratio Perm		c0.16		c0.64		
v/c Ratio	0.26	0.55		2.56dl	0.57	
Uniform Delay, d1	23.9	26.4		17.5	10.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	4.7		35.9	0.8	
Delay (s)	24.5	31.1		53.4	11.2	
Level of Service	C	C		D	B	
Approach Delay (s)	27.9			53.4	11.2	
Approach LOS	C			D	B	

Intersection Summary

HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	103.5%	ICU Level of Service	G
Analysis Period (min)	15		

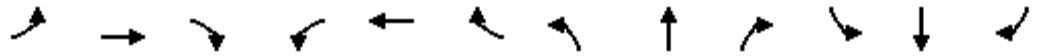
dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
Volume (vph)	458	834	374	97	617	41	76	149	73	66	411	186
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.99		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3319		1752	3503		1752	3334		1787	1845	1553
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1752	3319		1752	3503		1752	3334		1787	1845	1553
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	498	907	407	105	671	45	83	162	79	72	447	202
RTOR Reduction (vph)	0	56	0	0	6	0	0	60	0	0	0	155
Lane Group Flow (vph)	498	1258	0	105	710	0	83	181	0	72	447	47
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	3%	2%	2%	3%	2%	0%	3%	2%	1%	1%	3%	4%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	23.0	40.2		7.6	24.8		5.0	22.0		3.9	20.9	20.9
Effective Green, g (s)	23.0	40.2		7.6	24.8		5.0	22.0		3.9	20.9	20.9
Actuated g/C Ratio	0.26	0.45		0.08	0.28		0.06	0.25		0.04	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	449	1487		148	968		98	818		78	430	362
v/s Ratio Prot	c0.28	c0.38		0.06	0.20		c0.05	0.05		0.04	c0.24	
v/s Ratio Perm												0.03
v/c Ratio	1.11	0.85		0.71	0.73		0.85	0.22		0.92	1.04	0.13
Uniform Delay, d1	33.4	22.0		40.0	29.5		42.0	27.0		42.8	34.4	27.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	75.6	4.6		14.4	2.9		45.5	0.1		75.7	54.0	0.2
Delay (s)	108.9	26.6		54.4	32.4		87.5	27.2		118.5	88.4	27.4
Level of Service	F	C		D	C		F	C		F	F	C
Approach Delay (s)		49.3			35.2			42.6			74.3	
Approach LOS		D			D			D			E	

Intersection Summary

HCM Average Control Delay	50.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘			↖↗		↗	↗↘	↗	↗	↗↘	↗
Volume (vph)	125	648	294	165	689	91	172	717	37	137	1355	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95			0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1763	3338			3255		1805	3539	1529	1787	3471	1494
Flt Permitted	0.21	1.00			0.57		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	395	3338			1859		1805	3539	1529	1787	3471	1494
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	704	320	179	749	99	187	779	40	149	1473	146
RTOR Reduction (vph)	0	60	0	0	9	0	0	0	12	0	0	22
Lane Group Flow (vph)	136	964	0	0	1018	0	187	779	28	149	1473	124
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	2%	2%	2%	0%	1%	0%	0%	2%	1%	1%	4%	4%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	50.2	50.2			50.2		5.0	18.1	18.1	7.0	20.1	20.1
Effective Green, g (s)	50.2	50.2			50.2		5.0	18.1	18.1	7.0	20.1	20.1
Actuated g/C Ratio	0.58	0.58			0.58		0.06	0.21	0.21	0.08	0.23	0.23
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	227	1919			1069		103	734	317	143	799	344
v/s Ratio Prot		0.29					c0.10	0.22		0.08	c0.42	
v/s Ratio Perm	0.34				c0.55				0.02			0.08
v/c Ratio	0.60	0.50			0.95		1.82	1.06	0.09	1.04	1.84	0.36
Uniform Delay, d1	12.0	11.1			17.4		41.1	34.6	27.9	40.1	33.6	28.2
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2	0.2			17.1		402.5	50.7	0.1	86.8	384.5	0.6
Delay (s)	16.2	11.3			34.5		443.6	85.3	28.1	127.0	418.1	28.8
Level of Service	B	B			C		F	F	C	F	F	C
Approach Delay (s)		11.9			34.5			149.6			361.4	
Approach LOS		B			C			F			F	

Intersection Summary

HCM Average Control Delay	169.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	254	290	957	200	766	1027
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3476		3433	3574
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3476		3433	3574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	315	1040	217	833	1116
RTOR Reduction (vph)	0	287	21	0	0	0
Lane Group Flow (vph)	276	28	1236	0	833	1116
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	2%	1%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	6.0	6.0	28.8		21.8	47.6
Effective Green, g (s)	6.0	6.0	28.8		21.8	47.6
Actuated g/C Ratio	0.09	0.09	0.42		0.32	0.69
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	158	244	1459		1091	2480
v/s Ratio Prot	c0.15	0.01	c0.36		c0.24	0.31
v/s Ratio Perm						
v/c Ratio	1.75	0.11	0.85		0.76	0.45
Uniform Delay, d1	31.3	28.8	17.9		21.1	4.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	360.9	0.2	4.7		3.2	0.1
Delay (s)	392.2	29.1	22.7		24.3	4.8
Level of Service	F	C	C		C	A
Approach Delay (s)	198.6		22.7			13.1
Approach LOS	F		C			B

Intersection Summary

HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	379	162	96	24	237	48	139	897	48	60	438	374
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	1571	1787	3469		1805	3543		1770	3574	1558
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	1571	1787	3469		1805	3543		1770	3574	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	412	176	104	26	258	52	151	975	52	65	476	407
RTOR Reduction (vph)	0	0	74	0	23	0	0	4	0	0	0	264
Lane Group Flow (vph)	412	176	30	26	287	0	151	1023	0	65	476	143
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	1%	0%	1%	1%	1%	0%	1%	0%	2%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	7.3	19.9	19.9	3.1	15.7		5.2	26.0		3.2	24.0	24.0
Effective Green, g (s)	7.3	19.9	19.9	3.1	15.7		5.2	26.0		3.2	24.0	24.0
Actuated g/C Ratio	0.11	0.29	0.29	0.05	0.23		0.08	0.38		0.05	0.35	0.35
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	375	1043	458	81	799		138	1351		83	1258	548
v/s Ratio Prot	c0.12	0.05		0.01	c0.08		c0.08	c0.29		c0.04	0.13	
v/s Ratio Perm			0.02									0.09
v/c Ratio	1.10	0.17	0.07	0.32	0.36		1.09	0.76		0.78	0.38	0.26
Uniform Delay, d1	30.5	18.0	17.4	31.5	22.0		31.5	18.4		32.2	16.5	15.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	75.7	0.1	0.1	2.3	0.3		104.1	2.5		37.0	0.2	0.3
Delay (s)	106.2	18.1	17.5	33.8	22.3		135.6	20.8		69.2	16.7	16.0
Level of Service	F	B	B	C	C		F	C		E	B	B
Approach Delay (s)		70.4			23.2			35.5			20.0	
Approach LOS		E			C			D			C	

Intersection Summary

HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	113	23	30	128	360	96	769	73	249	712	126
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3442		1805	3148		3467	3610	1579	3502	3574	1561
Flt Permitted	0.35	1.00		0.66	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	665	3442		1250	3148		3467	3610	1579	3502	3574	1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	123	25	33	139	391	104	836	79	271	774	137
RTOR Reduction (vph)	0	19	0	0	167	0	0	0	38	0	0	57
Lane Group Flow (vph)	83	129	0	33	363	0	104	836	41	271	774	80
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	2%	1%	0%	1%	0%	1%	0%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	13.2	13.2		13.2	13.2		3.9	19.4	19.4	6.5	22.0	22.0
Effective Green, g (s)	13.2	13.2		13.2	13.2		3.9	19.4	19.4	6.5	22.0	22.0
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.08	0.38	0.38	0.13	0.43	0.43
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	889		323	813		265	1371	599	445	1539	672
v/s Ratio Prot		0.04			0.12		0.03	c0.23		0.08	c0.22	
v/s Ratio Perm	c0.12			0.03					0.03			0.05
v/c Ratio	0.48	0.15		0.10	0.45		0.39	0.61	0.07	0.61	0.50	0.12
Uniform Delay, d1	16.1	14.6		14.4	15.9		22.5	12.8	10.1	21.1	10.6	8.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	0.1		0.1	0.4		1.0	0.8	0.0	2.4	0.3	0.1
Delay (s)	18.2	14.7		14.6	16.3		23.4	13.6	10.1	23.5	10.8	8.8
Level of Service	B	B		B	B		C	B	B	C	B	A
Approach Delay (s)		15.9			16.2			14.3			13.5	
Approach LOS		B			B			B			B	

Intersection Summary

HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	745	133	85	1207	30	359	22	253	54	10	46
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1687	3539	984	1456	3553		1603	1517	1031	1752	1640	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1687	3539	984	1456	3553		1603	1517	1031	1752	1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	810	145	92	1312	33	390	24	275	59	11	50
RTOR Reduction (vph)	0	0	85	0	1	0	0	0	214	0	46	0
Lane Group Flow (vph)	13	810	60	92	1344	0	207	207	61	59	15	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	7%	2%	61%	24%	1%	7%	7%	67%	53%	3%	0%	2%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	1.2	38.5	38.5	9.6	46.9		20.6	20.6	20.6	7.1	7.1	
Effective Green, g (s)	1.2	38.5	38.5	9.6	46.9		20.6	20.6	20.6	7.1	7.1	
Actuated g/C Ratio	0.01	0.42	0.42	0.10	0.51		0.22	0.22	0.22	0.08	0.08	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	22	1476	410	151	1805		358	339	230	135	126	
v/s Ratio Prot	0.01	0.23		c0.06	c0.38		0.13	c0.14		c0.03	0.01	
v/s Ratio Perm			0.06						0.06			
v/c Ratio	0.59	0.55	0.15	0.61	0.74		0.58	0.61	0.27	0.44	0.12	
Uniform Delay, d1	45.3	20.3	16.7	39.6	18.0		32.0	32.2	29.6	40.7	39.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	36.0	0.6	0.3	6.8	1.9		2.7	3.7	0.9	2.3	0.4	
Delay (s)	81.3	21.0	17.0	46.4	19.9		34.7	35.9	30.5	42.9	40.1	
Level of Service	F	C	B	D	B		C	D	C	D	D	
Approach Delay (s)		21.2			21.6			33.4			41.5	
Approach LOS		C			C			C			D	






















Intersection Summary

HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	11.0
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	609	296	377	882	212	293	380	646	161	210	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.91		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3326		1583	3471	1568	1787	2815		1703	3340	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3326		1583	3471	1568	1787	2815		1703	3340	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	662	322	410	959	230	318	413	702	175	228	59
RTOR Reduction (vph)	0	74	0	0	0	158	0	274	0	0	29	0
Lane Group Flow (vph)	159	910	0	410	959	72	318	841	0	175	258	0
Confl. Peds. (#/hr)			5									
Heavy Vehicles (%)	0%	2%	4%	14%	4%	3%	1%	18%	15%	6%	6%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.9	24.8		11.0	24.9	24.9	15.8	16.1		11.0	11.3	
Effective Green, g (s)	10.9	24.8		11.0	24.9	24.9	15.8	16.1		11.0	11.3	
Actuated g/C Ratio	0.14	0.31		0.14	0.31	0.31	0.20	0.20		0.14	0.14	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	248	1039		219	1089	492	356	571		236	475	
v/s Ratio Prot	0.09	0.27		c0.26	c0.28		c0.18	c0.30		0.10	0.08	
v/s Ratio Perm						0.05						
v/c Ratio	0.64	0.88		1.87	0.88	0.15	0.89	1.47		0.74	0.54	
Uniform Delay, d1	32.4	25.8		34.2	25.8	19.6	31.0	31.7		32.8	31.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	8.9		409.4	8.9	0.2	23.9	222.0		12.2	1.4	
Delay (s)	38.2	34.7		443.6	34.8	19.8	54.8	253.6		45.0	33.1	
Level of Service	D	C		F	C	B	D	F		D	C	
Approach Delay (s)		35.2			137.5			209.5			37.6	
Approach LOS		D			F			F			D	
Intersection Summary												
HCM Average Control Delay			124.6									F
HCM Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			79.4							11.5		
Intersection Capacity Utilization			101.8%									G
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↑	↑↑						↑↑	
Volume (vph)	0	1352	57	227	1089	0	0	0	0	302	166	314
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.94	
Flt Protected		1.00		0.95	1.00						0.98	
Satd. Flow (prot)		5002		1785	3438						3150	
Flt Permitted		1.00		0.12	1.00						0.98	
Satd. Flow (perm)		5002		221	3438						3150	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1470	62	247	1184	0	0	0	0	328	180	341
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	28	0
Lane Group Flow (vph)	0	1528	0	247	1184	0	0	0	0	0	821	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	7%	3%	2%	1%	5%	3%	1%	3%	1%	3%	4%	6%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		47.3		47.3	47.3						27.2	
Effective Green, g (s)		47.3		47.3	47.3						27.2	
Actuated g/C Ratio		0.56		0.56	0.56						0.32	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		2800		124	1924						1014	
v/s Ratio Prot		0.31			0.34							
v/s Ratio Perm				c1.12							0.26	
v/c Ratio		0.55		1.99	0.62						0.81	
Uniform Delay, d1		11.8		18.6	12.5						26.3	
Progression Factor		1.00		0.52	0.31						1.00	
Incremental Delay, d2		0.1		470.7	0.4						4.6	
Delay (s)		11.9		480.3	4.3						30.9	
Level of Service		B		F	A						C	
Approach Delay (s)		11.9			86.4			0.0			30.9	
Approach LOS		B			F			A			C	
Intersection Summary												
HCM Average Control Delay			44.1		HCM Level of Service					D		
HCM Volume to Capacity ratio			1.56									
Actuated Cycle Length (s)			84.5		Sum of lost time (s)			10.0				
Intersection Capacity Utilization			76.4%		ICU Level of Service					D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	338	1316	0	0	1209	102	107	210	213	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.94				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5032			5015			3264				
Flt Permitted		0.65			1.00			0.99				
Satd. Flow (perm)		3308			5015			3264				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	367	1430	0	0	1314	111	116	228	232	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	1797	0	0	1417	0	0	562	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		47.3			47.3			27.2				
Effective Green, g (s)		47.3			47.3			27.2				
Actuated g/C Ratio		0.56			0.56			0.32				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1852			2807			1051				
v/s Ratio Prot					0.28							
v/s Ratio Perm		c0.54						0.17				
v/c Ratio		2.55dl			0.50			0.54				
Uniform Delay, d1		17.9			11.4			23.5				
Progression Factor		0.64			1.00			1.00				
Incremental Delay, d2		12.9			0.1			0.3				
Delay (s)		24.3			11.5			23.7				
Level of Service		C			B			C				
Approach Delay (s)		24.3			11.5			23.7			0.0	
Approach LOS		C			B			C			A	

Intersection Summary

HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕			↕↕↕			↕↕			↕↕	
Volume (vph)	36	1368	110	63	798	62	65	660	76	128	711	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.99			0.99	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		4972			4937			3208			3400	
Flt Permitted		0.89			0.75			0.55			0.53	
Satd. Flow (perm)		4434			3716			1765			1809	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1487	120	68	867	67	71	717	83	139	773	73
RTOR Reduction (vph)	0	10	0	0	10	0	0	10	0	0	7	0
Lane Group Flow (vph)	0	1636	0	0	992	0	0	861	0	0	978	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	3%	0%	4%	0%	7%	10%	15%	1%	5%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5			48.5			23.0			23.0	
Effective Green, g (s)		48.5			48.5			23.0			23.0	
Actuated g/C Ratio		0.61			0.61			0.29			0.29	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2688			2253			507			520	
v/s Ratio Prot												
v/s Ratio Perm		c0.37			0.27			0.49			c0.54	
v/c Ratio		0.61			0.44			1.70			1.88	
Uniform Delay, d1		9.8			8.5			28.5			28.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.0			0.6			322.6			403.5	
Delay (s)		10.9			9.1			351.1			432.0	
Level of Service		B			A			F			F	
Approach Delay (s)		10.9			9.1			351.1			432.0	
Approach LOS		B			A			F			F	

Intersection Summary

HCM Average Control Delay	168.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	125.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕↕	↗
Volume (vph)	165	1338	329	126	771	54	347	525	137	70	573	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		0.99	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3518	1460		3387	1547	1736	1827	1444		1807	1528
Flt Permitted		0.61	1.00		0.50	1.00	0.12	1.00	1.00		0.46	1.00
Satd. Flow (perm)		2166	1460		1713	1547	215	1827	1444		844	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	179	1454	358	137	838	59	377	571	149	76	623	114
RTOR Reduction (vph)	0	0	55	0	0	19	0	0	15	0	0	32
Lane Group Flow (vph)	0	1633	303	0	975	40	377	571	134	0	699	82
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	2%	6%	17%	4%	0%	4%	4%	9%	1%	5%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Effective Green, g (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Actuated g/C Ratio		0.52	0.52		0.52	0.52	0.38	0.38	0.38		0.38	0.38
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1131	762		895	808	81	690	546		319	577
v/s Ratio Prot								0.31				
v/s Ratio Perm		c0.75	0.21		0.57	0.03	c1.75		0.09		0.83	0.05
v/c Ratio		1.44	0.40		1.90dl	0.05	4.65	0.83	0.25		2.19	0.14
Uniform Delay, d1		21.5	13.0		21.5	10.5	28.0	25.3	19.2		28.0	18.4
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		204.8	1.6		57.4	0.1	1672.3	7.7	0.1		546.2	0.0
Delay (s)		226.3	14.5		78.9	10.7	1700.3	33.0	19.3		574.2	18.4
Level of Service		F	B		E	B	F	C	B		F	B
Approach Delay (s)		188.2			75.0			604.1			496.3	
Approach LOS		F			E			F			F	

Intersection Summary

HCM Average Control Delay	307.7	HCM Level of Service	F
HCM Volume to Capacity ratio	2.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	144.2%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	120	1313	124	71	856	170	99	788	30	152	662	144
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3521	1525	1805	3438	1540	1747	3486		1764	3396	
Flt Permitted		0.64	1.00	0.10	1.00	1.00	0.23	1.00		0.22	1.00	
Satd. Flow (perm)		2279	1525	197	3438	1540	417	3486		410	3396	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	1427	135	77	930	185	108	857	33	165	720	157
RTOR Reduction (vph)	0	0	41	0	0	60	0	3	0	0	20	0
Lane Group Flow (vph)	0	1557	94	77	930	125	108	887	0	165	857	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	3%	2%	3%	0%	5%	2%	3%	3%	0%	2%	3%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		38.6	38.6	38.6	38.6	38.6	36.9	36.9		36.9	36.9	
Effective Green, g (s)		38.6	38.6	38.6	38.6	38.6	36.9	36.9		36.9	36.9	
Actuated g/C Ratio		0.45	0.45	0.45	0.45	0.45	0.43	0.43		0.43	0.43	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1035	693	89	1561	699	181	1513		178	1474	
v/s Ratio Prot					0.27			0.25				0.25
v/s Ratio Perm		c0.68	0.06	0.39		0.08	0.26			c0.40		
v/c Ratio		1.50	0.14	0.87	0.60	0.18	0.60	0.59		0.93	0.58	
Uniform Delay, d1		23.2	13.5	20.9	17.4	13.8	18.4	18.3		22.8	18.2	
Progression Factor		1.00	1.00	0.63	0.60	0.27	1.00	1.00		1.00	1.00	
Incremental Delay, d2		232.0	0.4	57.1	1.4	0.5	7.8	0.9		46.9	0.7	
Delay (s)		255.2	13.9	70.3	11.8	4.2	26.1	19.2		69.7	18.9	
Level of Service		F	B	E	B	A	C	B		E	B	
Approach Delay (s)		236.0			14.4			19.9			26.9	
Approach LOS		F			B			B			C	

Intersection Summary

HCM Average Control Delay	94.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	↗
Volume (vph)	69	1333	19	39	1132	10	37	197	324	38	88	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		0.99	
Satd. Flow (prot)	1803	3539	1579	1751	3505	1579		3578	1549		3289	
Flt Permitted	0.16	1.00	1.00	0.11	1.00	1.00		0.87	1.00		0.87	
Satd. Flow (perm)	312	3539	1579	205	3505	1579		3149	1549		2896	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1449	21	42	1230	11	40	214	352	41	96	123
RTOR Reduction (vph)	0	0	4	0	0	2	0	0	11	0	21	0
Lane Group Flow (vph)	75	1449	17	42	1230	9	0	254	341	0	239	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	2%	0%	3%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	51.5	51.5	51.5	51.5	51.5	51.5		25.0	25.0		25.0	
Effective Green, g (s)	51.5	51.5	51.5	51.5	51.5	51.5		25.0	25.0		25.0	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.61		0.29	0.29		0.29	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	189	2144	957	124	2124	957		926	456		852	
v/s Ratio Prot		c0.41			0.35							
v/s Ratio Perm	0.24		0.01	0.20		0.01		0.08	c0.22		0.08	
v/c Ratio	0.40	0.68	0.02	0.34	0.58	0.01		0.27	0.75		0.28	
Uniform Delay, d1	8.7	11.2	6.7	8.3	10.2	6.6		23.0	27.2		23.1	
Progression Factor	1.16	1.13	1.50	1.26	1.33	0.94		1.00	1.00		1.00	
Incremental Delay, d2	0.6	0.2	0.0	3.2	0.5	0.0		0.1	5.8		0.1	
Delay (s)	10.7	12.8	10.0	13.7	14.1	6.2		23.1	33.0		23.1	
Level of Service	B	B	B	B	B	A		C	C		C	
Approach Delay (s)		12.7			14.0			28.8			23.1	
Approach LOS		B			B			C			C	

Intersection Summary

HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	672	1398	1114	454	182	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.97	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1770	3539	3505	1551	3349	1415
Flt Permitted	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (perm)	1770	3539	3505	1551	3349	1415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	730	1520	1211	493	198	174
RTOR Reduction (vph)	0	0	0	164	39	100
Lane Group Flow (vph)	730	1520	1211	329	216	17
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	2%	3%	1%	2%	1%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	31.0	65.0	30.0	30.0	12.0	12.0
Effective Green, g (s)	31.0	65.0	30.0	30.0	12.0	12.0
Actuated g/C Ratio	0.36	0.76	0.35	0.35	0.14	0.14
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	646	2706	1237	547	473	200
v/s Ratio Prot	c0.41	0.43	c0.35		c0.06	
v/s Ratio Perm				0.21		0.01
v/c Ratio	1.13	0.56	0.98	0.60	0.46	0.08
Uniform Delay, d1	27.0	4.1	27.2	22.6	33.5	31.7
Progression Factor	0.85	1.13	1.00	1.00	1.00	1.00
Incremental Delay, d2	74.9	0.7	21.0	4.8	0.3	0.1
Delay (s)	97.9	5.4	48.2	27.4	33.8	31.8
Level of Service	F	A	D	C	C	C
Approach Delay (s)		35.4	42.2		33.1	
Approach LOS		D	D		C	

Intersection Summary			
HCM Average Control Delay		37.9	HCM Level of Service D
HCM Volume to Capacity ratio		0.96	
Actuated Cycle Length (s)		85.0	Sum of lost time (s) 12.0
Intersection Capacity Utilization		90.3%	ICU Level of Service E
Analysis Period (min)		15	
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	197	554	397	311	719	105	51	2121	851	122	746	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	3610	1514	3502	3574	1529		5127	1577		5107	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.84	1.00		0.67	1.00
Satd. Flow (perm)	3467	3610	1514	3502	3574	1529		4334	1577		3460	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	214	602	432	338	782	114	55	2305	925	133	811	248
RTOR Reduction (vph)	0	0	25	0	0	19	0	0	0	0	0	109
Lane Group Flow (vph)	214	602	407	338	782	95	0	2360	925	0	944	139
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	1%	0%	1%	0%	1%	0%	2%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	10.6	33.1	33.1	12.0	34.5	34.5		34.9	95.0		34.9	34.9
Effective Green, g (s)	10.6	33.1	33.1	12.0	34.5	34.5		34.9	95.0		34.9	34.9
Actuated g/C Ratio	0.11	0.35	0.35	0.13	0.36	0.36		0.37	1.00		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	387	1258	528	442	1298	555		1592	1577		1271	562
v/s Ratio Prot	0.06	0.17		0.10	0.22							
v/s Ratio Perm			c0.27			0.06		c0.54	c0.59		0.27	0.09
v/c Ratio	0.55	0.48	0.77	0.76	0.60	0.17		1.48	0.59		1.66dl	0.25
Uniform Delay, d1	40.0	24.2	27.6	40.1	24.7	20.5		30.1	0.0		26.1	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	1.3	10.4	7.7	2.1	0.7		220.5	1.6		2.4	0.2
Delay (s)	41.7	25.5	37.9	47.8	26.7	21.2		250.6	1.6		28.5	21.1
Level of Service	D	C	D	D	C	C		F	A		C	C
Approach Delay (s)		32.6			32.0			180.5			27.0	
Approach LOS		C			C			F			C	

Intersection Summary

HCM Average Control Delay	101.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	111.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑		↘	↑↑	
Volume (vph)	185	128	17	31	35	79	3	215	126	234	78	25
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.97	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	2006	794	955	2124	1051	902	1796		1299	1997	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	2006	794	955	2124	1051	902	1796		1299	1997	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	139	18	34	38	86	3	234	137	254	85	27
RTOR Reduction (vph)	0	0	14	0	0	79	0	49	0	0	11	0
Lane Group Flow (vph)	201	139	4	34	38	7	3	322	0	254	101	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	0%	80%	100%	89%	70%	49%	100%	93%	81%	39%	97%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						
Actuated Green, G (s)	17.9	20.0	20.0	6.0	8.1	8.1	1.0	28.5		27.5	55.0	
Effective Green, g (s)	17.9	20.0	20.0	6.0	8.1	8.1	1.0	28.5		27.5	55.0	
Actuated g/C Ratio	0.18	0.20	0.20	0.06	0.08	0.08	0.01	0.29		0.28	0.56	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	326	405	160	58	174	86	9	517		361	1109	
v/s Ratio Prot	c0.11	c0.07		0.04	0.02		0.00	c0.18		c0.20	0.05	
v/s Ratio Perm			0.00			0.01						
v/c Ratio	0.62	0.34	0.02	0.59	0.22	0.08	0.33	0.62		0.70	0.09	
Uniform Delay, d1	37.4	33.9	31.7	45.3	42.5	42.0	48.7	30.6		32.1	10.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	0.5	0.1	14.2	0.6	0.4	20.6	2.3		6.1	0.0	
Delay (s)	40.8	34.4	31.7	59.5	43.1	42.4	69.3	32.9		38.2	10.3	
Level of Service	D	C	C	E	D	D	E	C		D	B	
Approach Delay (s)		37.9			46.3			33.2			29.7	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	99.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	187	282	304	341	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.91		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	2042		3303	2201		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	2042		3303	2201		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	203	307	330	371	0	0
RTOR Reduction (vph)	86	0	0	0	0	0
Lane Group Flow (vph)	424	0	330	371	0	0
Heavy Vehicles (%)	62%	60%	6%	64%	2%	2%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	11.6		5.7	25.3		
Effective Green, g (s)	11.6		5.7	25.3		
Actuated g/C Ratio	0.46		0.23	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	936		744	2201		
v/s Ratio Prot	c0.21		c0.10	0.17		
v/s Ratio Perm						
v/c Ratio	0.45		0.44	0.17		
Uniform Delay, d1	4.7		8.4	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.3		0.4	0.0		
Delay (s)	5.0		8.9	0.0		
Level of Service	A		A	A		
Approach Delay (s)	5.0			4.2	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	25.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑			↑↑		↘	↔		↘		↗
Volume (vph)	96	92	0	0	97	175	89	552	109	267	0	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.90		1.00	0.98		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1003	2524			2930		898	3286		1770		2429
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1003	2524			2930		898	3286		1770		2429
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	104	100	0	0	105	190	97	600	118	290	0	316
RTOR Reduction (vph)	0	0	0	0	159	0	0	17	0	0	0	246
Lane Group Flow (vph)	104	100	0	0	136	0	87	711	0	290	0	70
Heavy Vehicles (%)	80%	43%	0%	0%	30%	1%	83%	1%	4%	2%	0%	17%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	10.1	25.1			11.0		16.1	16.1		15.2		15.2
Effective Green, g (s)	10.1	25.1			11.0		16.1	16.1		15.2		15.2
Actuated g/C Ratio	0.15	0.37			0.16		0.24	0.24		0.22		0.22
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	148	926			471		211	773		393		540
v/s Ratio Prot	c0.10	0.04			c0.05		0.10	c0.22		c0.16		0.03
v/s Ratio Perm												
v/c Ratio	0.70	0.11			0.29		0.41	0.92		0.74		0.13
Uniform Delay, d1	27.7	14.3			25.3		22.1	25.5		24.7		21.3
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	14.0	0.1			0.3		1.3	16.1		7.1		0.1
Delay (s)	41.8	14.3			25.6		23.5	41.7		31.8		21.4
Level of Service	D	B			C		C	D		C		C
Approach Delay (s)		28.3			25.6			39.7			26.4	
Approach LOS		C			C			D			C	

Intersection Summary

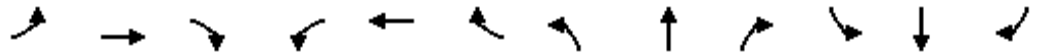
HCM Average Control Delay	32.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	68.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	41	536	15	7	319	37	14	15	10	62	17	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		0.99	
Frt		1.00			0.98			1.00	0.85		0.97	
Flt Protected		1.00			1.00			0.98	1.00		0.97	
Satd. Flow (prot)		3343			3229			1847	1577		1694	
Flt Permitted		0.90			0.94			0.89	1.00		0.83	
Satd. Flow (perm)		3022			3052			1675	1577		1441	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	583	16	8	347	40	15	16	11	67	18	28
RTOR Reduction (vph)	0	2	0	0	10	0	0	0	8	0	13	0
Lane Group Flow (vph)	0	642	0	0	385	0	0	31	3	0	100	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	11%	7%	0%	0%	11%	0%	0%	0%	0%	0%	0%	16%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		59.0			59.0			23.0	23.0		23.0	
Effective Green, g (s)		59.0			59.0			23.0	23.0		23.0	
Actuated g/C Ratio		0.66			0.66			0.26	0.26		0.26	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		1981			2001			428	403		368	
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.13			0.02	0.00		c0.07	
v/c Ratio		0.32			0.19			0.07	0.01		0.27	
Uniform Delay, d1		6.8			6.1			25.4	25.0		26.8	
Progression Factor		1.00			1.45			1.00	1.00		1.00	
Incremental Delay, d2		0.4			0.2			0.3	0.0		1.8	
Delay (s)		7.2			9.0			25.7	25.0		28.6	
Level of Service		A			A			C	C		C	
Approach Delay (s)		7.2			9.0			25.5			28.6	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	707	13	112	643	65	18	54	96	76	75	47
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.99			0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1788		1787	3386			1709		1738	1773	
Flt Permitted	0.95	1.00		0.95	1.00			0.95		0.34	1.00	
Satd. Flow (perm)	1805	1788		1787	3386			1640		615	1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	768	14	122	699	71	20	59	104	83	82	51
RTOR Reduction (vph)	0	0	0	0	5	0	0	69	0	0	33	0
Lane Group Flow (vph)	77	782	0	122	765	0	0	114	0	83	100	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	1%	5%	4%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	54.3		12.8	62.3			11.9		11.9	11.9	
Effective Green, g (s)	4.8	54.3		12.8	62.3			11.9		11.9	11.9	
Actuated g/C Ratio	0.05	0.60		0.14	0.69			0.13		0.13	0.13	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	96	1079		254	2344			217		81	234	
v/s Ratio Prot	0.04	c0.44		c0.07	0.23							0.06
v/s Ratio Perm								0.07		c0.13		
v/c Ratio	0.80	0.72		0.48	0.33			0.52		1.02	0.43	
Uniform Delay, d1	42.1	12.6		35.5	5.5			36.4		39.0	35.9	
Progression Factor	0.91	0.81		1.47	0.14			1.00		1.00	1.00	
Incremental Delay, d2	34.4	4.2		0.4	0.3			1.1		106.9	0.5	
Delay (s)	72.7	14.3		52.7	1.1			37.5		146.0	36.4	
Level of Service	E	B		D	A			D		F	D	
Approach Delay (s)		19.6			8.1			37.5			78.5	
Approach LOS		B			A			D			E	

Intersection Summary

HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘			↗	↗		↗↘	
Volume (vph)	45	851	24	82	793	21	38	76	147	10	10	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)	1796	3426		1770	3423			1861	1542		1728	
Flt Permitted	0.22	1.00		0.19	1.00			0.91	1.00		0.94	
Satd. Flow (perm)	413	3426		357	3423			1730	1542		1652	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	925	26	89	862	23	41	83	160	11	11	17
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	38	0	9	0
Lane Group Flow (vph)	49	949	0	89	883	0	0	124	122	0	30	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	0%	2%	5%	1%	0%	0%	2%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2		2		2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	188	1561		163	1559			788	702		753	
v/s Ratio Prot		c0.28			0.26							
v/s Ratio Perm	0.12			0.25				0.07	c0.08		0.02	
v/c Ratio	0.26	0.61		0.55	0.57			0.16	0.17		0.04	
Uniform Delay, d1	15.1	18.4		17.8	18.0			14.4	14.5		13.6	
Progression Factor	1.42	1.42		0.85	0.86			1.00	1.00		1.00	
Incremental Delay, d2	2.6	1.4		10.4	1.2			0.4	0.5		0.1	
Delay (s)	24.1	27.5		25.4	16.7			14.8	15.0		13.7	
Level of Service	C	C		C	B			B	B		B	
Approach Delay (s)		27.3			17.5			14.9			13.7	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	21.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	73	607	52	59	1166	70	45	85	39	42	64	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.99	
Satd. Flow (prot)	1768	3379		1036	3471	1527	1531	2148			2934	
Flt Permitted	0.15	1.00		0.34	1.00	1.00	0.64	1.00			0.86	
Satd. Flow (perm)	278	3379		371	3471	1527	1029	2148			2556	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	79	660	57	64	1267	76	49	92	42	46	70	64
RTOR Reduction (vph)	0	7	0	0	0	30	0	29	0	0	43	0
Lane Group Flow (vph)	79	710	0	64	1267	46	49	105	0	0	137	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	4%	22%	74%	4%	4%	17%	50%	79%	0%	33%	3%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Effective Green, g (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.31	0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	167	2027		223	2083	916	320	668			795	
v/s Ratio Prot		0.21			c0.37			0.05				
v/s Ratio Perm	0.28			0.17		0.03	0.05				c0.05	
v/c Ratio	0.47	0.35		0.29	0.61	0.05	0.15	0.16			0.17	
Uniform Delay, d1	10.1	9.1		8.7	11.3	7.4	22.4	22.5			22.6	
Progression Factor	0.40	0.27		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	7.9	0.4		3.2	1.3	0.1	1.0	0.5			0.5	
Delay (s)	12.0	2.8		11.9	12.7	7.5	23.4	23.0			23.0	
Level of Service	B	A		B	B	A	C	C			C	
Approach Delay (s)		3.7			12.4			23.1			23.0	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑		↘	↑↑↑		↘	↑	↘	↘	↑↑	↘
Volume (vph)	125	468	40	109	862	50	199	214	108	263	209	201
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1527	4640		1798	4820		1742	1827	1522	1709	3539	1352
Flt Permitted	0.23	1.00		0.43	1.00		0.61	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	369	4640		806	4820		1119	1827	1522	1022	3539	1352
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	509	43	118	937	54	216	233	117	286	227	218
RTOR Reduction (vph)	0	11	0	0	8	0	0	0	64	0	0	38
Lane Group Flow (vph)	136	541	0	118	983	0	216	233	53	286	227	180
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	18%	11%	2%	0%	7%	0%	3%	4%	4%	5%	2%	17%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Effective Green, g (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Actuated g/C Ratio	0.46	0.46		0.46	0.46		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	169	2129		370	2212		481	785	654	439	1520	581
v/s Ratio Prot		0.12			0.20			0.13				0.06
v/s Ratio Perm	c0.37			0.15			0.19		0.03	c0.28		0.13
v/c Ratio	0.80	0.25		0.32	0.44		0.45	0.30	0.08	0.65	0.15	0.31
Uniform Delay, d1	19.7	14.1		14.6	15.6		17.1	15.9	14.3	19.2	14.8	16.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.1	0.3		0.2	0.1		3.0	1.0	0.2	7.3	0.2	1.4
Delay (s)	51.9	14.4		14.8	15.7		20.2	16.8	14.6	26.5	15.0	17.3
Level of Service	D	B		B	B		C	B	B	C	B	B
Approach Delay (s)		21.8			15.6			17.6			20.2	
Approach LOS		C			B			B			C	

Intersection Summary

HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	367	725	0	0	0	0	0	1417	1549	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.95	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4766						4596	1375			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4766						4596	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	399	788	0	0	0	0	0	1540	1684	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	129	70	0	0	0
Lane Group Flow (vph)	0	1187	0	0	0	0	0	2253	772	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	7%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						16.0	36.2			
Effective Green, g (s)		34.0						16.0	36.2			
Actuated g/C Ratio		0.57						0.27	0.60			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2701						1226	830			
v/s Ratio Prot								c0.49				
v/s Ratio Perm		0.25							c0.56			
v/c Ratio		0.44						1.84	0.93			
Uniform Delay, d1		7.5						22.0	10.8			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.5						380.1	16.8			
Delay (s)		8.0						402.1	27.5			
Level of Service		A						F	C			
Approach Delay (s)		8.0			0.0			304.3			0.0	
Approach LOS		A			A			F			A	

Intersection Summary

HCM Average Control Delay	224.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔	↔					↕↔			↕↔	
Volume (vph)	50	1113	825	0	0	0	0	321	76	33	311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.96	0.85					0.97			1.00	
Flt Protected		1.00	1.00					1.00			1.00	
Satd. Flow (prot)		4474	1355					1793			1839	
Flt Permitted		1.00	1.00					1.00			0.90	
Satd. Flow (perm)		4474	1355					1793			1665	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1210	897	0	0	0	0	349	83	36	338	0
RTOR Reduction (vph)	0	108	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	1560	493	0	0	0	0	419	0	0	374	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	4%	6%	1%	0%	0%	0%	0%	3%	1%	0%	3%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free							4		
Actuated Green, G (s)		29.7	60.0					21.3			21.3	
Effective Green, g (s)		29.7	60.0					21.3			21.3	
Actuated g/C Ratio		0.49	1.00					0.36			0.36	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		2215	1355					637			591	
v/s Ratio Prot								c0.23				
v/s Ratio Perm		0.35	0.36								0.22	
v/c Ratio		0.70	0.36					0.66			0.63	
Uniform Delay, d1		11.7	0.0					16.3			16.1	
Progression Factor		0.44	1.00					0.89			1.00	
Incremental Delay, d2		0.1	0.1					5.1			5.1	
Delay (s)		5.3	0.1					19.6			21.2	
Level of Service		A	A					B			C	
Approach Delay (s)		4.1			0.0			19.6			21.2	
Approach LOS		A			A			B			C	

Intersection Summary

HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	15	651	93	344	330	0	0	220	1197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1776	1459	1785	1881			1570	1477
Flt Permitted				0.95	1.00	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)				1730	1776	1459	354	1881			1570	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	16	708	101	374	359	0	0	239	1301
RTOR Reduction (vph)	0	0	0	0	0	77	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	16	708	24	374	359	0	0	778	755
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	7%	4%	1%	1%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	429	353	204	1082			903	1477
v/s Ratio Prot					c0.40			0.19			0.50	
v/s Ratio Perm				0.01		0.02	c1.06					0.51
v/c Ratio				0.04	1.65	0.07	1.83	0.33			0.86	0.51
Uniform Delay, d1				17.4	22.8	17.5	12.8	6.7			10.7	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.03	1.00
Incremental Delay, d2				0.2	302.9	0.4	393.5	0.8			9.9	1.2
Delay (s)				17.6	325.7	17.9	406.2	7.5			21.0	1.2
Level of Service				B	F	B	F	A			C	A
Approach Delay (s)		0.0			282.0			211.0			11.3	
Approach LOS		A			F			F			B	

Intersection Summary

HCM Average Control Delay	130.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.78		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↕		↖	↕			↕	
Volume (vph)	29	151	26	313	64	19	16	269	590	7	83	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90			0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1838		1687	3470		1796	2537			3467	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.89	
Satd. Flow (perm)	1805	1838		1687	3470		1796	2537			3106	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	340	70	21	17	292	641	8	90	7
RTOR Reduction (vph)	0	8	0	0	13	0	0	408	0	0	5	0
Lane Group Flow (vph)	32	184	0	340	78	0	17	525	0	0	100	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	1%	0%	7%	0%	0%	0%	2%	37%	0%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	2.6	16.4		8.8	22.6		0.5	21.2			16.7	
Effective Green, g (s)	2.6	16.4		8.8	22.6		0.5	21.2			16.7	
Actuated g/C Ratio	0.04	0.28		0.15	0.39		0.01	0.36			0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	80	516		254	1343		15	921			888	
v/s Ratio Prot	0.02	c0.10		c0.20	0.02		0.01	c0.21				
v/s Ratio Perm												0.03
v/c Ratio	0.40	0.36		1.34	0.06		1.13	0.57			0.11	
Uniform Delay, d1	27.1	16.8		24.8	11.2		28.9	14.9			15.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	3.3	0.4		176.5	0.0		279.2	0.8			0.1	
Delay (s)	30.4	17.2		201.3	11.2		308.1	15.8			15.4	
Level of Service	C	B		F	B		F	B			B	
Approach Delay (s)		19.1			161.2			21.0			15.4	
Approach LOS		B			F			C			B	

Intersection Summary

HCM Average Control Delay	55.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	724	62	24	151	14	174	170	175	138	51	33
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.92		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.98	
Satd. Flow (prot)	1805	3304		1805	3558		1805	1889		1643	2581	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.98	
Satd. Flow (perm)	1805	3304		1805	3558		1805	1889		1643	2581	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	787	67	26	164	15	189	185	190	150	55	36
RTOR Reduction (vph)	0	4	0	0	6	0	0	150	0	0	23	0
Lane Group Flow (vph)	60	850	0	26	173	0	189	225	0	81	137	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	7%	17%	0%	0%	0%	0%	61%	88%	0%	76%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	5.0	28.3		2.5	26.3		15.7	15.7		12.0	12.0	
Effective Green, g (s)	5.0	28.3		2.5	26.3		15.7	15.7		12.0	12.0	
Actuated g/C Ratio	0.07	0.38		0.03	0.35		0.21	0.21		0.16	0.16	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	121	1255		61	1256		380	398		265	416	
v/s Ratio Prot	c0.03	c0.26		0.01	0.05		0.10	c0.12		0.05	c0.05	
v/s Ratio Perm												
v/c Ratio	0.50	0.68		0.43	0.14		0.50	0.57		0.31	0.33	
Uniform Delay, d1	33.5	19.3		35.3	16.4		25.9	26.3		27.6	27.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	1.6		4.7	0.1		1.4	2.2		0.9	0.6	
Delay (s)	36.7	20.9		40.0	16.5		27.3	28.6		28.5	28.3	
Level of Service	D	C		D	B		C	C		C	C	
Approach Delay (s)		21.9			19.4			28.2			28.4	
Approach LOS		C			B			C			C	

Intersection Summary

HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	74.5	Sum of lost time (s)	11.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	30	117	178	56	641	0	0	443	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3566	1581	1795	1188			2843	1579
Flt Permitted					0.99	1.00	0.48	1.00			1.00	1.00
Satd. Flow (perm)					3566	1581	901	1188			2843	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	127	193	61	697	0	0	482	59
RTOR Reduction (vph)	0	0	0	0	0	141	0	0	0	0	0	15
Lane Group Flow (vph)	0	0	0	0	160	52	61	697	0	0	482	44
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	24%	88%	0%	0%	0%	0%	60%	88%	1%	27%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					12.8	12.8	67.7	67.7			67.7	67.7
Effective Green, g (s)					12.8	12.8	67.7	67.7			67.7	67.7
Actuated g/C Ratio					0.14	0.14	0.75	0.75			0.75	0.75
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					507	225	678	894			2139	1188
v/s Ratio Prot								c0.59			0.17	
v/s Ratio Perm					0.04	0.03	0.07					0.03
v/c Ratio					0.32	0.23	0.09	0.78			0.23	0.04
Uniform Delay, d1					34.7	34.2	3.0	6.7			3.3	2.8
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.4	0.5	0.3	6.7			0.2	0.1
Delay (s)					35.0	34.8	3.2	13.4			3.6	2.9
Level of Service					D	C	A	B			A	A
Approach Delay (s)		0.0			34.9			12.5			3.5	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	14.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	877	446	193	385	454	0	567	545
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.92			1.00	1.00
Flt Protected	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	3079	1568	4568			1752	1881
Flt Permitted	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	3079	1568	4568			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	953	485	210	418	493	0	616	592
RTOR Reduction (vph)	0	0	49	0	0	0	0	0
Lane Group Flow (vph)	476	962	161	911	0	0	616	592
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	19%	3%	1%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	31.6	31.6	31.6	23.4			21.5	48.4
Effective Green, g (s)	31.6	31.6	31.6	23.4			21.5	48.4
Actuated g/C Ratio	0.35	0.35	0.35	0.26			0.24	0.54
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	577	1081	551	1188			419	1012
v/s Ratio Prot				c0.20			c0.35	0.31
v/s Ratio Perm	0.29	0.31	0.10					
v/c Ratio	0.82	0.89	0.29	1.21dr			1.47	0.58
Uniform Delay, d1	26.7	27.6	21.1	30.8			34.2	14.0
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	8.9	8.9	0.1	4.8			224.2	0.6
Delay (s)	35.6	36.5	21.2	35.5			258.5	14.6
Level of Service	D	D	C	D			F	B
Approach Delay (s)		34.3		35.5				139.0
Approach LOS		C		D				F

Intersection Summary

HCM Average Control Delay	68.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		





















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	84	12	36	143	114	60	226	156	36	55	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	91	13	39	155	124	65	246	170	39	60	36
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	140	13	195	124	188	292	69	66				
Volume Left (vph)	49	0	39	0	65	0	39	0				
Volume Right (vph)	0	13	0	124	0	170	0	36				
Hadj (s)	0.17	-0.70	0.40	-0.67	1.10	1.17	0.88	0.24				
Departure Headway (s)	7.1	6.2	7.0	6.0	7.3	7.3	7.6	7.0				
Degree Utilization, x	0.28	0.02	0.38	0.21	0.38	0.60	0.15	0.13				
Capacity (veh/h)	479	540	488	570	483	472	445	484				
Control Delay (s)	11.5	8.1	13.1	9.3	13.4	19.3	10.7	9.8				
Approach Delay (s)	11.3		11.6		17.0		10.3					
Approach LOS	B		B		C		B					
Intersection Summary												
Delay			13.8									
HCM Level of Service			B									
Intersection Capacity Utilization			49.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕↗		↗	↕↗	
Volume (veh/h)	14	367	13	12	164	16	47	9	40	34	15	56
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	399	14	13	178	17	51	10	43	37	16	61
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	201			418			713	661	409	692	658	188
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			418			713	661	409	692	658	188
tC, single (s)	4.1			4.8			7.9	7.4	7.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			4.2	4.8	4.2	3.5	4.8	3.3
p0 queue free %	99			98			77	97	91	88	94	93
cM capacity (veh/h)	1378			858			227	281	472	308	285	847

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	414	14	191	17	104	37	11	66
Volume Left	15	0	13	0	51	37	0	0
Volume Right	0	14	0	17	43	0	0	61
cSH	1378	1700	858	1700	296	308	285	729
Volume to Capacity	0.01	0.01	0.02	0.01	0.35	0.12	0.04	0.09
Queue Length 95th (ft)	1	0	1	0	38	10	3	7
Control Delay (s)	0.4	0.0	0.8	0.0	23.6	18.3	18.1	10.4
Lane LOS	A		A		C	C	C	B
Approach Delay (s)	0.4		0.7		23.6	13.7		
Approach LOS					C	B		

Intersection Summary

Average Delay		5.1						
Intersection Capacity Utilization		49.9%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	155	12	13	125	0	0	0	0	28	134	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.98	
Flt Protected		1.00	1.00		1.00						0.99	
Satd. Flow (prot)		3252	1550		3586						3424	
Flt Permitted		1.00	1.00		0.93						0.99	
Satd. Flow (perm)		3252	1550		3364						3424	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	168	13	14	136	0	0	0	0	30	146	35
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	168	9	0	150	0	0	0	0	0	182	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	11%	0%	0%	0%	0%	0%	2%	0%	0%	2%	0%
Turn Type		NA	Perm	Perm	NA					Perm	NA	
Protected Phases		2			6						8	
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.6	54.6		54.6						13.4	
Effective Green, g (s)		54.6	54.6		54.6						13.4	
Actuated g/C Ratio		0.71	0.71		0.71						0.18	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2321	1106		2401						600	
v/s Ratio Prot		c0.05										
v/s Ratio Perm			0.01		0.04						0.05	
v/c Ratio		0.07	0.01		0.06						0.30	
Uniform Delay, d1		3.3	3.2		3.3						27.5	
Progression Factor		1.00	1.00		0.24						1.00	
Incremental Delay, d2		0.1	0.0		0.0						0.3	
Delay (s)		3.4	3.2		0.8						27.8	
Level of Service		A	A		A						C	
Approach Delay (s)		3.4			0.8			0.0			27.8	
Approach LOS		A			A			A			C	

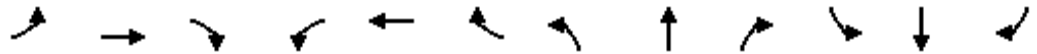
Intersection Summary

HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↑↑	↗		↔↔				
Volume (vph)	14	141	0	0	138	46	5	194	57	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.97				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		3516			3539	1520		3418				
Flt Permitted		0.93			1.00	1.00		1.00				
Satd. Flow (perm)		3302			3539	1520		3418				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	153	0	0	150	50	5	211	62	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	51	0	0	0	0
Lane Group Flow (vph)	0	168	0	0	150	36	0	227	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.6			54.6	54.6		13.4				
Effective Green, g (s)		54.6			54.6	54.6		13.4				
Actuated g/C Ratio		0.71			0.71	0.71		0.18				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2357			2526	1085		599				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.05				0.02		0.07				
v/c Ratio		0.07			0.06	0.03		0.38				
Uniform Delay, d1		3.3			3.3	3.2		27.9				
Progression Factor		0.56			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.1		0.4				
Delay (s)		1.9			3.3	3.3		28.3				
Level of Service		A			A	A		C				
Approach Delay (s)		1.9			3.3			28.3			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↵	↵↵	↑	↑↑↑	↵	↵	↵	↵
Volume (vph)	104	488	0	293	70	0	1201	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1697	3335		5085	1318		1681	1701
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1697	3335		5085	1318		1681	1701
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	530	0	318	76	0	1305	138
RTOR Reduction (vph)	34	0	0	0	0	0	0	0
Lane Group Flow (vph)	79	530	0	318	76	0	718	725
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	5%	5%	5%	2%	19%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	19.3	19.3		11.4	11.4		40.3	40.3
Effective Green, g (s)	19.3	19.3		11.4	11.4		40.3	40.3
Actuated g/C Ratio	0.23	0.23		0.13	0.13		0.47	0.47
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	385	757		682	177		797	806
v/s Ratio Prot				c0.06			c0.43	0.43
v/s Ratio Perm	0.05	c0.16			0.06			
v/c Ratio	0.21	0.70		0.47	0.43		0.90	0.90
Uniform Delay, d1	26.6	30.2		34.0	33.8		20.5	20.5
Progression Factor	0.45	0.66		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	2.4		0.5	1.7		15.3	15.0
Delay (s)	12.2	22.3		34.5	35.5		35.8	35.5
Level of Service	B	C		C	D		D	D
Approach Delay (s)			20.5	34.7				35.7
Approach LOS			C	C				D
Intersection Summary								
HCM Average Control Delay			31.6		HCM Level of Service			C
HCM Volume to Capacity ratio			0.78					
Actuated Cycle Length (s)			85.0		Sum of lost time (s)		14.0	
Intersection Capacity Utilization			69.8%		ICU Level of Service			C
Analysis Period (min)			15					
c	Critical Lane Group							

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑	↑	↑	↑↑↑
Volume (vph)	586	895	104	1840	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.94	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3092	1427	1522	1509	4526
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3092	1427	1522	1509	4526
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	637	973	113	2000	0
RTOR Reduction (vph)	0	0	47	1	0
Lane Group Flow (vph)	1104	506	55	1010	1000
Heavy Vehicles (%)	6%	3%	2%	2%	2%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	47.0	47.0	28.5	28.5	28.5
Effective Green, g (s)	47.0	47.0	28.5	28.5	28.5
Actuated g/C Ratio	0.55	0.55	0.34	0.34	0.34
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1710	789	510	506	1518
v/s Ratio Prot	c0.36		0.04	c0.67	0.22
v/s Ratio Perm		0.35			
v/c Ratio	0.65	0.64	0.11	2.00	1.76dl
Uniform Delay, d1	13.2	13.2	19.5	28.2	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	4.0	0.1	455.5	1.0
Delay (s)	15.1	17.1	19.6	483.8	25.1
Level of Service	B	B	B	F	C
Approach Delay (s)	15.7				244.3
Approach LOS	B				F

Intersection Summary

HCM Average Control Delay	145.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	884	40	10	302	0	0	0	0	441	409	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5144			5079					1805	3574	1555
Flt Permitted		1.00			0.90					0.95	1.00	1.00
Satd. Flow (perm)		5144			4578					1805	3574	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	961	43	11	328	0	0	0	0	479	445	467
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	184
Lane Group Flow (vph)	0	998	0	0	339	0	0	0	0	479	445	283
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	1%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		30.0			30.0					38.0	38.0	38.0
Effective Green, g (s)		30.0			30.0					38.0	38.0	38.0
Actuated g/C Ratio		0.38			0.38					0.48	0.48	0.48
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1929			1717					857	1698	739
v/s Ratio Prot		c0.19									0.12	
v/s Ratio Perm					0.07					c0.27		0.18
v/c Ratio		0.52			0.20					0.56	0.26	0.38
Uniform Delay, d1		19.4			16.9					15.0	12.6	13.5
Progression Factor		1.00			0.18					1.00	1.00	1.00
Incremental Delay, d2		1.0			0.2					2.6	0.4	1.5
Delay (s)		20.4			3.3					17.6	13.0	15.0
Level of Service		C			A					B	B	B
Approach Delay (s)		20.4			3.3			0.0			15.2	
Approach LOS		C			A			A			B	

Intersection Summary

HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖			↖↖↖	↖		↖↖↖				
Volume (vph)	531	814	0	0	304	924	18	1114	78	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.97		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.91	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4815			4301	1334		5057				
Flt Permitted	0.95	0.66			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3210			4301	1334		5057				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	577	885	0	0	330	1004	20	1211	85	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	5	0	10	0	0	0	0
Lane Group Flow (vph)	358	1104	0	0	827	497	0	1306	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	3%	1%	0%	1%	6%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	12.0	42.0			26.5	26.5		27.0				
Effective Green, g (s)	12.0	42.0			26.5	26.5		27.0				
Actuated g/C Ratio	0.15	0.52			0.33	0.33		0.34				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	233	1926			1425	442		1707				
v/s Ratio Prot	c0.23	0.09			0.19							
v/s Ratio Perm		0.21				c0.37		0.26				
v/c Ratio	1.54	1.02dl			1.00dr	1.12		0.77				
Uniform Delay, d1	34.0	12.9			22.1	26.8		23.7				
Progression Factor	1.00	2.16			1.00	1.00		1.00				
Incremental Delay, d2	259.2	1.1			1.7	81.0		3.3				
Delay (s)	293.3	29.0			23.9	107.8		27.0				
Level of Service	F	C			C	F		C				
Approach Delay (s)		93.7			55.5			27.0			0.0	
Approach LOS		F			E			C			A	

Intersection Summary

HCM Average Control Delay	60.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012



Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑			↑↑			↑↑	
Volume (vph)	0	876	1077	0	1433	173	100	9	182	21	162	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.92			0.98			0.91			0.99	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3229			3502			3163			3450	
Flt Permitted		1.00			1.00			0.98			0.99	
Satd. Flow (perm)		3229			3502			3163			3450	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	952	1171	0	1558	188	109	10	198	23	176	20
RTOR Reduction (vph)	0	341	0	0	14	0	0	180	0	0	12	0
Lane Group Flow (vph)	0	1782	0	0	1732	0	0	137	0	0	207	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	2%	0%	1%	1%	0%	1%	3%	2%	0%	2%	6%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1639			1778			292			743	
v/s Ratio Prot		c0.55			0.49			c0.04			c0.06	
v/s Ratio Perm												
v/c Ratio		1.09			0.97			0.47			0.28	
Uniform Delay, d1		16.0			15.6			28.0			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		50.0			16.0			5.3			0.9	
Delay (s)		66.0			31.6			33.3			22.2	
Level of Service		E			C			C			C	
Approach Delay (s)		66.0			31.6			33.3			22.2	
Approach LOS		E			C			C			C	

Intersection Summary

HCM Average Control Delay	47.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	135	800	29	215	593	466	17	612	101	314	390	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96	1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5097	1528	1778	3273		1796	1863	1556	1787	1863	1572
Flt Permitted		0.66	1.00	0.25	1.00		0.25	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)		3382	1528	462	3273		476	1863	1556	314	1863	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	870	32	234	645	507	18	665	110	341	424	60
RTOR Reduction (vph)	0	0	14	0	22	0	0	0	22	0	0	22
Lane Group Flow (vph)	0	1017	18	234	1130	0	18	665	88	341	424	38
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	2%	1%	1%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		4	4			2			2	
Permitted Phases	4		4	4			2		2	2		2
Actuated Green, G (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.58	0.58	0.58	0.58		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		1945	879	266	1882		143	559	467	94	559	472
v/s Ratio Prot					0.35			0.36			0.23	
v/s Ratio Perm		0.30	0.01	c0.51			0.04		0.06	c1.09		0.02
v/c Ratio		0.52	0.02	0.88	0.60		0.13	1.19	0.19	3.63	0.76	0.08
Uniform Delay, d1		10.3	7.3	14.6	11.0		20.4	28.0	20.8	28.0	25.4	20.1
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.0	0.0	31.3	1.4		1.8	102.2	0.9	1208.3	9.3	0.3
Delay (s)		11.3	7.4	46.0	12.5		22.2	130.2	21.7	1236.3	34.7	20.4
Level of Service		B	A	D	B		C	F	C	F	C	C
Approach Delay (s)		11.2			18.1			112.7			530.3	
Approach LOS		B			B			F			F	

Intersection Summary

HCM Average Control Delay	139.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.82		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	116.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	408	592	0	613	1589	0	0	0	553	0	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.95			0.98	0.98				1.00		0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.92	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3098			3021	1388				3433		1552
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3098			3021	1388				3433		1552
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	443	643	0	666	1727	0	0	0	601	0	295
RTOR Reduction (vph)	0	222	0	0	244	0	0	0	0	0	0	222
Lane Group Flow (vph)	263	864	0	0	1286	863	0	0	0	601	0	73
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	1%	0%	1%	4%	0%	0%	0%	2%	15%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	14.1	54.2			36.1	82.7				20.5		20.5
Effective Green, g (s)	14.1	54.2			36.1	82.7				20.5		20.5
Actuated g/C Ratio	0.17	0.66			0.44	1.00				0.25		0.25
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	305	2030			1319	1388				851		385
v/s Ratio Prot	c0.15	0.28			c0.43					0.18		
v/s Ratio Perm						c0.62						0.05
v/c Ratio	0.86	0.43			0.97	0.62				0.71		0.19
Uniform Delay, d1	33.4	6.8			22.9	0.0				28.4		24.5
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	21.3	0.1			18.9	2.1				2.7		0.2
Delay (s)	54.7	7.0			41.8	2.1				31.0		24.8
Level of Service	D	A			D	A				C		C
Approach Delay (s)		16.3			27.5			0.0			29.0	
Approach LOS		B			C			A			C	

Intersection Summary

HCM Average Control Delay	24.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	134	707	0	0	1424	592	386	186	876	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.91	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5085	1549	1649	1511	1490			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5085	1549	1649	1511	1490			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	768	0	0	1548	643	420	202	952	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	236	0	90	128	0	0	0
Lane Group Flow (vph)	146	768	0	0	1548	407	378	525	453	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	2%	1%	4%	5%	3%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	5.4	32.6			23.2	23.2	18.1	18.1	18.1			
Effective Green, g (s)	5.4	32.6			23.2	23.2	18.1	18.1	18.1			
Actuated g/C Ratio	0.09	0.56			0.40	0.40	0.31	0.31	0.31			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	164	2852			2010	612	508	466	459			
v/s Ratio Prot	c0.08	0.15			c0.30		0.23	c0.35	0.30			
v/s Ratio Perm						0.26						
v/c Ratio	0.89	0.27			0.77	0.67	0.74	1.13	0.99			
Uniform Delay, d1	26.4	6.8			15.4	14.6	18.2	20.3	20.2			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	40.4	0.1			1.9	2.7	5.8	81.2	38.2			
Delay (s)	66.7	6.9			17.3	17.3	24.1	101.5	58.4			
Level of Service	E	A			B	B	C	F	E			
Approach Delay (s)		16.4			17.3			67.0			0.0	
Approach LOS		B			B			E			A	






























Intersection Summary

HCM Average Control Delay	33.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations	 	 			 			 			 	 		
Volume (vph)	432	762	571	160	1177	150	495	52	187	133	67	622		
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88		
Frpb, ped/bikes	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	0.97	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00		
Satd. Flow (prot)	3400	3261	1411	1770	3539	1599	1698	1721	1599		1827	2704		
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00		
Satd. Flow (perm)	3400	3261	1411	1770	3539	1599	1698	1721	1599		1827	2704		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	470	828	621	174	1279	163	538	57	203	145	73	676		
RTOR Reduction (vph)	0	18	288	0	0	44	0	0	175	0	0	248		
Lane Group Flow (vph)	470	990	153	174	1279	119	296	299	28	0	218	428		
Confl. Peds. (#/hr)			20									20		
Heavy Vehicles (%)	3%	3%	1%	2%	2%	1%	1%	0%	1%	1%	0%	2%		
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm		
Protected Phases	5	2		1	6	6	8	8	8	7	7			
Permitted Phases			2									7		
Actuated Green, G (s)	10.1	30.0	30.0	8.3	28.2	28.2	12.1	12.1	12.1		20.3	20.3		
Effective Green, g (s)	10.1	30.0	30.0	8.3	28.2	28.2	12.1	12.1	12.1		20.3	20.3		
Actuated g/C Ratio	0.12	0.35	0.35	0.10	0.33	0.33	0.14	0.14	0.14		0.23	0.23		
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	396	1128	488	169	1151	520	237	240	223		428	633		
v/s Ratio Prot	c0.14	0.30		0.10	c0.36	0.07	c0.17	0.17	0.02		0.12			
v/s Ratio Perm			0.11									c0.16		
v/c Ratio	1.19	0.88	0.31	1.03	1.11	0.23	1.25	1.25	0.13		0.51	0.68		
Uniform Delay, d1	38.3	26.6	20.8	39.2	29.2	21.3	37.3	37.3	32.7		28.9	30.2		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	106.8	7.9	0.4	77.2	62.5	0.2	142.1	140.5	0.3		1.0	2.9		
Delay (s)	145.1	34.6	21.2	116.4	91.8	21.6	179.4	177.8	32.9		29.8	33.1		
Level of Service	F	C	C	F	F	C	F	F	C		C	C		
Approach Delay (s)		58.6			87.4			141.5			32.3			
Approach LOS		E			F			F			C			
Intersection Summary														
HCM Average Control Delay			75.6									HCM Level of Service	E	
HCM Volume to Capacity ratio			0.97											
Actuated Cycle Length (s)			86.7								12.0			
Intersection Capacity Utilization			81.5%										ICU Level of Service	D
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	144	733	185	91	602	70	596	553	81	104	378	255
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3384		1787	3450		1770	1803		1787	1863	1541
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.40	1.00	1.00
Satd. Flow (perm)	1770	3384		1787	3450		1770	1803		758	1863	1541
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	797	201	99	654	76	648	601	88	113	411	277
RTOR Reduction (vph)	0	25	0	0	10	0	0	6	0	0	0	20
Lane Group Flow (vph)	157	973	0	99	720	0	648	683	0	113	411	257
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	2%	2%	1%	2%	5%	2%	3%	2%	1%	2%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	9.0	24.0		5.0	20.0		24.0	40.6		21.8	21.8	30.8
Effective Green, g (s)	9.0	24.0		5.0	20.0		24.0	40.6		21.8	21.8	30.8
Actuated g/C Ratio	0.10	0.26		0.06	0.22		0.26	0.45		0.24	0.24	0.34
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	175	894		98	760		468	806		241	447	591
v/s Ratio Prot	c0.09	c0.29		0.06	0.21		c0.37	0.38		0.03	c0.22	0.04
v/s Ratio Perm										0.09		0.12
v/c Ratio	0.90	1.09		1.01	0.95		1.38	0.85		0.47	0.92	0.44
Uniform Delay, d1	40.4	33.4		42.9	34.9		33.4	22.4		30.8	33.6	23.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	39.8	57.0		93.7	20.6		186.0	8.3		1.4	23.8	0.5
Delay (s)	80.2	90.4		136.6	55.5		219.4	30.6		32.3	57.4	23.8
Level of Service	F	F		F	E		F	C		C	E	C
Approach Delay (s)		89.1			65.1			122.1			42.2	
Approach LOS		F			E			F			D	

Intersection Summary

HCM Average Control Delay	85.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	267	672	213	100	355	50	220	1133	107	202	1260	133
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3401		1770	3574	1564	1752	3505	1564	1805	3438	1534
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3401		1770	3574	1564	1752	3505	1564	1805	3438	1534
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	290	730	232	109	386	54	239	1232	116	220	1370	145
RTOR Reduction (vph)	0	34	0	0	0	29	0	0	22	0	0	23
Lane Group Flow (vph)	290	928	0	109	386	25	239	1232	94	220	1370	122
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	2%	1%	2%	1%	1%	3%	3%	1%	0%	5%	3%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	26.2		7.5	24.2	24.2	13.3	29.4	29.4	11.9	28.0	28.0
Effective Green, g (s)	9.5	26.2		7.5	24.2	24.2	13.3	29.4	29.4	11.9	28.0	28.0
Actuated g/C Ratio	0.11	0.29		0.08	0.27	0.27	0.15	0.33	0.33	0.13	0.31	0.31
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	185	990		148	961	421	259	1145	511	239	1070	477
v/s Ratio Prot	c0.17	c0.27		0.06	0.11		c0.14	0.35		0.12	c0.40	
v/s Ratio Perm						0.02			0.06			0.08
v/c Ratio	1.57	0.94		0.74	0.40	0.06	0.92	1.08	0.18	0.92	1.28	0.25
Uniform Delay, d1	40.2	31.1		40.3	27.0	24.5	37.8	30.3	21.7	38.6	31.0	23.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	279.9	15.6		17.3	0.3	0.1	35.7	49.6	0.8	37.3	133.4	1.3
Delay (s)	320.2	46.7		57.6	27.2	24.5	73.6	79.9	22.5	75.8	164.4	24.5
Level of Service	F	D		E	C	C	E	E	C	E	F	C
Approach Delay (s)		110.0			33.0			74.7			141.5	
Approach LOS		F			C			E			F	

Intersection Summary

HCM Average Control Delay	101.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	211	539	7	127	286	29	184	1234	22	63	912	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	3566		1805	3513		1787	3530		1805	3556	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1752	3566		1805	3513		1787	3530		1805	3556	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	229	586	8	138	311	32	200	1341	24	68	991	30
RTOR Reduction (vph)	0	1	0	0	8	0	0	1	0	0	2	0
Lane Group Flow (vph)	229	593	0	138	335	0	200	1364	0	68	1019	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	1%	0%	0%	1%	2%	1%	2%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	14.3	23.0		11.8	20.5		13.9	41.4		7.7	35.2	
Effective Green, g (s)	14.3	23.0		11.8	20.5		13.9	41.4		7.7	35.2	
Actuated g/C Ratio	0.15	0.23		0.12	0.21		0.14	0.42		0.08	0.36	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	256	838		218	736		254	1493		142	1279	
v/s Ratio Prot	c0.13	c0.17		0.08	0.10		c0.11	c0.39		0.04	0.29	
v/s Ratio Perm												
v/c Ratio	0.89	0.71		0.63	0.46		0.79	0.91		0.48	0.80	
Uniform Delay, d1	41.1	34.4		41.0	33.8		40.6	26.6		43.2	28.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	30.1	2.8		5.9	0.4		14.8	8.9		2.5	3.5	
Delay (s)	71.1	37.1		46.9	34.3		55.4	35.4		45.7	31.7	
Level of Service	E	D		D	C		E	D		D	C	
Approach Delay (s)		46.6			37.9			38.0			32.6	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	38.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	97.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	664	537	214	2316	1482	313
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3467	1553		5114	4970	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	3467	1553		3232	4970	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	722	584	233	2517	1611	340
RTOR Reduction (vph)	0	21	0	0	27	0
Lane Group Flow (vph)	722	563	0	2750	1924	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	0%	1%	1%	1%	1%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	37.0	37.0		75.0	75.0	
Effective Green, g (s)	37.0	37.0		75.0	75.0	
Actuated g/C Ratio	0.31	0.31		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1069	479		2020	3106	
v/s Ratio Prot	0.21				0.39	
v/s Ratio Perm		c0.36		c0.85		
v/c Ratio	0.68	1.17		2.99dl	0.62	
Uniform Delay, d1	36.3	41.5		22.5	13.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.4	98.6		165.9	0.9	
Delay (s)	39.7	140.1		188.4	14.7	
Level of Service	D	F		F	B	
Approach Delay (s)	84.6			188.4	14.7	
Approach LOS	F			F	B	

Intersection Summary

HCM Average Control Delay	109.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	117.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↗↘		↗	↗	↗
Volume (vph)	265	655	142	134	684	46	177	490	70	120	248	488
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3409		1787	3470		1752	3484		1787	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1752	3409		1787	3470		1752	3484		1787	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	288	712	154	146	743	50	192	533	76	130	270	530
RTOR Reduction (vph)	0	24	0	0	6	0	0	14	0	0	0	211
Lane Group Flow (vph)	288	842	0	146	787	0	192	595	0	130	270	319
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	3%	2%	3%	1%	3%	1%	3%	1%	3%	1%	2%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	26.1		8.7	22.7		7.1	18.4		6.1	17.4	17.4
Effective Green, g (s)	12.1	26.1		8.7	22.7		7.1	18.4		6.1	17.4	17.4
Actuated g/C Ratio	0.16	0.35		0.12	0.30		0.09	0.24		0.08	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	282	1182		206	1046		165	851		145	430	366
v/s Ratio Prot	c0.16	c0.25		0.08	0.23		c0.11	0.17		0.07	0.14	
v/s Ratio Perm												c0.20
v/c Ratio	1.02	0.71		0.71	0.75		1.16	0.70		0.90	0.63	0.87
Uniform Delay, d1	31.6	21.3		32.1	23.8		34.1	25.9		34.3	26.0	27.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	59.2	2.1		10.6	3.1		120.9	2.5		45.1	2.9	19.6
Delay (s)	90.8	23.4		42.7	26.9		155.0	28.4		79.3	28.9	47.4
Level of Service	F	C		D	C		F	C		E	C	D
Approach Delay (s)		40.2			29.3			58.8			46.5	
Approach LOS		D			C			E			D	

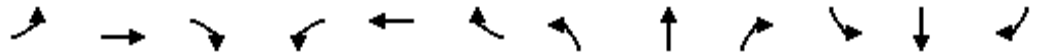
Intersection Summary

HCM Average Control Delay	43.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	662	279	102	573	110	267	1062	175	216	1370	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1711	3385			3175		1770	3471	1537	1787	3438	1531
Flt Permitted	0.25	1.00			0.64		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	452	3385			2037		1770	3471	1537	1787	3438	1531
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	720	303	111	623	120	290	1154	190	235	1489	117
RTOR Reduction (vph)	0	65	0	0	18	0	0	0	31	0	0	14
Lane Group Flow (vph)	137	958	0	0	836	0	290	1154	159	235	1489	103
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	5%	1%	1%	2%	3%	2%	2%	4%	1%	1%	5%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	35.1	35.1			35.1		5.1	17.3	17.3	8.2	20.4	20.4
Effective Green, g (s)	35.1	35.1			35.1		5.1	17.3	17.3	8.2	20.4	20.4
Actuated g/C Ratio	0.48	0.48			0.48		0.07	0.24	0.24	0.11	0.28	0.28
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	219	1637			985		124	827	366	202	966	430
v/s Ratio Prot		0.28					c0.16	0.33		0.13	c0.43	
v/s Ratio Perm	0.30				c0.41				0.10			0.07
v/c Ratio	0.63	0.59			0.85		2.34	1.40	0.43	1.16	1.54	0.24
Uniform Delay, d1	13.9	13.5			16.4		33.8	27.6	23.5	32.2	26.1	20.1
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.5			6.9		626.8	185.3	0.8	114.3	248.8	0.3
Delay (s)	19.4	14.0			23.3		660.5	213.0	24.3	146.5	274.9	20.4
Level of Service	B	B			C		F	F	C	F	F	C
Approach Delay (s)		14.7			23.3			270.5			242.4	
Approach LOS		B			C			F			F	

Intersection Summary

HCM Average Control Delay	168.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	116.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	489	516	605	381	475	1518
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2814	3355		3433	3574
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2814	3355		3433	3574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	532	561	658	414	516	1650
RTOR Reduction (vph)	0	465	109	0	0	0
Lane Group Flow (vph)	532	96	963	0	516	1650
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	1%	1%	0%	2%	1%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	11.2	11.2	27.3		15.2	40.0
Effective Green, g (s)	11.2	11.2	27.3		15.2	40.0
Actuated g/C Ratio	0.17	0.17	0.42		0.23	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	308	480	1394		794	2176
v/s Ratio Prot	c0.29	0.03	0.29		c0.15	c0.46
v/s Ratio Perm						
v/c Ratio	1.73	0.20	0.69		0.65	0.76
Uniform Delay, d1	27.3	23.4	15.7		22.8	9.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	340.6	0.2	1.5		1.8	1.6
Delay (s)	367.9	23.6	17.2		24.7	10.9
Level of Service	F	C	B		C	B
Approach Delay (s)	191.2		17.2			14.2
Approach LOS	F		B			B

Intersection Summary

HCM Average Control Delay	59.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	65.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	199	105	108	325	62	149	462	69	107	747	372
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	1571	1805	3474		1805	3526		1787	3574	1573
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	1571	1805	3474		1805	3526		1787	3574	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	216	114	117	353	67	162	502	75	116	812	404
RTOR Reduction (vph)	0	0	93	0	21	0	0	12	0	0	0	200
Lane Group Flow (vph)	275	216	21	117	399	0	162	565	0	116	812	204
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	1%	0%	0%	1%	1%	0%	0%	0%	1%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	5.1	12.7	12.7	7.2	14.8		7.2	24.3		7.8	24.9	24.9
Effective Green, g (s)	5.1	12.7	12.7	7.2	14.8		7.2	24.3		7.8	24.9	24.9
Actuated g/C Ratio	0.07	0.19	0.19	0.11	0.22		0.11	0.36		0.11	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	263	667	293	191	756		191	1260		205	1309	576
v/s Ratio Prot	c0.08	0.06		0.06	c0.11		c0.09	0.16		0.06	c0.23	
v/s Ratio Perm			0.01									0.13
v/c Ratio	1.05	0.32	0.07	0.61	0.53		0.85	0.45		0.57	0.62	0.35
Uniform Delay, d1	31.4	23.9	22.8	29.1	23.5		29.9	16.7		28.5	17.7	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	67.9	0.3	0.1	5.7	0.7		27.8	0.3		3.6	0.9	0.4
Delay (s)	99.4	24.2	22.9	34.8	24.2		57.7	17.0		32.0	18.6	16.1
Level of Service	F	C	C	C	C		E	B		C	B	B
Approach Delay (s)		58.1			26.5			25.9			19.0	
Approach LOS		E			C			C			B	

Intersection Summary

HCM Average Control Delay	29.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗↘	↗↘	↗	↗↘	↗↘	↗
Volume (vph)	93	118	45	68	101	384	65	436	38	416	1273	223
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3403		1805	3114		3502	3610	1576	3502	3610	1574
Flt Permitted	0.32	1.00		0.64	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	611	3403		1216	3114		3502	3610	1576	3502	3610	1574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	128	49	74	110	417	71	474	41	452	1384	242
RTOR Reduction (vph)	0	37	0	0	245	0	0	0	22	0	0	49
Lane Group Flow (vph)	101	140	0	74	282	0	71	474	19	452	1384	193
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	14.1	14.1		14.1	14.1		2.6	27.1	27.1	5.2	29.7	29.7
Effective Green, g (s)	14.1	14.1		14.1	14.1		2.6	27.1	27.1	5.2	29.7	29.7
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.04	0.46	0.46	0.09	0.51	0.51
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	148	822		294	752		156	1675	731	312	1836	800
v/s Ratio Prot		0.04			0.09		0.02	0.13		c0.13	c0.38	
v/s Ratio Perm	c0.17			0.06					0.01			0.12
v/c Ratio	0.68	0.17		0.25	0.37		0.46	0.28	0.03	1.45	0.75	0.24
Uniform Delay, d1	20.1	17.5		17.9	18.5		27.2	9.7	8.5	26.6	11.4	8.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.2	0.1		0.5	0.3		2.1	0.1	0.0	219.1	1.8	0.2
Delay (s)	32.3	17.6		18.3	18.8		29.3	9.7	8.5	245.7	13.2	8.2
Level of Service	C	B		B	B		C	A	A	F	B	A
Approach Delay (s)		23.0			18.7			12.0			63.2	
Approach LOS		C			B			B			E	

Intersection Summary

HCM Average Control Delay	44.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	718	417	566	1196	82	109	17	254	28	20	15
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98	1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3406	1172	1583	3490		1058	1066	973	1597	1658	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1719	3406	1172	1583	3490		1058	1066	973	1597	1658	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	780	453	615	1300	89	118	18	276	30	22	16
RTOR Reduction (vph)	0	0	288	0	3	0	0	0	236	0	15	0
Lane Group Flow (vph)	52	780	165	615	1386	0	67	69	40	30	23	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	5%	6%	35%	14%	2%	6%	62%	67%	62%	13%	0%	11%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	7.2	36.8	36.8	27.0	56.6		14.6	14.6	14.6	6.1	6.1	
Effective Green, g (s)	7.2	36.8	36.8	27.0	56.6		14.6	14.6	14.6	6.1	6.1	
Actuated g/C Ratio	0.07	0.36	0.36	0.27	0.56		0.14	0.14	0.14	0.06	0.06	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	123	1241	427	423	1956		153	154	141	96	100	
v/s Ratio Prot	0.03	0.23		c0.39	c0.40		0.06	c0.06		c0.02	0.01	
v/s Ratio Perm			0.14						0.04			
v/c Ratio	0.42	0.63	0.39	1.45	0.71		0.44	0.45	0.28	0.31	0.23	
Uniform Delay, d1	44.9	26.5	23.7	37.0	16.2		39.5	39.5	38.5	45.4	45.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.3	1.3	1.0	217.1	1.4		2.7	2.8	1.5	1.9	1.2	
Delay (s)	47.2	27.7	24.8	254.1	17.6		42.2	42.3	40.0	47.3	46.4	
Level of Service	D	C	C	F	B		D	D	D	D	D	
Approach Delay (s)		27.5			90.1			40.8			46.8	
Approach LOS		C			F			D			D	

Intersection Summary

HCM Average Control Delay	62.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	101.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	139	568	307	368	1216	322	356	274	433	238	366	195
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.91		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3138		1492	3471	1568	1687	2780		1736	2983	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3138		1492	3471	1568	1687	2780		1736	2983	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	617	334	400	1322	350	387	298	471	259	398	212
RTOR Reduction (vph)	0	111	0	0	0	206	0	221	0	0	108	0
Lane Group Flow (vph)	151	840	0	400	1322	144	387	548	0	259	502	0
Confl. Peds. (#/hr)			10									
Heavy Vehicles (%)	0%	4%	16%	21%	4%	3%	7%	21%	16%	4%	22%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	5.8	25.0		7.5	26.7	26.7	7.0	9.0		7.0	9.0	
Effective Green, g (s)	5.8	25.0		7.5	26.7	26.7	7.0	9.0		7.0	9.0	
Actuated g/C Ratio	0.09	0.38		0.12	0.41	0.41	0.11	0.14		0.11	0.14	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	161	1207		172	1426	644	182	385		187	413	
v/s Ratio Prot	0.08	0.27		c0.27	c0.38		c0.23	0.20		0.15	c0.17	
v/s Ratio Perm						0.09						
v/c Ratio	0.94	0.70		2.33	0.93	0.22	2.13	1.42		1.39	1.22	
Uniform Delay, d1	29.4	16.8		28.8	18.2	12.4	29.0	28.0		29.0	28.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	52.7	2.0		614.3	10.9	0.3	524.9	205.6		202.8	117.6	
Delay (s)	82.2	18.9		643.1	29.1	12.7	553.9	233.6		231.8	145.6	
Level of Service	F	B		F	C	B	F	F		F	F	
Approach Delay (s)		27.5			144.9			340.8			171.3	
Approach LOS		C			F			F			F	

Intersection Summary

HCM Average Control Delay	168.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	11.5
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↖	↑↑						↑↑	
Volume (vph)	0	1200	72	206	1351	0	0	0	0	128	240	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.92	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		4942		1784	3438						3020	
Flt Permitted		1.00		0.14	1.00						0.99	
Satd. Flow (perm)		4942		264	3438						3020	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1304	78	224	1468	0	0	0	0	139	261	502
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	12	0
Lane Group Flow (vph)	0	1376	0	224	1468	0	0	0	0	0	890	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	9%	4%	2%	1%	5%	2%	3%	1%	0%	5%	9%	7%
Turn Type		NA		Perm	NA						Perm	NA
Protected Phases		4			8							6
Permitted Phases				8						6		
Actuated Green, G (s)		47.2		47.2	47.2							31.1
Effective Green, g (s)		47.2		47.2	47.2							31.1
Actuated g/C Ratio		0.53		0.53	0.53							0.35
Clearance Time (s)		5.0		5.0	5.0							5.0
Vehicle Extension (s)		2.0		2.0	2.0							2.0
Lane Grp Cap (vph)		2642		141	1838							1064
v/s Ratio Prot		0.28			0.43							
v/s Ratio Perm				c0.85								0.29
v/c Ratio		0.52		1.59	0.80							0.92dr
Uniform Delay, d1		13.3		20.5	16.7							26.3
Progression Factor		1.00		0.33	0.23							1.00
Incremental Delay, d2		0.1		289.3	1.8							5.6
Delay (s)		13.3		296.0	5.7							31.9
Level of Service		B		F	A							C
Approach Delay (s)		13.3			44.1			0.0				31.9
Approach LOS		B			D			A				C

Intersection Summary

HCM Average Control Delay	30.7	HCM Level of Service	C
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	204	1124	0	0	1491	113	66	91	106	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.94				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5047			5021			3255				
Flt Permitted		0.65			1.00			0.99				
Satd. Flow (perm)		3306			5021			3255				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	222	1222	0	0	1621	123	72	99	115	0	0	0
RTOR Reduction (vph)	0	0	0	0	8	0	0	23	0	0	0	0
Lane Group Flow (vph)	0	1444	0	0	1736	0	0	263	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		47.2			47.2			31.1				
Effective Green, g (s)		47.2			47.2			31.1				
Actuated g/C Ratio		0.53			0.53			0.35				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1767			2684			1146				
v/s Ratio Prot					0.35							
v/s Ratio Perm		c0.44						0.08				
v/c Ratio		2.61dl			0.65			0.23				
Uniform Delay, d1		17.0			14.6			20.2				
Progression Factor		0.41			1.00			1.00				
Incremental Delay, d2		2.5			0.4			0.0				
Delay (s)		9.5			15.0			20.2				
Level of Service		A			B			C				
Approach Delay (s)		9.5			15.0			20.2			0.0	
Approach LOS		A			B			C			A	

Intersection Summary

HCM Average Control Delay	13.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	88.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕↕			↕↕↕			↕↕			↕↕	
Volume (vph)	56	969	56	38	1291	31	197	630	34	44	150	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			1.00			0.99			0.98	
Flt Protected		1.00			1.00			0.99			0.99	
Satd. Flow (prot)		4930			5015			3468			3014	
Flt Permitted		0.79			0.87			0.80			0.61	
Satd. Flow (perm)		3897			4375			2818			1860	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	61	1053	61	41	1403	34	214	685	37	48	163	35
RTOR Reduction (vph)	0	7	0	0	3	0	0	4	0	0	17	0
Lane Group Flow (vph)	0	1168	0	0	1475	0	0	933	0	0	229	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	4%	8%	0%	3%	0%	9%	0%	0%	0%	23%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		47.5			47.5			24.0			24.0	
Effective Green, g (s)		47.5			47.5			24.0			24.0	
Actuated g/C Ratio		0.59			0.59			0.30			0.30	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2314			2598			845			558	
v/s Ratio Prot												
v/s Ratio Perm		0.30			c0.34			c0.33			0.12	
v/c Ratio		0.50			0.57			1.10			0.41	
Uniform Delay, d1		9.4			10.0			28.0			22.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.8			0.9			63.3			2.2	
Delay (s)		10.2			10.9			91.3			24.6	
Level of Service		B			B			F			C	
Approach Delay (s)		10.2			10.9			91.3			24.6	
Approach LOS		B			B			F			C	

Intersection Summary

HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	118.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗		↕↕	↗	↖	↕	↗		↖↖	↗
Volume (vph)	68	943	232	105	918	39	287	253	82	23	1012	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)		3466	1460		3418	1547	1752	1845	1574		1776	1528
Flt Permitted		0.71	1.00		0.61	1.00	0.12	1.00	1.00		0.99	1.00
Satd. Flow (perm)		2464	1460		2090	1547	217	1845	1574		1759	1528
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	1025	252	114	998	42	312	275	89	25	1100	313
RTOR Reduction (vph)	0	0	9	0	0	12	0	0	47	0	0	51
Lane Group Flow (vph)	0	1099	243	0	1112	30	312	275	42	0	1125	262
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	4%	6%	23%	3%	0%	3%	3%	0%	0%	7%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Effective Green, g (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Actuated g/C Ratio		0.52	0.52		0.52	0.52	0.38	0.38	0.38		0.38	0.38
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1287	762		1091	808	82	697	595		665	577
v/s Ratio Prot								0.15				
v/s Ratio Perm		0.45	0.17		0.53	0.02	1.44		0.03		0.64	0.17
v/c Ratio		0.85	0.32		1.02	0.04	3.80	0.39	0.07		1.69	0.45
Uniform Delay, d1		18.5	12.3		21.5	10.5	28.0	20.5	17.9		28.0	21.0
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		7.4	1.1		32.2	0.1	1291.3	0.1	0.0		317.8	0.2
Delay (s)		25.9	13.4		53.7	10.6	1319.3	20.6	17.9		345.8	21.2
Level of Service		C	B		D	B	F	C	B		F	C
Approach Delay (s)		23.6			52.1			619.7			275.1	
Approach LOS		C			D			F			F	

Intersection Summary

HCM Average Control Delay	196.3	HCM Level of Service	F
HCM Volume to Capacity ratio	2.19		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	143.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	63	735	275	28	915	90	59	574	28	214	814	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3482	1510	1798	3471	1540	1748	3514		1728	3458	
Flt Permitted		0.72	1.00	0.23	1.00	1.00	0.19	1.00		0.34	1.00	
Satd. Flow (perm)		2533	1510	430	3471	1540	349	3514		617	3458	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	799	299	30	995	98	64	624	30	233	885	78
RTOR Reduction (vph)	0	0	55	0	0	35	0	5	0	0	9	0
Lane Group Flow (vph)	0	867	244	30	995	63	64	649	0	233	954	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	6%	3%	4%	0%	4%	2%	3%	2%	0%	4%	3%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2				6
Permitted Phases	4					4	2			6		
Actuated Green, G (s)		38.6	38.6	38.6	38.6	38.6	36.9	36.9		36.9	36.9	
Effective Green, g (s)		38.6	38.6	38.6	38.6	38.6	36.9	36.9		36.9	36.9	
Actuated g/C Ratio		0.45	0.45	0.45	0.45	0.45	0.43	0.43		0.43	0.43	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1150	686	195	1576	699	152	1525		268	1501	
v/s Ratio Prot					0.29			0.18				0.28
v/s Ratio Perm		c0.34	0.16	0.07		0.04	0.18			c0.38		
v/c Ratio		0.75	0.36	0.15	0.63	0.09	0.42	0.43		0.87	0.64	
Uniform Delay, d1		19.3	15.1	13.6	17.8	13.2	16.7	16.7		21.9	18.8	
Progression Factor		1.00	1.00	1.39	1.08	1.78	1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.6	1.4	1.5	1.8	0.2	3.9	0.4		25.2	1.0	
Delay (s)		23.9	16.5	20.5	20.9	23.8	20.6	17.1		47.0	19.8	
Level of Service		C	B	C	C	C	C	B		D	B	
Approach Delay (s)		22.0			21.1			17.4			25.1	
Approach LOS		C			C			B			C	

Intersection Summary		
HCM Average Control Delay	21.9	HCM Level of Service C
HCM Volume to Capacity ratio	0.81	
Actuated Cycle Length (s)	85.0	Sum of lost time (s) 9.5
Intersection Capacity Utilization	97.2%	ICU Level of Service F
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	↗
Volume (vph)	52	948	40	24	1108	36	36	85	122	28	135	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	
Satd. Flow (prot)	1802	3505	1579	1749	3471	1579		3551	1436		3288	
Flt Permitted	0.20	1.00	1.00	0.25	1.00	1.00		0.75	1.00		0.92	
Satd. Flow (perm)	387	3505	1579	468	3471	1579		2691	1436		3036	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	1030	43	26	1204	39	39	92	133	30	147	175
RTOR Reduction (vph)	0	0	9	0	0	7	0	0	89	0	60	0
Lane Group Flow (vph)	57	1030	34	26	1204	32	0	131	44	0	292	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	0%	3%	4%	0%	0%	0%	10%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	62.1	62.1	62.1	62.1	62.1	62.1		14.4	14.4		14.4	
Effective Green, g (s)	62.1	62.1	62.1	62.1	62.1	62.1		14.4	14.4		14.4	
Actuated g/C Ratio	0.73	0.73	0.73	0.73	0.73	0.73		0.17	0.17		0.17	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	283	2561	1154	342	2536	1154		456	243		514	
v/s Ratio Prot		0.29			c0.35							
v/s Ratio Perm	0.15		0.02	0.06		0.02		0.05	0.03		c0.10	
v/c Ratio	0.20	0.40	0.03	0.08	0.47	0.03		0.29	0.18		0.57	
Uniform Delay, d1	3.6	4.4	3.2	3.3	4.7	3.1		30.8	30.3		32.4	
Progression Factor	0.69	0.82	0.34	1.90	2.66	2.34		1.00	1.00		1.00	
Incremental Delay, d2	1.1	0.3	0.0	0.0	0.1	0.0		0.1	0.1		0.9	
Delay (s)	3.6	3.9	1.1	6.2	12.6	7.4		30.9	30.4		33.3	
Level of Service	A	A	A	A	B	A		C	C		C	
Approach Delay (s)		3.8			12.3			30.7			33.3	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	71.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/20/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	347	600	1280	61	647	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3406	3471	1521	3422	1374
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3406	3471	1521	3422	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	377	652	1391	66	703	279
RTOR Reduction (vph)	0	0	0	19	4	183
Lane Group Flow (vph)	377	652	1391	47	727	68
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	6%	4%	3%	2%	4%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	24.8	54.0	25.2	25.2	23.0	23.0
Effective Green, g (s)	24.8	54.0	25.2	25.2	23.0	23.0
Actuated g/C Ratio	0.29	0.64	0.30	0.30	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	516	2164	1029	451	926	372
v/s Ratio Prot	c0.21	0.19	c0.40		c0.21	
v/s Ratio Perm				0.03		0.05
v/c Ratio	0.73	0.30	1.35	0.10	0.79	0.18
Uniform Delay, d1	27.1	7.0	29.9	21.7	28.7	23.8
Progression Factor	0.80	1.58	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	0.3	164.8	0.5	4.1	0.1
Delay (s)	25.9	11.4	194.7	22.2	32.8	23.9
Level of Service	C	B	F	C	C	C
Approach Delay (s)		16.7	186.9		30.5	
Approach LOS		B	F		C	

Intersection Summary

HCM Average Control Delay	92.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	59	262	169	484	987	124	149	921	331	8	1180	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frbp, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		1.00	1.00
Satd. Flow (prot)	3433	3539	1473	3502	3610	1532		5090	1517		5134	1532
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.65	1.00		0.93	1.00
Satd. Flow (perm)	3433	3539	1473	3502	3610	1532		3354	1517		4764	1532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	64	285	184	526	1073	135	162	1001	360	9	1283	127
RTOR Reduction (vph)	0	0	4	0	0	44	0	0	228	0	0	43
Lane Group Flow (vph)	64	285	180	526	1073	91	0	1163	132	0	1292	84
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	2%	2%	4%	0%	0%	0%	2%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		2	6		6
Actuated Green, G (s)	6.0	30.2	30.2	11.8	36.0	36.0		33.0	33.0		33.0	33.0
Effective Green, g (s)	6.0	30.2	30.2	11.8	36.0	36.0		33.0	33.0		33.0	33.0
Actuated g/C Ratio	0.07	0.34	0.34	0.13	0.40	0.40		0.37	0.37		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	5.5		5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	229	1188	494	459	1444	613		1230	556		1747	562
v/s Ratio Prot	0.02	0.08		c0.15	c0.30							
v/s Ratio Perm			c0.12			0.06		c0.35	0.09		0.27	0.05
v/c Ratio	0.28	0.24	0.36	1.15	0.74	0.15		1.95dl	0.24		0.74	0.15
Uniform Delay, d1	39.9	21.6	22.6	39.1	23.1	17.2		27.6	19.8		24.8	19.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.5	2.1	88.5	3.5	0.5		14.4	0.2		1.7	0.1
Delay (s)	40.6	22.1	24.7	127.6	26.6	17.7		42.1	20.0		26.4	19.2
Level of Service	D	C	C	F	C	B		D	B		C	B
Approach Delay (s)		25.2			56.5			36.9			25.8	
Approach LOS		C			E			D			C	

Intersection Summary

HCM Average Control Delay	39.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑		↑	↑↑			↑↑	
Volume (vph)	3	294	152	191	694	8	164	2	145	4	3	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes		1.00	0.98	1.00	1.00		1.00	0.98			0.98	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			0.95	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.98	
Satd. Flow (prot)		1981	797	976	2521		912	1579			1909	
Flt Permitted		0.95	1.00	0.95	1.00		0.95	1.00			0.82	
Satd. Flow (perm)		1881	797	976	2521		912	1579			1602	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	320	165	208	754	9	178	2	158	4	3	4
RTOR Reduction (vph)	0	0	114	0	0	0	0	110	0	0	4	0
Lane Group Flow (vph)	0	323	51	208	763	0	178	50	0	0	7	0
Confl. Peds. (#/hr)			5			5			5			5
Heavy Vehicles (%)	100%	82%	99%	85%	43%	38%	98%	100%	91%	50%	100%	75%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Actuated Green, G (s)		38.0	38.0	32.9	74.9		28.6	38.1			5.5	
Effective Green, g (s)		38.0	38.0	32.9	74.9		28.6	38.1			5.5	
Actuated g/C Ratio		0.31	0.31	0.27	0.61		0.23	0.31			0.05	
Clearance Time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		586	248	263	1548		214	493			72	
v/s Ratio Prot				c0.21	0.30		c0.20	c0.03				
v/s Ratio Perm		c0.17	0.06								0.00	
v/c Ratio		0.55	0.21	0.79	0.49		0.83	0.10			0.10	
Uniform Delay, d1		34.9	30.9	41.4	13.0		44.4	29.8			55.9	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		1.1	0.4	14.9	0.2		23.2	0.1			0.6	
Delay (s)		36.0	31.3	56.2	13.3		67.6	29.9			56.5	
Level of Service		D	C	E	B		E	C			E	
Approach Delay (s)		34.4			22.5			49.7			56.5	
Approach LOS		C			C			D			E	

Intersection Summary

HCM Average Control Delay	31.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	221	138	275	1112	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.94		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	1858		3213	2375		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	1858		3213	2375		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	240	150	299	1209	0	0
RTOR Reduction (vph)	84	0	0	0	0	0
Lane Group Flow (vph)	306	0	299	1209	0	0
Heavy Vehicles (%)	80%	88%	9%	52%	0%	0%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	12.1		7.4	27.5		
Effective Green, g (s)	12.1		7.4	27.5		
Actuated g/C Ratio	0.44		0.27	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	818		865	2375		
v/s Ratio Prot	0.16		0.09	c0.51		
v/s Ratio Perm						
v/c Ratio	0.37		0.35	0.51		
Uniform Delay, d1	5.2		8.1	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	0.3		0.2	0.2		
Delay (s)	5.5		8.3	0.2		
Level of Service	A		A	A		
Approach Delay (s)	5.5			1.8	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	2.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	27.5	Sum of lost time (s)	0.0
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	58	0	0	254	380	456	366	91	112	0	515
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.91		1.00	0.98		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (prot)	970	2136			2959		1060	2840		1752		2045
Flt Permitted	0.95	1.00			1.00		0.95	0.99		0.95		1.00
Satd. Flow (perm)	970	2136			2959		1060	2840		1752		2045
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	63	0	0	276	413	496	398	99	122	0	560
RTOR Reduction (vph)	0	0	0	0	271	0	0	17	0	0	0	489
Lane Group Flow (vph)	159	63	0	0	418	0	327	649	0	122	0	71
Heavy Vehicles (%)	86%	69%	0%	0%	26%	1%	55%	5%	4%	3%	0%	39%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	8.1	27.4			15.3		16.1	16.1		8.1		8.1
Effective Green, g (s)	8.1	27.4			15.3		16.1	16.1		8.1		8.1
Actuated g/C Ratio	0.13	0.43			0.24		0.25	0.25		0.13		0.13
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	124	920			712		268	719		223		260
v/s Ratio Prot	c0.16	0.03			c0.14		c0.31	0.23		c0.07		0.03
v/s Ratio Perm												
v/c Ratio	1.28	0.07			0.59		1.22	0.90		0.55		0.27
Uniform Delay, d1	27.8	10.6			21.4		23.8	23.0		26.0		25.1
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	174.9	0.0			1.2		127.9	14.6		2.7		0.6
Delay (s)	202.7	10.6			22.6		151.7	37.6		28.8		25.7
Level of Service	F	B			C		F	D		C		C
Approach Delay (s)		148.2			22.6		75.1				26.2	
Approach LOS		F			C		E				C	

Intersection Summary

HCM Average Control Delay	54.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑			↑	↑		↑	
Volume (vph)	20	419	14	4	636	38	45	10	5	41	14	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			0.99	1.00		1.00	
Frt		1.00			0.99			1.00	0.85		0.94	
Flt Protected		1.00			1.00			0.96	1.00		0.98	
Satd. Flow (prot)		3140			3295			1811	1575		1652	
Flt Permitted		0.91			0.95			0.78	1.00		0.87	
Satd. Flow (perm)		2860			3142			1477	1575		1469	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	455	15	4	691	41	49	11	5	45	15	50
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	4	0	30	0
Lane Group Flow (vph)	0	490	0	0	732	0	0	60	1	0	80	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	5%	15%	0%	0%	9%	0%	0%	0%	0%	0%	0%	9%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm		NA
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		69.0			69.0			23.0	23.0			23.0
Effective Green, g (s)		69.0			69.0			23.0	23.0			23.0
Actuated g/C Ratio		0.69			0.69			0.23	0.23			0.23
Clearance Time (s)		4.0			4.0			4.0	4.0			4.0
Lane Grp Cap (vph)		1973			2168			340	362			338
v/s Ratio Prot												
v/s Ratio Perm		0.17			c0.23			0.04	0.00			c0.05
v/c Ratio		0.25			0.34			0.18	0.00			0.24
Uniform Delay, d1		5.8			6.3			30.9	29.7			31.4
Progression Factor		1.00			0.48			1.00	1.00			1.00
Incremental Delay, d2		0.3			0.4			1.1	0.0			1.6
Delay (s)		6.1			3.4			32.0	29.7			33.0
Level of Service		A			A			C	C			C
Approach Delay (s)		6.1			3.4			31.8				33.0
Approach LOS		A			A			C				C

Intersection Summary

HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	105.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	691	21	172	609	56	12	47	59	100	89	32
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.99			0.93		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1752	1753		1787	3309			1734		1501	1812	
Flt Permitted	0.95	1.00		0.95	1.00			0.97		0.52	1.00	
Satd. Flow (perm)	1752	1753		1787	3309			1682		827	1812	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	751	23	187	662	61	13	51	64	109	97	35
RTOR Reduction (vph)	0	1	0	0	5	0	0	41	0	0	14	0
Lane Group Flow (vph)	54	773	0	187	718	0	0	87	0	109	118	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	3%	8%	0%	1%	8%	2%	0%	0%	0%	19%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	59.3		14.1	68.6			15.6		15.6	15.6	
Effective Green, g (s)	4.8	59.3		14.1	68.6			15.6		15.6	15.6	
Actuated g/C Ratio	0.05	0.59		0.14	0.69			0.16		0.16	0.16	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	84	1040		252	2270			262		129	283	
v/s Ratio Prot	0.03	c0.44		c0.10	0.22							0.06
v/s Ratio Perm								0.05		c0.13		
v/c Ratio	0.64	0.74		0.74	0.32			0.33		0.84	0.42	
Uniform Delay, d1	46.8	14.8		41.2	6.3			37.6		41.0	38.1	
Progression Factor	0.92	0.89		0.60	3.09			1.00		1.00	1.00	
Incremental Delay, d2	11.9	4.8		7.9	0.3			0.3		35.8	0.4	
Delay (s)	55.0	18.0		32.7	19.7			37.8		76.8	38.4	
Level of Service	E	B		C	B			D		E	D	
Approach Delay (s)		20.4			22.4			37.8			55.8	
Approach LOS		C			C			D			E	

Intersection Summary

HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	735	60	312	896	21	14	41	112	11	47	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.98		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1801	3290		1767	3394			1874	1585		1812	
Flt Permitted	0.17	1.00		0.23	1.00			0.95	1.00		0.97	
Satd. Flow (perm)	329	3290		421	3394			1797	1585		1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	799	65	339	974	23	15	45	122	12	51	17
RTOR Reduction (vph)	0	6	0	0	2	0	0	0	56	0	9	0
Lane Group Flow (vph)	26	858	0	339	995	0	0	60	66	0	71	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	9%	0%	2%	6%	2%	0%	0%	0%	4%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1		1	1			2			2	
Permitted Phases	1			1			2		2	2		2
Actuated Green, G (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Effective Green, g (s)	46.0	46.0		46.0	46.0			46.0	46.0		46.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	151	1513		194	1561			827	729		816	
v/s Ratio Prot		0.26			0.29							
v/s Ratio Perm	0.08			c0.81				0.03	c0.04		0.04	
v/c Ratio	0.17	0.57		1.75	0.64			0.07	0.09		0.09	
Uniform Delay, d1	15.8	19.7		27.0	20.6			15.1	15.2		15.2	
Progression Factor	0.68	0.68		0.76	0.79			1.00	1.00		1.00	
Incremental Delay, d2	1.8	1.1		356.1	1.9			0.2	0.2		0.2	
Delay (s)	12.6	14.5		376.6	18.2			15.3	15.5		15.4	
Level of Service	B	B		F	B			B	B		B	
Approach Delay (s)		14.4			109.2			15.4			15.4	
Approach LOS		B			F			B			B	

Intersection Summary

HCM Average Control Delay	65.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	122.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	101	961	71	136	887	117	33	182	105	28	27	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.95			0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1734	3256		1163	3438	1527	1277	1898			2981	
Flt Permitted	0.25	1.00		0.20	1.00	1.00	0.69	1.00			0.82	
Satd. Flow (perm)	456	3256		245	3438	1527	930	1898			2486	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	110	1045	77	148	964	127	36	198	114	30	29	37
RTOR Reduction (vph)	0	5	0	0	0	46	0	82	0	0	27	0
Lane Group Flow (vph)	110	1117	0	148	964	81	36	230	0	0	69	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	4%	7%	45%	55%	5%	4%	40%	75%	84%	0%	33%	3%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2				2
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Effective Green, g (s)	64.0	64.0		64.0	64.0	64.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.64	0.64		0.64	0.64	0.64	0.28	0.28			0.28	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	292	2084		157	2200	977	260	531			696	
v/s Ratio Prot		0.34			0.28			c0.12				
v/s Ratio Perm	0.24			c0.60		0.05	0.04				0.03	
v/c Ratio	0.38	0.54		0.94	0.44	0.08	0.14	0.43			0.10	
Uniform Delay, d1	8.5	9.9		16.3	9.0	6.8	27.0	29.5			26.7	
Progression Factor	0.28	0.26		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	3.5	0.9		58.0	0.6	0.2	1.1	2.6			0.3	
Delay (s)	5.8	3.5		74.4	9.6	7.0	28.1	32.1			27.0	
Level of Service	A	A		E	A	A	C	C			C	
Approach Delay (s)		3.7			17.1			31.6			27.0	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↓		↘	↑↑↓		↘	↑	↘	↘	↑↑	↘
Volume (vph)	272	915	21	50	599	27	145	73	97	247	284	250
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1651	4316		1802	4783		1711	1845	1453	1775	3471	1342
Flt Permitted	0.37	1.00		0.23	1.00		0.56	1.00	1.00	0.71	1.00	1.00
Satd. Flow (perm)	636	4316		431	4783		1015	1845	1453	1319	3471	1342
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	995	23	54	651	29	158	79	105	268	309	272
RTOR Reduction (vph)	0	3	0	0	6	0	0	0	36	0	0	98
Lane Group Flow (vph)	296	1015	0	54	674	0	158	79	69	268	309	174
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	9%	20%	8%	0%	8%	0%	5%	3%	9%	1%	4%	18%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	35.0	35.0		35.0	35.0		30.5	30.5	30.5	30.5	30.5	30.5
Effective Green, g (s)	35.0	35.0		35.0	35.0		30.5	30.5	30.5	30.5	30.5	30.5
Actuated g/C Ratio	0.47	0.47		0.47	0.47		0.41	0.41	0.41	0.41	0.41	0.41
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	297	2014		201	2232		413	750	591	536	1412	546
v/s Ratio Prot		0.24			0.14			0.04				0.09
v/s Ratio Perm	c0.47			0.13			0.16		0.05	c0.20		0.13
v/c Ratio	1.00	0.50		0.27	0.30		0.38	0.11	0.12	0.50	0.22	0.32
Uniform Delay, d1	19.9	13.9		12.2	12.4		15.6	13.8	13.9	16.6	14.5	15.2
Progression Factor	1.00	1.00		1.00	1.00		1.01	1.08	1.16	1.00	1.00	1.00
Incremental Delay, d2	50.9	0.1		0.3	0.0		2.5	0.3	0.4	3.3	0.4	1.5
Delay (s)	70.9	14.0		12.5	12.4		18.3	15.2	16.5	19.9	14.8	16.7
Level of Service	E	B		B	B		B	B	B	B	B	B
Approach Delay (s)		26.8			12.4			17.0			17.0	
Approach LOS		C			B			B			B	

Intersection Summary

HCM Average Control Delay	20.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	283	389	0	0	0	0	0	1219	1356	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		0.99						1.00	1.00			
Frt		1.00						0.95	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4530						4593	1375			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4530						4593	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	308	423	0	0	0	0	0	1325	1474	0	0	0
RTOR Reduction (vph)	0	5	0	0	0	0	0	167	163	0	0	0
Lane Group Flow (vph)	0	726	0	0	0	0	0	1895	574	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	4%	17%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		27.0						23.0	29.6			
Effective Green, g (s)		27.0						23.0	29.6			
Actuated g/C Ratio		0.45						0.38	0.49			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2039						1761	678			
v/s Ratio Prot								c0.41				
v/s Ratio Perm		0.16							c0.42			
v/c Ratio		0.36						1.08	0.85			
Uniform Delay, d1		10.8						18.5	13.2			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.5						45.2	9.6			
Delay (s)		11.3						63.7	22.8			
Level of Service		B						E	C			
Approach Delay (s)		11.3			0.0			52.9			0.0	
Approach LOS		B			A			D			A	

Intersection Summary

HCM Average Control Delay	44.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔↔	↔					↔			↔	
Volume (vph)	26	668	951	0	0	0	0	307	69	44	142	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.94	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			0.99	
Satd. Flow (prot)		4247	1341					1821			1778	
Flt Permitted		1.00	1.00					1.00			0.86	
Satd. Flow (perm)		4247	1341					1821			1553	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	726	1034	0	0	0	0	334	75	48	154	0
RTOR Reduction (vph)	0	295	0	0	0	0	0	10	0	0	0	0
Lane Group Flow (vph)	0	976	517	0	0	0	0	399	0	0	202	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	4%	11%	2%	0%	0%	0%	0%	1%	2%	0%	7%	0%
Turn Type	Perm	NA	Free					Perm	NA		Perm	NA
Protected Phases		2						4			4	
Permitted Phases	2		Free					4		4		
Actuated Green, G (s)		21.5	60.0					29.5			29.5	
Effective Green, g (s)		21.5	60.0					29.5			29.5	
Actuated g/C Ratio		0.36	1.00					0.49			0.49	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		1522	1341					895			764	
v/s Ratio Prot								c0.22				
v/s Ratio Perm		0.23	0.39								0.13	
v/c Ratio		0.64	0.39					0.45			0.26	
Uniform Delay, d1		16.0	0.0					9.9			8.9	
Progression Factor		0.88	1.00					0.80			1.00	
Incremental Delay, d2		0.4	0.5					1.6			0.8	
Delay (s)		14.5	0.5					9.5			9.8	
Level of Service		B	A					A			A	
Approach Delay (s)		10.5			0.0			9.5			9.8	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	43	706	59	214	301	0	0	235	1108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.99	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1776	1445	1785	1863			1582	1477
Flt Permitted				0.95	1.00	1.00	0.21	1.00			1.00	1.00
Satd. Flow (perm)				1730	1776	1445	403	1863			1582	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	47	767	64	233	327	0	0	255	1204
RTOR Reduction (vph)	0	0	0	0	0	49	0	0	0	0	5	0
Lane Group Flow (vph)	0	0	0	47	767	15	233	327	0	0	744	710
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	7%	5%	1%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2				2
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	429	349	232	1071			910	1477
v/s Ratio Prot					c0.43			0.18			0.47	
v/s Ratio Perm				0.03		0.01	c0.58					0.48
v/c Ratio				0.11	1.79	0.04	1.00	0.31			0.82	0.48
Uniform Delay, d1				17.7	22.8	17.4	12.8	6.6			10.2	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.76	1.00
Incremental Delay, d2				0.5	363.8	0.2	60.2	0.7			7.8	1.1
Delay (s)				18.3	386.6	17.7	72.9	7.3			15.5	1.1
Level of Service				B	F	B	E	A			B	A
Approach Delay (s)		0.0			340.0			34.6			8.5	
Approach LOS		A			F			C			A	

Intersection Summary

HCM Average Control Delay	114.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↘		↗	↕		↗	↕			↕	
Volume (vph)	3	104	29	563	157	25	38	163	802	3	357	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.88			0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1748		1703	3526		1805	2303			3493	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.81	
Satd. Flow (perm)	1805	1748		1703	3526		1805	2303			2838	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	113	32	612	171	27	41	177	872	3	388	36
RTOR Reduction (vph)	0	10	0	0	10	0	0	586	0	0	6	0
Lane Group Flow (vph)	3	135	0	612	188	0	41	463	0	0	421	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	6%	0%	6%	0%	0%	0%	0%	42%	0%	2%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	1.1	17.5		29.4	45.8		2.2	23.3			17.1	
Effective Green, g (s)	1.1	17.5		29.4	45.8		2.2	23.3			17.1	
Actuated g/C Ratio	0.01	0.21		0.36	0.56		0.03	0.28			0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	24	372		609	1965		48	653			590	
v/s Ratio Prot	0.00	c0.08		c0.36	0.05		0.02	c0.20				
v/s Ratio Perm												0.15
v/c Ratio	0.12	0.36		1.00	0.10		0.85	0.97dr			0.71	
Uniform Delay, d1	40.1	27.6		26.4	8.5		39.8	26.4			30.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	2.3	0.6		37.7	0.0		76.9	3.5			4.1	
Delay (s)	42.4	28.2		64.1	8.5		116.7	29.9			34.3	
Level of Service	D	C		E	A		F	C			C	
Approach Delay (s)		28.5			50.5			33.2			34.3	
Approach LOS		C			D			C			C	

Intersection Summary

HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	82.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↕		↰	↕		↰	↕		↰	↕	
Volume (vph)	22	601	186	131	452	30	76	77	97	73	315	175
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	2446		1805	3570		1805	1743		1643	2219	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	2446		1805	3570		1805	1743		1643	2219	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	653	202	142	491	33	83	84	105	79	342	190
RTOR Reduction (vph)	0	23	0	0	3	0	0	91	0	0	53	0
Lane Group Flow (vph)	24	832	0	142	521	0	83	98	0	71	487	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	45%	30%	0%	0%	0%	0%	79%	94%	0%	73%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	3.0	32.5		12.8	42.8		12.6	12.6		23.2	23.2	
Effective Green, g (s)	3.0	32.5		12.8	42.8		12.6	12.6		23.2	23.2	
Actuated g/C Ratio	0.03	0.33		0.13	0.44		0.13	0.13		0.24	0.24	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	56	819		238	1574		234	226		393	530	
v/s Ratio Prot	0.01	c0.34		c0.08	0.15		0.05	c0.06		0.04	c0.22	
v/s Ratio Perm												
v/c Ratio	0.43	1.02		0.60	0.33		0.35	0.43		0.18	0.92	
Uniform Delay, d1	46.2	32.3		39.7	17.8		38.5	39.0		29.4	36.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	35.6		4.0	0.2		1.3	1.8		0.3	21.4	
Delay (s)	51.4	67.9		43.7	17.9		39.8	40.8		29.7	57.4	
Level of Service	D	E		D	B		D	D		C	E	
Approach Delay (s)		67.4			23.4			40.5			54.2	
Approach LOS		E			C			D			D	

Intersection Summary

HCM Average Control Delay	49.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	97.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	101	222	200	36	374	0	0	464	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	1.00	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.98	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3546	1583	1797	1166			2888	1581
Flt Permitted					0.98	1.00	0.47	1.00			1.00	1.00
Satd. Flow (perm)					3546	1583	883	1166			2888	1581
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	110	241	217	39	407	0	0	504	286
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	97
Lane Group Flow (vph)	0	0	0	0	351	46	39	407	0	0	504	189
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	61%	88%	0%	0%	0%	0%	63%	85%	1%	25%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					15.9	15.9	49.6	49.6			49.6	49.6
Effective Green, g (s)					15.9	15.9	49.6	49.6			49.6	49.6
Actuated g/C Ratio					0.21	0.21	0.66	0.66			0.66	0.66
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					752	336	584	771			1910	1046
v/s Ratio Prot								c0.35			0.17	
v/s Ratio Perm					0.10	0.03	0.04					0.12
v/c Ratio					0.47	0.14	0.07	0.53			0.26	0.18
Uniform Delay, d1					25.8	24.0	4.5	6.6			5.2	4.9
Progression Factor					1.00	1.00	1.00	1.00			0.76	0.53
Incremental Delay, d2					0.5	0.2	0.2	2.6			0.3	0.4
Delay (s)					26.3	24.2	4.7	9.2			4.3	3.0
Level of Service					C	C	A	A			A	A
Approach Delay (s)		0.0			25.5			8.8			3.8	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/20/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations	↔	↔↔	↔	↔↔↔		↔	↔	↔
Volume (vph)	1024	194	152	257	361	0	368	470
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.91			1.00	1.00
Flt Protected	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1643	2872	1568	4516			1770	1863
Flt Permitted	0.95	0.97	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1643	2872	1568	4516			1770	1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1113	211	165	279	392	0	400	511
RTOR Reduction (vph)	0	0	56	0	0	0	0	0
Lane Group Flow (vph)	556	768	109	671	0	0	400	511
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	0%	59%	3%	2%	1%	2%	2%	2%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	22.5	22.5	22.5	21.5			17.5	42.5
Effective Green, g (s)	22.5	22.5	22.5	21.5			17.5	42.5
Actuated g/C Ratio	0.30	0.30	0.30	0.29			0.23	0.57
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	493	862	470	1295			413	1056
v/s Ratio Prot				c0.15			c0.23	0.27
v/s Ratio Perm	c0.34	0.27	0.07					
v/c Ratio	1.13	1.08dl	0.23	0.87dr			0.97	0.48
Uniform Delay, d1	26.2	25.1	19.7	22.4			28.5	9.7
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	80.5	11.1	0.1	1.5			35.5	0.1
Delay (s)	106.8	36.2	19.8	23.9			64.0	9.8
Level of Service	F	D	B	C			E	A
Approach Delay (s)		60.8		23.9				33.6
Approach LOS		E		C				C

Intersection Summary

HCM Average Control Delay	44.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.





















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street





















4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	56	28	91	89	52	20	207	40	91	297	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	61	30	99	97	57	22	225	43	99	323	35
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	88	30	196	57	134	156	260	196				
Volume Left (vph)	27	0	99	0	22	0	99	0				
Volume Right (vph)	0	30	0	57	0	43	0	35				
Hadj (s)	0.15	-0.70	1.09	-0.70	1.32	1.32	1.00	0.95				
Departure Headway (s)	7.4	6.5	8.0	6.2	7.9	7.9	7.3	7.3				
Degree Utilization, x	0.18	0.06	0.44	0.10	0.29	0.34	0.53	0.40				
Capacity (veh/h)	454	508	430	544	441	442	480	482				
Control Delay (s)	10.8	8.7	15.9	8.7	12.9	13.7	17.0	13.7				
Approach Delay (s)	10.3		14.3		13.3		15.6					
Approach LOS	B		B		B		C					
Intersection Summary												
Delay			14.1									
HCM Level of Service			B									
Intersection Capacity Utilization			47.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	100	43	20	258	9	45	12	8	12	68	107
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	109	47	22	280	10	49	13	9	13	74	116
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	295			160			635	492	119	497	528	290
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	295			160			635	492	119	497	528	290
tC, single (s)	4.1			4.7			8.1	7.3	6.2	7.1	7.4	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			4.4	4.8	3.3	3.5	4.8	3.3
p0 queue free %	98			98			75	96	99	97	78	84
cM capacity (veh/h)	1272			1127			193	361	931	450	340	745
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3				
Volume Total	128	47	302	10	71	13	49	141				
Volume Left	20	0	22	0	49	13	0	0				
Volume Right	0	47	0	10	9	0	0	116				
cSH	1272	1700	1127	1700	236	450	340	617				
Volume to Capacity	0.02	0.03	0.02	0.01	0.30	0.03	0.14	0.23				
Queue Length 95th (ft)	1	0	1	0	30	2	13	22				
Control Delay (s)	1.3	0.0	0.8	0.0	26.6	13.2	17.4	12.6				
Lane LOS	A		A		D	B	C	B				
Approach Delay (s)	1.0		0.7		26.6	13.8						
Approach LOS					D	B						
Intersection Summary												
Average Delay			6.7									
Intersection Capacity Utilization			43.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/20/2012



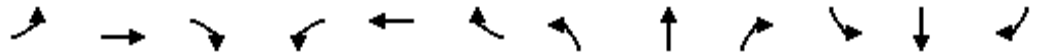
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	183	13	21	103	0	0	0	0	20	209	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.99	
Flt Protected		1.00	1.00		0.99						1.00	
Satd. Flow (prot)		2714	1550		2954						3167	
Flt Permitted		1.00	1.00		0.91						1.00	
Satd. Flow (perm)		2714	1550		2699						3167	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	199	14	23	112	0	0	0	0	22	227	23
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	199	10	0	135	0	0	0	0	0	258	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	33%	0%	0%	25%	0%	0%	2%	0%	0%	14%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		53.6	53.6		53.6						14.4	
Effective Green, g (s)		53.6	53.6		53.6						14.4	
Actuated g/C Ratio		0.70	0.70		0.70						0.19	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		1902	1086		1891						596	
v/s Ratio Prot		c0.07										
v/s Ratio Perm			0.01		0.05						0.08	
v/c Ratio		0.10	0.01		0.07						0.43	
Uniform Delay, d1		3.7	3.4		3.6						27.4	
Progression Factor		1.00	1.00		0.30						1.00	
Incremental Delay, d2		0.1	0.0		0.1						0.5	
Delay (s)		3.8	3.5		1.2						28.0	
Level of Service		A	A		A						C	
Approach Delay (s)		3.8			1.2			0.0			28.0	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
270: Mandela Parkway & 14th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↑↑	↗		↔↔				
Volume (vph)	23	160	0	0	124	30	7	153	59	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.96				
Flt Protected		0.99			1.00	1.00		1.00				
Satd. Flow (prot)		3507			3539	1520		3391				
Flt Permitted		0.92			1.00	1.00		1.00				
Satd. Flow (perm)		3250			3539	1520		3391				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	174	0	0	135	33	8	166	64	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	10	0	52	0	0	0	0
Lane Group Flow (vph)	0	199	0	0	135	23	0	186	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		53.6			53.6	53.6		14.4				
Effective Green, g (s)		53.6			53.6	53.6		14.4				
Actuated g/C Ratio		0.70			0.70	0.70		0.19				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2277			2480	1065		638				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.06				0.02		0.05				
v/c Ratio		0.09			0.05	0.02		0.29				
Uniform Delay, d1		3.7			3.6	3.5		26.7				
Progression Factor		0.42			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.0		0.3				
Delay (s)		1.6			3.6	3.5		26.9				
Level of Service		A			A	A		C				
Approach Delay (s)		1.6			3.6			26.9			0.0	
Approach LOS		A			A			C			A	

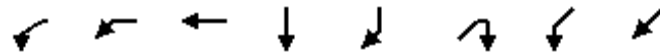
Intersection Summary

HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/20/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↶	↶↶	↶	↶↶↶	↶	↶	↶	↶
Volume (vph)	68	345	0	559	132	0	1891	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1584	3127		5136	1218		1681	1698
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1584	3127		5136	1218		1681	1698
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	375	0	608	143	0	2055	170
RTOR Reduction (vph)	3	0	0	0	0	0	0	0
Lane Group Flow (vph)	71	375	0	608	143	0	1110	1115
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	12%	12%	5%	1%	28%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	19.0	19.0		18.8	18.8		63.2	63.2
Effective Green, g (s)	19.0	19.0		18.8	18.8		63.2	63.2
Actuated g/C Ratio	0.17	0.17		0.16	0.16		0.55	0.55
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	262	517		840	199		924	933
v/s Ratio Prot				c0.12			c0.66	0.66
v/s Ratio Perm	0.04	c0.12			0.12			
v/c Ratio	0.27	0.73		0.72	0.72		1.20	1.20
Uniform Delay, d1	41.9	45.5		45.6	45.6		25.9	25.9
Progression Factor	0.65	0.71		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	4.7		3.1	11.7		101.0	98.3
Delay (s)	27.9	36.9		48.7	57.3		126.9	124.2
Level of Service	C	D		D	E		F	F
Approach Delay (s)			35.4	50.4				125.6
Approach LOS			D	D				F

Intersection Summary			
HCM Average Control Delay		97.3	HCM Level of Service F
HCM Volume to Capacity ratio		1.02	
Actuated Cycle Length (s)		115.0	Sum of lost time (s) 14.0
Intersection Capacity Utilization		89.3%	ICU Level of Service E
Analysis Period (min)		15	
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/20/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑	↑	↑	↑↑↑
Volume (vph)	452	535	42	1091	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.95	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3137	1470	1537	1524	4571
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3137	1470	1537	1524	4571
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	491	582	46	1186	0
RTOR Reduction (vph)	0	0	24	0	0
Lane Group Flow (vph)	741	332	17	598	593
Heavy Vehicles (%)	7%	0%	1%	1%	3%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	64.0	64.0	41.5	41.5	41.5
Effective Green, g (s)	64.0	64.0	41.5	41.5	41.5
Actuated g/C Ratio	0.56	0.56	0.36	0.36	0.36
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1746	818	555	550	1650
v/s Ratio Prot	c0.24		0.01	c0.39	0.13
v/s Ratio Perm		0.23			
v/c Ratio	0.42	0.41	0.03	1.09	0.96dl
Uniform Delay, d1	14.8	14.6	23.8	36.8	27.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	1.5	0.0	64.2	0.1
Delay (s)	15.6	16.1	23.8	101.0	27.1
Level of Service	B	B	C	F	C
Approach Delay (s)	15.7				62.9
Approach LOS	B				E

Intersection Summary

HCM Average Control Delay	40.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	620	37	7	280	0	0	0	0	547	883	529
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5130			5179					1787	3539	1550
Flt Permitted		1.00			0.91					0.95	1.00	1.00
Satd. Flow (perm)		5130			4731					1787	3539	1550
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	674	40	8	304	0	0	0	0	595	960	575
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	52
Lane Group Flow (vph)	0	706	0	0	312	0	0	0	0	595	960	523
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	2%	2%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		16.0			16.0					52.0	52.0	52.0
Effective Green, g (s)		16.0			16.0					52.0	52.0	52.0
Actuated g/C Ratio		0.20			0.20					0.65	0.65	0.65
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1026			946					1162	2300	1008
v/s Ratio Prot		c0.14									0.27	
v/s Ratio Perm					0.07					0.33		c0.34
v/c Ratio		0.69			0.33					0.51	0.42	0.52
Uniform Delay, d1		29.7			27.4					7.3	6.7	7.4
Progression Factor		1.00			1.11					1.00	1.00	1.00
Incremental Delay, d2		3.8			0.8					1.6	0.6	1.9
Delay (s)		33.5			31.1					9.0	7.3	9.3
Level of Service		C			C					A	A	A
Approach Delay (s)		33.5			31.1			0.0			8.3	
Approach LOS		C			C			A			A	

Intersection Summary

HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	430	845	0	0	267	492	6	437	27	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.96		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.93	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1552	4829			4433	1316		5067				
Flt Permitted	0.95	0.71			1.00	1.00		1.00				
Satd. Flow (perm)	1552	3433			4433	1316		5067				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	467	918	0	0	290	535	7	475	29	0	0	0
RTOR Reduction (vph)	0	0	0	0	132	132	0	8	0	0	0	0
Lane Group Flow (vph)	336	1049	0	0	426	135	0	503	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	6%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	18.0	36.5			15.0	15.0		32.5				
Effective Green, g (s)	18.0	36.5			15.0	15.0		32.5				
Actuated g/C Ratio	0.22	0.46			0.19	0.19		0.41				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	349	1880			831	247		2058				
v/s Ratio Prot	c0.22	0.13			0.10							
v/s Ratio Perm		c0.13				0.10		0.10				
v/c Ratio	0.96	0.56			0.51	0.54		0.24				
Uniform Delay, d1	30.7	15.9			29.2	29.4		15.7				
Progression Factor	0.84	0.73			1.00	1.00		1.00				
Incremental Delay, d2	35.7	1.0			2.3	8.4		0.3				
Delay (s)	61.4	12.6			31.5	37.8		15.9				
Level of Service	E	B			C	D		B				
Approach Delay (s)		24.4			33.5			15.9			0.0	
Approach LOS		C			C			B			A	

Intersection Summary

















HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/20/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	379	1022	0	1662	111	57	5	96	13	200	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.89			0.99			0.91			0.98	
Flt Protected		1.00			1.00			0.98			1.00	
Satd. Flow (prot)		3107			3468			3190			3395	
Flt Permitted		1.00			1.00			0.98			1.00	
Satd. Flow (perm)		3107			3468			3190			3395	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	412	1111	0	1807	121	62	5	104	14	217	43
RTOR Reduction (vph)	0	526	0	0	7	0	0	94	0	0	24	0
Lane Group Flow (vph)	0	997	0	0	1921	0	0	77	0	0	250	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	2%	1%	2%	3%	0%	1%	1%	1%	0%	3%	2%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1577			1761			294			731	
v/s Ratio Prot		0.32			c0.55			c0.02			c0.07	
v/s Ratio Perm												
v/c Ratio		0.63			1.09			0.26			0.34	
Uniform Delay, d1		11.6			16.0			27.4			21.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.9			50.7			2.1			1.3	
Delay (s)		13.5			66.7			29.6			22.9	
Level of Service		B			E			C			C	
Approach Delay (s)		13.5			66.7			29.6			22.9	
Approach LOS		B			E			C			C	
Intersection Summary												
HCM Average Control Delay			41.2								HCM Level of Service	D
HCM Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			65.0							12.0		
Intersection Capacity Utilization			76.2%								ICU Level of Service	D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	40	429	36	79	289	42	89	213	93	275	575	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5103	1496	1764	3520		1787	1881	1555	1769	1827	1570
Flt Permitted		0.88	1.00	0.45	1.00		0.17	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)		4527	1496	844	3520		314	1881	1555	952	1827	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	466	39	86	314	46	97	232	101	299	625	75
RTOR Reduction (vph)	0	0	16	0	14	0	0	0	55	0	0	17
Lane Group Flow (vph)	0	509	23	86	346	0	97	232	46	299	625	58
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	1%	3%	1%	0%	0%	1%	1%	1%	1%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		51.0	51.0	51.0	51.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.60	0.60	0.60	0.60		0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		2716	898	506	2112		89	531	439	269	516	443
v/s Ratio Prot					0.10			0.12			c0.34	
v/s Ratio Perm		c0.11	0.02	0.10			0.31		0.03	0.31		0.04
v/c Ratio		0.19	0.03	0.17	0.16		1.09	0.44	0.10	1.11	1.21	0.13
Uniform Delay, d1		7.7	6.9	7.6	7.5		30.5	25.0	22.6	30.5	30.5	22.7
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.1	0.7	0.2		121.9	2.6	0.5	88.2	112.0	0.6
Delay (s)		7.8	7.0	8.3	7.7		152.4	27.6	23.0	118.7	142.5	23.3
Level of Service		A	A	A	A		F	C	C	F	F	C
Approach Delay (s)		7.8			7.8			54.7			126.4	
Approach LOS		A			A			D			F	

Intersection Summary

HCM Average Control Delay	65.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	260	348	0	913	606	0	0	0	685	0	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.96			1.00	0.98				1.00		0.98
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.98	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1770	3142			3322	1375				3433		1560
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1770	3142			3322	1375				3433		1560
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	283	378	0	992	659	0	0	0	745	0	313
RTOR Reduction (vph)	0	173	0	0	16	0	0	0	0	0	0	135
Lane Group Flow (vph)	95	488	0	0	1134	501	0	0	0	745	0	178
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	2%	0%	2%	0%	1%	5%	0%	0%	0%	2%	5%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	3.7	32.3			24.6	59.7				19.4		19.4
Effective Green, g (s)	3.7	32.3			24.6	59.7				19.4		19.4
Actuated g/C Ratio	0.06	0.54			0.41	1.00				0.32		0.32
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	110	1700			1369	1375				1116		507
v/s Ratio Prot	c0.05	0.16			c0.34					c0.22		
v/s Ratio Perm						0.36						0.11
v/c Ratio	0.86	0.29			0.83	0.36				0.67		0.35
Uniform Delay, d1	27.7	7.4			15.7	0.0				17.4		15.4
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	46.0	0.1			4.3	0.7				1.5		0.4
Delay (s)	73.7	7.5			19.9	0.7				18.9		15.8
Level of Service	E	A			B	A				B		B
Approach Delay (s)		15.9			14.1			0.0			18.0	
Approach LOS		B			B			A			B	

Intersection Summary

HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	69	623	0	0	748	246	473	1	979	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frpb, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.86	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5136	1552	1633	1441	1490			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5136	1552	1633	1441	1490			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	677	0	0	813	267	514	1	1064	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	187	0	86	86	0	0	0
Lane Group Flow (vph)	75	677	0	0	813	80	463	477	467	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	5%	10%	3%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	2.6	22.6			16.0	16.0	22.9	22.9	22.9			
Effective Green, g (s)	2.6	22.6			16.0	16.0	22.9	22.9	22.9			
Actuated g/C Ratio	0.05	0.42			0.30	0.30	0.43	0.43	0.43			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	87	2170			1536	464	699	617	638			
v/s Ratio Prot	c0.04	0.13			c0.16		0.28	c0.33	0.31			
v/s Ratio Perm						0.05						
v/c Ratio	0.86	0.31			0.53	0.17	0.66	0.77	0.73			
Uniform Delay, d1	25.3	10.3			15.6	13.9	12.2	13.1	12.7			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	53.8	0.1			0.3	0.2	2.4	6.0	4.3			
Delay (s)	79.0	10.4			15.9	14.0	14.6	19.0	17.1			
Level of Service	E	B			B	B	B	B	B			
Approach Delay (s)		17.2			15.5			17.0			0.0	
Approach LOS		B			B			B			A	
























Intersection Summary

HCM Average Control Delay	16.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	344	888	420	118	654	82	318	30	115	72	40	272
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.99	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (prot)	3433	3332	1403	1770	3574	1599	1698	1719	1599		1829	2715
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00
Satd. Flow (perm)	3433	3332	1403	1770	3574	1599	1698	1719	1599		1829	2715
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	374	965	457	128	711	89	346	33	125	78	43	296
RTOR Reduction (vph)	0	4	246	0	0	49	0	0	112	0	0	242
Lane Group Flow (vph)	374	1007	165	128	711	40	190	189	13	0	121	54
Confl. Peds. (#/hr)			20									20
Heavy Vehicles (%)	2%	3%	2%	2%	1%	1%	1%	0%	1%	1%	0%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm
Protected Phases	5	2		1	6	6	8	8	8	7	7	
Permitted Phases			2									7
Actuated Green, G (s)	13.2	27.1	27.1	5.1	19.0	19.0	7.1	7.1	7.1		12.3	12.3
Effective Green, g (s)	13.2	27.1	27.1	5.1	19.0	19.0	7.1	7.1	7.1		12.3	12.3
Actuated g/C Ratio	0.20	0.40	0.40	0.08	0.28	0.28	0.11	0.11	0.11		0.18	0.18
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	670	1336	562	134	1005	449	178	181	168		333	494
v/s Ratio Prot	0.11	c0.30		c0.07	0.20	0.03	c0.11	0.11	0.01		c0.07	
v/s Ratio Perm			0.12									0.02
v/c Ratio	0.56	0.75	0.29	0.96	0.71	0.09	1.07	1.04	0.08		0.36	0.11
Uniform Delay, d1	24.6	17.4	13.7	31.1	21.8	17.9	30.2	30.2	27.3		24.2	23.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.0	2.5	0.3	63.5	2.3	0.1	86.5	79.0	0.2		0.7	0.1
Delay (s)	25.6	19.9	14.0	94.6	24.1	18.0	116.7	109.3	27.5		24.9	23.2
Level of Service	C	B	B	F	C	B	F	F	C		C	C
Approach Delay (s)		19.7			33.2			91.8			23.7	
Approach LOS		B			C			F			C	
Intersection Summary												
HCM Average Control Delay			33.6		HCM Level of Service					C		
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			67.6		Sum of lost time (s)				16.0			
Intersection Capacity Utilization			64.1%		ICU Level of Service				C			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	501	203	130	426	31	288	134	55	37	388	85
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3298		1770	3527		1770	1783		1787	1827	1546
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.63	1.00	1.00
Satd. Flow (perm)	1770	3298		1770	3527		1770	1783		1183	1827	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	545	221	141	463	34	313	146	60	40	422	92
RTOR Reduction (vph)	0	64	0	0	8	0	0	20	0	0	0	49
Lane Group Flow (vph)	183	702	0	141	489	0	313	186	0	40	422	43
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	3%	3%	2%	1%	0%	2%	1%	1%	1%	4%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	7.1	18.3		7.1	18.3		6.1	23.9		21.1	21.1	28.2
Effective Green, g (s)	7.1	18.3		7.1	18.3		6.1	23.9		21.1	21.1	28.2
Actuated g/C Ratio	0.10	0.27		0.10	0.27		0.09	0.35		0.31	0.31	0.41
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	183	880		183	941		157	621		393	562	726
v/s Ratio Prot	c0.10	c0.21		0.08	0.14		c0.18	0.10		0.00	c0.23	0.01
v/s Ratio Perm										0.03		0.02
v/c Ratio	1.00	0.80		0.77	0.52		1.99	0.30		0.10	0.75	0.06
Uniform Delay, d1	30.7	23.4		30.0	21.4		31.2	16.3		17.0	21.4	12.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	66.5	5.1		17.9	0.5		469.1	0.3		0.1	5.6	0.0
Delay (s)	97.3	28.5		47.9	21.9		500.3	16.5		17.1	27.0	12.2
Level of Service	F	C		D	C		F	B		B	C	B
Approach Delay (s)		41.8			27.6			308.3			23.8	
Approach LOS		D			C			F			C	

Intersection Summary

HCM Average Control Delay	86.7	HCM Level of Service	F
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↗
Volume (vph)	66	209	193	157	733	29	250	883	69	91	1804	73
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3247		1787	3574	1577	1787	3539	1578	1787	3471	1562
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3247		1787	3574	1577	1787	3539	1578	1787	3471	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	227	210	171	797	32	272	960	75	99	1961	79
RTOR Reduction (vph)	0	164	0	0	0	7	0	0	14	0	0	8
Lane Group Flow (vph)	72	273	0	171	797	25	272	960	61	99	1961	71
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	2%	2%	1%	1%	0%	1%	2%	0%	1%	4%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	5.2	22.0		11.3	28.1	28.1	17.6	42.7	42.7	9.0	34.1	34.1
Effective Green, g (s)	5.2	22.0		11.3	28.1	28.1	17.6	42.7	42.7	9.0	34.1	34.1
Actuated g/C Ratio	0.05	0.22		0.11	0.28	0.28	0.18	0.43	0.43	0.09	0.34	0.34
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	91	714		202	1004	443	315	1511	674	161	1184	533
v/s Ratio Prot	0.04	0.08		c0.10	c0.22		c0.15	0.27		0.06	c0.56	
v/s Ratio Perm						0.02			0.04			0.05
v/c Ratio	0.79	0.38		0.85	0.79	0.06	0.86	0.64	0.09	0.61	1.66	0.13
Uniform Delay, d1	46.9	33.2		43.5	33.3	26.3	40.0	22.5	17.1	43.8	33.0	22.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	36.1	0.3		26.4	4.4	0.1	20.9	2.0	0.3	6.8	299.1	0.5
Delay (s)	82.9	33.6		69.9	37.7	26.3	61.0	24.6	17.3	50.6	332.1	23.3
Level of Service	F	C		E	D	C	E	C	B	D	F	C
Approach Delay (s)		40.5			42.8			31.7			307.6	
Approach LOS		D			D			C			F	

Intersection Summary

HCM Average Control Delay	154.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷		↶	↷		↶	↷	
Volume (vph)	52	261	64	64	367	16	230	383	13	44	1127	14
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3453		1805	3550		1805	3555		1805	3498	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	3453		1805	3550		1805	3555		1805	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	284	70	70	399	17	250	416	14	48	1225	15
RTOR Reduction (vph)	0	22	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	57	332	0	70	413	0	250	429	0	48	1239	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	1%	1%	0%	1%	0%	0%	1%	0%	0%	3%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	7.0	16.1		7.5	16.6		14.2	49.4		5.1	40.3	
Effective Green, g (s)	7.0	16.1		7.5	16.6		14.2	49.4		5.1	40.3	
Actuated g/C Ratio	0.08	0.17		0.08	0.18		0.15	0.54		0.06	0.44	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	135	604		147	640		278	1907		100	1531	
v/s Ratio Prot	0.03	0.10		c0.04	c0.12		c0.14	0.12		0.03	c0.35	
v/s Ratio Perm												
v/c Ratio	0.42	0.55		0.48	0.64		0.90	0.22		0.48	0.81	
Uniform Delay, d1	40.6	34.7		40.4	35.0		38.2	11.3		42.2	22.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	1.0		2.4	2.2		29.0	0.1		3.6	3.3	
Delay (s)	42.7	35.7		42.8	37.3		67.3	11.3		45.8	25.8	
Level of Service	D	D		D	D		E	B		D	C	
Approach Delay (s)		36.7			38.1			31.9			26.6	
Approach LOS		D			D			C			C	

Intersection Summary

HCM Average Control Delay	31.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/20/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	267	263	243	1722	1249	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	3467	1564		5149	4868	
Flt Permitted	0.95	1.00		0.64	1.00	
Satd. Flow (perm)	3467	1564		3314	4868	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	290	286	264	1872	1358	426
RTOR Reduction (vph)	0	36	0	0	63	0
Lane Group Flow (vph)	290	250	0	2136	1721	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	1%	0%	1%	0%	2%	2%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	27.0	27.0		55.0	55.0	
Effective Green, g (s)	27.0	27.0		55.0	55.0	
Actuated g/C Ratio	0.30	0.30		0.61	0.61	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1040	469		2025	2975	
v/s Ratio Prot	0.08				0.35	
v/s Ratio Perm		c0.16		c0.64		
v/c Ratio	0.28	0.53		2.69dl	0.58	
Uniform Delay, d1	24.1	26.3		17.5	10.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	4.3		36.3	0.8	
Delay (s)	24.7	30.6		53.8	11.4	
Level of Service	C	C		D	B	
Approach Delay (s)	27.6			53.8	11.4	
Approach LOS	C			D	B	

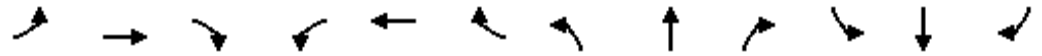
Intersection Summary

HCM Average Control Delay	33.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	104.0%	ICU Level of Service	G
Analysis Period (min)	15		
dl Defacto Left Lane. Recode with 1 though lane as a left lane.			
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖	↖
Volume (vph)	462	835	374	96	640	41	78	152	70	69	415	186
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.99		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1752	3289		1805	3470		1770	3341		1752	1845	1568
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1752	3289		1805	3470		1770	3341		1752	1845	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	502	908	407	104	696	45	85	165	76	75	451	202
RTOR Reduction (vph)	0	56	0	0	5	0	0	57	0	0	0	155
Lane Group Flow (vph)	502	1259	0	104	736	0	85	184	0	75	451	47
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	3%	2%	5%	0%	3%	1%	2%	2%	1%	3%	3%	3%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	23.0	40.3		7.6	24.9		5.0	22.0		3.9	20.9	20.9
Effective Green, g (s)	23.0	40.3		7.6	24.9		5.0	22.0		3.9	20.9	20.9
Actuated g/C Ratio	0.26	0.45		0.08	0.28		0.06	0.24		0.04	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	449	1476		153	962		99	819		76	429	365
v/s Ratio Prot	c0.29	c0.38		0.06	0.21		c0.05	0.05		0.04	c0.24	
v/s Ratio Perm												0.03
v/c Ratio	1.12	0.85		0.68	0.77		0.86	0.22		0.99	1.05	0.13
Uniform Delay, d1	33.4	22.1		39.9	29.8		42.0	27.1		42.9	34.5	27.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	78.7	5.0		11.4	3.7		47.9	0.1		98.0	57.6	0.2
Delay (s)	112.1	27.1		51.3	33.4		89.9	27.2		140.9	92.0	27.4
Level of Service	F	C		D	C		F	C		F	F	C
Approach Delay (s)		50.6			35.6			43.6			79.1	
Approach LOS		D			D			D			E	

Intersection Summary

HCM Average Control Delay	52.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	648	297	167	694	91	172	720	39	137	1370	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95			0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1763	3326			3250		1752	3539	1528	1805	3471	1480
Flt Permitted	0.21	1.00			0.57		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	392	3326			1853		1752	3539	1528	1805	3471	1480
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	704	323	182	754	99	187	783	42	149	1489	163
RTOR Reduction (vph)	0	61	0	0	9	0	0	0	12	0	0	25
Lane Group Flow (vph)	133	966	0	0	1026	0	187	783	30	149	1489	138
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	2%	2%	3%	1%	1%	0%	3%	2%	1%	0%	4%	5%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	50.9	50.9			50.9		5.0	18.0	18.0	7.0	20.0	20.0
Effective Green, g (s)	50.9	50.9			50.9		5.0	18.0	18.0	7.0	20.0	20.0
Actuated g/C Ratio	0.58	0.58			0.58		0.06	0.20	0.20	0.08	0.23	0.23
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	227	1926			1073		100	725	313	144	790	337
v/s Ratio Prot		0.29					c0.11	0.22		0.08	c0.43	
v/s Ratio Perm	0.34				c0.55				0.02			0.09
v/c Ratio	0.59	0.50			0.96		1.87	1.08	0.10	1.03	1.88	0.41
Uniform Delay, d1	11.8	11.0			17.4		41.5	35.0	28.4	40.5	34.0	28.9
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.2			17.7		427.0	57.1	0.1	84.5	403.0	0.8
Delay (s)	15.6	11.2			35.1		468.4	92.1	28.5	125.0	436.9	29.7
Level of Service	B	B			D		F	F	C	F	F	C
Approach Delay (s)		11.7			35.1			159.0			374.3	
Approach LOS		B			D			F			F	

Intersection Summary

HCM Average Control Delay	176.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	115.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/20/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	254	292	969	200	768	1029
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3477		3433	3574
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3477		3433	3574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	276	317	1053	217	835	1118
RTOR Reduction (vph)	0	289	21	0	0	0
Lane Group Flow (vph)	276	28	1249	0	835	1118
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	2%	1%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	6.0	6.0	28.9		21.8	47.7
Effective Green, g (s)	6.0	6.0	28.9		21.8	47.7
Actuated g/C Ratio	0.09	0.09	0.42		0.32	0.69
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	158	243	1463		1089	2482
v/s Ratio Prot	c0.15	0.01	c0.36		c0.24	0.31
v/s Ratio Perm						
v/c Ratio	1.75	0.11	0.85		0.77	0.45
Uniform Delay, d1	31.4	28.9	18.0		21.2	4.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	360.9	0.2	5.1		3.3	0.1
Delay (s)	392.2	29.1	23.1		24.4	4.8
Level of Service	F	C	C		C	A
Approach Delay (s)	198.1		23.1			13.2
Approach LOS	F		C			B

Intersection Summary

HCM Average Control Delay	45.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↗	↖	↑↑		↖	↑↑		↖	↑↑	↗
Volume (vph)	380	165	96	25	238	51	139	899	50	62	438	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	1570	1787	3464		1805	3542		1770	3574	1557
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	1570	1787	3464		1805	3542		1770	3574	1557
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	413	179	104	27	259	55	151	977	54	67	476	408
RTOR Reduction (vph)	0	0	74	0	25	0	0	4	0	0	0	260
Lane Group Flow (vph)	413	179	30	27	289	0	151	1027	0	67	476	148
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	1%	0%	1%	1%	1%	0%	1%	0%	2%	1%	1%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	7.3	19.8	19.8	3.2	15.7		5.2	25.9		4.5	25.2	25.2
Effective Green, g (s)	7.3	19.8	19.8	3.2	15.7		5.2	25.9		4.5	25.2	25.2
Actuated g/C Ratio	0.11	0.29	0.29	0.05	0.23		0.07	0.37		0.06	0.36	0.36
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	368	1020	448	82	784		135	1322		115	1298	565
v/s Ratio Prot	c0.12	0.05		0.02	c0.08		c0.08	c0.29		c0.04	0.13	
v/s Ratio Perm			0.02									0.10
v/c Ratio	1.12	0.18	0.07	0.33	0.37		1.12	0.78		0.58	0.37	0.26
Uniform Delay, d1	31.1	18.7	18.1	32.1	22.7		32.1	19.2		31.5	16.2	15.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	84.3	0.1	0.1	2.4	0.3		112.8	2.9		7.3	0.2	0.2
Delay (s)	115.4	18.7	18.1	34.4	23.0		144.9	22.1		38.9	16.4	15.8
Level of Service	F	B	B	C	C		F	C		D	B	B
Approach Delay (s)		76.0			23.9			37.8			17.7	
Approach LOS		E			C			D			B	

Intersection Summary

HCM Average Control Delay	38.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	69.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	113	25	30	129	360	100	777	73	249	714	127
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.89		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3436		1805	3149		3467	3610	1579	3502	3574	1561
Flt Permitted	0.35	1.00		0.66	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	663	3436		1248	3149		3467	3610	1579	3502	3574	1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	123	27	33	140	391	109	845	79	271	776	138
RTOR Reduction (vph)	0	20	0	0	166	0	0	0	38	0	0	57
Lane Group Flow (vph)	87	130	0	33	365	0	109	845	41	271	776	81
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	2%	1%	0%	1%	0%	1%	0%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	13.3	13.3		13.3	13.3		3.9	19.5	19.5	6.5	22.1	22.1
Effective Green, g (s)	13.3	13.3		13.3	13.3		3.9	19.5	19.5	6.5	22.1	22.1
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.08	0.38	0.38	0.13	0.43	0.43
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	172	891		324	816		264	1372	600	444	1540	672
v/s Ratio Prot		0.04			0.12		0.03	c0.23		0.08	c0.22	
v/s Ratio Perm	c0.13			0.03					0.03			0.05
v/c Ratio	0.51	0.15		0.10	0.45		0.41	0.62	0.07	0.61	0.50	0.12
Uniform Delay, d1	16.2	14.6		14.5	15.9		22.6	12.9	10.1	21.2	10.6	8.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.3	0.1		0.1	0.4		1.1	0.8	0.0	2.5	0.3	0.1
Delay (s)	18.5	14.7		14.6	16.3		23.7	13.7	10.2	23.7	10.9	8.8
Level of Service	B	B		B	B		C	B	B	C	B	A
Approach Delay (s)		16.1			16.2			14.5			13.6	
Approach LOS		B			B			B			B	























Intersection Summary

HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	51.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

46: Maritime Street & Burma Road

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	179	1	47	66	4	136	129	238	50	173	522	412
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.85		1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1543	843		912	1052		1318	2296		1719	2609	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1543	843		912	1052		1318	2296		1719	2609	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	195	1	51	72	4	148	140	259	54	188	567	448
RTOR Reduction (vph)	0	44	0	0	130	0	0	18	0	0	151	0
Lane Group Flow (vph)	195	8	0	72	22	0	140	295	0	188	864	0
Heavy Vehicles (%)	17%	100%	92%	98%	100%	53%	37%	58%	30%	5%	46%	8%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	12.7	11.7		10.9	9.9		11.4	28.5		13.0	30.1	
Effective Green, g (s)	12.7	11.7		10.9	9.9		11.4	28.5		13.0	30.1	
Actuated g/C Ratio	0.16	0.15		0.14	0.12		0.14	0.36		0.16	0.38	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	245	123		124	130		188	817		279	980	
v/s Ratio Prot	c0.13	0.01		0.08	c0.02		0.11	0.13		c0.11	c0.33	
v/s Ratio Perm												
v/c Ratio	0.80	0.07		0.58	0.17		0.74	0.36		0.67	0.88	
Uniform Delay, d1	32.5	29.5		32.5	31.4		33.0	19.1		31.6	23.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.2	0.2		6.8	0.6		14.8	0.3		6.3	9.4	
Delay (s)	48.7	29.7		39.2	32.1		47.7	19.3		37.8	32.7	
Level of Service	D	C		D	C		D	B		D	C	
Approach Delay (s)		44.7			34.4			28.1			33.5	
Approach LOS		D			C			C			C	
Intersection Summary												
HCM Average Control Delay			33.8				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			80.1			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			66.7%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

47: 14th Street & Maritime Street

4/20/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Volume (vph)	5	0	1	13	0	35	19	541	81	85	261	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.98			0.90		1.00	0.98		1.00	0.99	
Flt Protected		0.96			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1783			1463		1805	2267		1736	2059	
Flt Permitted		1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1857			1482		1805	2267		1736	2059	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	0	1	14	0	38	21	588	88	92	284	27
RTOR Reduction (vph)	0	1	0	0	36	0	0	16	0	0	9	0
Lane Group Flow (vph)	0	5	0	0	16	0	21	660	0	92	302	0
Heavy Vehicles (%)	0%	0%	0%	36%	0%	8%	0%	63%	10%	4%	80%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6								
Actuated Green, G (s)		1.9			1.9		0.5	18.6		2.4	20.5	
Effective Green, g (s)		1.9			1.9		0.5	18.6		2.4	20.5	
Actuated g/C Ratio		0.05			0.05		0.01	0.53		0.07	0.59	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		101			81		26	1208		119	1209	
v/s Ratio Prot							0.01	c0.29		c0.05	0.15	
v/s Ratio Perm		0.00			c0.01							
v/c Ratio		0.05			0.20		0.81	0.55		0.77	0.25	
Uniform Delay, d1		15.6			15.8		17.2	5.4		16.0	3.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			1.2		94.5	0.5		26.2	0.1	
Delay (s)		15.9			17.0		111.7	5.9		42.2	3.6	
Level of Service		B			B		F	A		D	A	
Approach Delay (s)		15.9			17.0			9.1			12.4	
Approach LOS		B			B			A			B	

Intersection Summary

HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	34.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway/Maritime Street

4/20/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↓
Volume (vph)	164	185	247	140	137	685
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1941	859	965	1920	997	1099
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1941	859	965	1920	997	1099
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	201	268	152	149	745
RTOR Reduction (vph)	0	164	0	0	0	541
Lane Group Flow (vph)	178	37	268	152	149	204
Heavy Vehicles (%)	86%	88%	87%	88%	81%	47%
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	11.8	11.8	22.4	38.2	17.4	17.4
Effective Green, g (s)	11.8	11.8	22.4	38.2	17.4	17.4
Actuated g/C Ratio	0.19	0.19	0.35	0.60	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	360	159	340	1153	273	301
v/s Ratio Prot	c0.09		c0.28	0.08	0.15	
v/s Ratio Perm		0.04				c0.19
v/c Ratio	0.49	0.23	0.79	0.13	0.55	0.68
Uniform Delay, d1	23.2	22.1	18.5	5.5	19.7	20.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.8	11.5	0.1	2.2	5.9
Delay (s)	24.3	22.8	29.9	5.6	22.0	26.5
Level of Service	C	C	C	A	C	C
Approach Delay (s)	23.5			21.1	25.8	
Approach LOS	C			C	C	

Intersection Summary

HCM Average Control Delay	24.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	63.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	164	185	137	685	247	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	970	1920	1994	1099	1873	859
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	970	1920	1994	1099	1873	859
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	178	201	149	745	268	152
RTOR Reduction (vph)	0	0	0	0	0	116
Lane Group Flow (vph)	178	201	149	745	268	36
Heavy Vehicles (%)	86%	88%	81%	47%	87%	88%
Turn Type	Prot	NA	NA	Free	NA	Perm
Protected Phases	5	2	6		7	
Permitted Phases				Free		7
Actuated Green, G (s)	9.8	20.5	6.7	37.3	8.8	8.8
Effective Green, g (s)	9.8	20.5	6.7	37.3	8.8	8.8
Actuated g/C Ratio	0.26	0.55	0.18	1.00	0.24	0.24
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	255	1055	358	1099	442	203
v/s Ratio Prot	0.18	0.10	0.07		0.14	
v/s Ratio Perm				c0.68		0.04
v/c Ratio	0.70	0.19	0.42	0.68	0.61	0.18
Uniform Delay, d1	12.4	4.2	13.6	0.0	12.7	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1	0.1	0.8	3.4	2.4	0.4
Delay (s)	20.5	4.3	14.4	3.4	15.1	11.8
Level of Service	C	A	B	A	B	B
Approach Delay (s)		11.9	5.2		13.9	
Approach LOS		B	A		B	

Intersection Summary


















HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	37.3	Sum of lost time (s)	0.0
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

49: W. Truck Services & Burma Road

4/20/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	63	0	136	282	127	0	0	36	126	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	68	0	148	307	138	0	0	39	137	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					788							
pX, platoon unblocked												
vC, conflicting volume	445			68			740	809	34	745	740	376
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	445			68			740	809	34	745	740	376
tC, single (s)	4.1			4.2			7.5	6.5	7.0	8.6	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	4.0	4.0	3.3
p0 queue free %	100			90			100	100	96	31	100	100
cM capacity (veh/h)	1126			1523			286	286	1022	198	313	628
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2						
Volume Total	46	23	592	39	91	46						
Volume Left	0	0	148	0	91	46						
Volume Right	0	0	138	39	0	0						
cSH	1700	1700	1523	1022	198	198						
Volume to Capacity	0.03	0.01	0.10	0.04	0.46	0.23						
Queue Length 95th (ft)	0	0	8	3	55	21						
Control Delay (s)	0.0	0.0	2.7	8.7	37.7	28.5						
Lane LOS			A	A	E	D						
Approach Delay (s)	0.0		2.7	8.7	34.6							
Approach LOS				A	D							
Intersection Summary												
Average Delay			8.0									
Intersection Capacity Utilization			53.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	718	417	566	1196	82	109	17	254	28	20	15
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.97	1.00	0.96	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1719	3406	1170	1583	3490		1058	1066	970	1597	1635	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1719	3406	1170	1583	3490		1058	1066	970	1597	1635	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	780	453	615	1300	89	118	18	276	30	22	16
RTOR Reduction (vph)	0	0	306	0	3	0	0	0	242	0	15	0
Lane Group Flow (vph)	52	780	147	615	1386	0	67	69	34	30	23	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	5%	6%	35%	14%	2%	6%	62%	67%	62%	13%	0%	11%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	6.8	34.7	34.7	51.4	79.3		15.1	15.1	15.1	4.5	4.5	
Effective Green, g (s)	6.8	34.7	34.7	51.4	79.3		15.1	15.1	15.1	4.5	4.5	
Actuated g/C Ratio	0.06	0.28	0.28	0.42	0.65		0.12	0.12	0.12	0.04	0.04	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	96	967	332	666	2265		131	132	120	59	60	
v/s Ratio Prot	0.03	c0.23		c0.39	0.40		0.06	c0.06		c0.02	0.01	
v/s Ratio Perm			0.13						0.04			
v/c Ratio	0.54	0.81	0.44	0.92	0.61		0.51	0.52	0.28	0.51	0.38	
Uniform Delay, d1	56.2	40.6	35.8	33.5	12.5		50.1	50.2	48.6	57.8	57.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	6.1	5.5	1.6	18.5	0.6		4.4	4.8	1.8	6.7	3.9	
Delay (s)	62.3	46.2	37.4	52.0	13.1		54.5	55.0	50.4	64.5	61.4	
Level of Service	E	D	D	D	B		D	D	D	E	E	
Approach Delay (s)		43.7			25.1			51.8			62.8	
Approach LOS		D			C			D			E	

Intersection Summary

HCM Average Control Delay	35.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	122.2	Sum of lost time (s)	16.5
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	139	568	307	368	1216	322	356	274	433	238	366	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.91		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3134		1492	3471	1568	1687	2780		1736	2983	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3134		1492	3471	1568	1687	2780		1736	2983	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	151	617	334	400	1322	350	387	298	471	259	398	212
RTOR Reduction (vph)	0	72	0	0	0	216	0	288	0	0	70	0
Lane Group Flow (vph)	151	879	0	400	1322	134	387	481	0	259	540	0
Confl. Peds. (#/hr)			10									
Heavy Vehicles (%)	0%	4%	16%	21%	4%	3%	7%	21%	16%	4%	22%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	9.3	25.0		22.5	38.2	38.2	19.0	21.0		15.0	17.0	
Effective Green, g (s)	9.3	25.0		22.5	38.2	38.2	19.0	21.0		15.0	17.0	
Actuated g/C Ratio	0.09	0.25		0.22	0.38	0.38	0.19	0.21		0.15	0.17	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	168	784		336	1326	599	321	584		260	507	
v/s Ratio Prot	0.08	c0.28		c0.27	0.38		c0.23	0.17		0.15	c0.18	
v/s Ratio Perm						0.09						
v/c Ratio	0.90	1.12		1.19	1.00	0.22	1.21	0.82		1.00	1.07	
Uniform Delay, d1	44.9	37.5		38.8	30.8	20.9	40.5	37.7		42.5	41.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	41.9	70.9		111.5	23.9	0.3	118.3	9.5		54.5	58.6	
Delay (s)	86.7	108.4		150.2	54.7	21.2	158.8	47.2		96.9	100.1	
Level of Service	F	F		F	D	C	F	D		F	F	
Approach Delay (s)		105.4			67.5			84.5			99.2	
Approach LOS		F			E			F			F	

Intersection Summary

HCM Average Control Delay	84.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕↕	↗
Volume (vph)	68	943	232	105	918	39	287	253	82	23	1012	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.95		1.00	0.95	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		1.00	1.00		0.99	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)		3466	1448		3419	1535	1752	1845	1567		1776	1521
Flt Permitted		0.56	1.00		0.50	1.00	0.95	1.00	1.00		1.00	1.00
Satd. Flow (perm)		1942	1448		1735	1535	1752	1845	1567		1776	1521
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	1025	252	114	998	42	312	275	89	25	1100	313
RTOR Reduction (vph)	0	0	144	0	0	9	0	0	50	0	0	30
Lane Group Flow (vph)	0	1099	108	0	1112	33	312	275	39	0	1125	283
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	4%	6%	23%	3%	0%	3%	3%	0%	0%	7%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)		45.0	45.0		45.0	45.0	20.0	20.0	20.0		42.5	42.5
Effective Green, g (s)		45.0	45.0		45.0	45.0	20.0	20.0	20.0		42.5	42.5
Actuated g/C Ratio		0.38	0.38		0.38	0.38	0.17	0.17	0.17		0.35	0.35
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		728	543		651	576	292	308	261		629	539
v/s Ratio Prot							c0.18	0.15			c0.63	
v/s Ratio Perm		0.57	0.07		c0.64	0.02			0.02			0.19
v/c Ratio		1.51	0.20		2.24dl	0.06	1.07	0.89	0.15		1.79	0.52
Uniform Delay, d1		37.5	25.3		37.5	24.0	50.0	49.0	42.7		38.8	30.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		236.4	0.8		325.2	0.2	72.0	25.5	0.1		361.2	0.4
Delay (s)		273.9	26.2		362.7	24.1	122.0	74.5	42.8		400.0	31.2
Level of Service		F	C		F	C	F	E	D		F	C
Approach Delay (s)		227.7			350.4			92.2			319.7	
Approach LOS		F			F			F			F	

Intersection Summary

HCM Average Control Delay	267.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	143.0%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	347	600	1280	61	647	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.99	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3406	3471	1521	3422	1374
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3406	3471	1521	3422	1374
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	377	652	1391	66	703	279
RTOR Reduction (vph)	0	0	0	19	4	188
Lane Group Flow (vph)	377	652	1391	47	727	63
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	6%	4%	3%	2%	4%
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	19.6	55.6	32.0	32.0	21.4	21.4
Effective Green, g (s)	19.6	55.6	32.0	32.0	21.4	21.4
Actuated g/C Ratio	0.23	0.65	0.38	0.38	0.25	0.25
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	408	2228	1307	573	862	346
v/s Ratio Prot	c0.21	0.19	c0.40		c0.21	
v/s Ratio Perm				0.03		0.05
v/c Ratio	0.92	0.29	1.06	0.08	0.84	0.18
Uniform Delay, d1	32.0	6.3	26.5	17.0	30.2	24.9
Progression Factor	0.77	1.59	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.9	0.3	43.9	0.3	7.3	0.1
Delay (s)	49.7	10.3	70.4	17.3	37.5	25.0
Level of Service	D	B	E	B	D	C
Approach Delay (s)		24.7	68.0		34.3	
Approach LOS		C	E		C	

Intersection Summary

HCM Average Control Delay	45.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷		↶	↷			↷	↶		↷	
Volume (vph)	24	735	60	312	896	21	14	41	112	11	47	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.99		1.00	1.00			1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		0.99	
Satd. Flow (prot)	1794	3287		1761	3393			1871	1573		1807	
Flt Permitted	0.26	1.00		0.30	1.00			0.94	1.00		0.96	
Satd. Flow (perm)	482	3287		558	3393			1772	1573		1756	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	799	65	339	974	23	15	45	122	12	51	17
RTOR Reduction (vph)	0	6	0	0	2	0	0	0	96	0	9	0
Lane Group Flow (vph)	26	858	0	339	995	0	0	60	26	0	71	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	9%	0%	2%	6%	2%	0%	0%	0%	4%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2		2		2
Permitted Phases	1			1			2		2	2		
Actuated Green, G (s)	71.0	71.0		71.0	71.0			21.0	21.0		21.0	
Effective Green, g (s)	71.0	71.0		71.0	71.0			21.0	21.0		21.0	
Actuated g/C Ratio	0.71	0.71		0.71	0.71			0.21	0.21		0.21	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	342	2334		396	2409			372	330		369	
v/s Ratio Prot		0.26			0.29							
v/s Ratio Perm	0.05			c0.61				0.03	0.02		c0.04	
v/c Ratio	0.08	0.37		0.86	0.41			0.16	0.08		0.19	
Uniform Delay, d1	4.4	5.7		10.7	6.0			32.3	31.7		32.5	
Progression Factor	0.24	0.33		0.77	0.67			1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3		19.9	0.5			0.9	0.5		1.1	
Delay (s)	1.4	2.2		28.1	4.5			33.2	32.2		33.7	
Level of Service	A	A		C	A			C	C		C	
Approach Delay (s)		2.2			10.5			32.5			33.7	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	9.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	43	706	59	214	301	0	0	235	1108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.93	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.94	1.00	1.00	1.00	1.00			1.00	1.00
Frft				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1705	1776	1424	1784	1863			1578	1477
Flt Permitted				0.95	1.00	1.00	0.17	1.00			1.00	1.00
Satd. Flow (perm)				1705	1776	1424	326	1863			1578	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	47	767	64	233	327	0	0	255	1204
RTOR Reduction (vph)	0	0	0	0	0	42	0	0	0	0	16	0
Lane Group Flow (vph)	0	0	0	47	767	22	233	327	0	0	733	710
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	7%	5%	1%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				25.5	25.5	25.5	43.5	43.5			43.5	80.0
Effective Green, g (s)				25.5	25.5	25.5	43.5	43.5			43.5	80.0
Actuated g/C Ratio				0.32	0.32	0.32	0.54	0.54			0.54	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				543	566	454	177	1013			858	1477
v/s Ratio Prot					c0.43			0.18			0.46	
v/s Ratio Perm				0.03		0.02	c0.71					0.48
v/c Ratio				0.09	1.36	0.05	1.32	0.32			0.85	0.48
Uniform Delay, d1				19.1	27.2	18.9	18.2	10.1			15.5	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			0.88	1.00
Incremental Delay, d2				0.3	171.1	0.2	176.5	0.8			10.0	1.1
Delay (s)				19.4	198.4	19.1	194.8	10.9			23.7	1.1
Level of Service				B	F	B	F	B			C	A
Approach Delay (s)		0.0			175.7			87.4			12.7	
Approach LOS		A			F			F			B	

Intersection Summary

HCM Average Control Delay	76.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/23/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↖	↖↖	↑	↑↑↑	↘	↗	↖	↗
Volume (vph)	68	345	0	559	132	0	1891	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frpb, ped/bikes	1.00	1.00		1.00	0.96		1.00	1.00
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1583	3127		5136	1217		1681	1698
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1583	3127		5136	1217		1681	1698
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	375	0	608	143	0	2055	170
RTOR Reduction (vph)	7	0	0	0	0	0	0	0
Lane Group Flow (vph)	67	375	0	608	143	0	1110	1115
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	12%	12%	5%	1%	28%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	18.3	18.3		16.2	16.2		71.5	71.5
Effective Green, g (s)	18.3	18.3		16.2	16.2		71.5	71.5
Actuated g/C Ratio	0.15	0.15		0.13	0.13		0.60	0.60
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	241	477		693	164		1002	1012
v/s Ratio Prot				c0.12			c0.66	0.66
v/s Ratio Perm	0.04	c0.12			0.12			
v/c Ratio	0.28	0.79		0.88	0.87		1.11	1.10
Uniform Delay, d1	45.0	49.0		50.9	50.9		24.2	24.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	8.3		12.1	36.3		62.8	60.4
Delay (s)	45.6	57.3		63.0	87.2		87.0	84.7
Level of Service	D	E		E	F		F	F
Approach Delay (s)			55.4	67.6				85.8
Approach LOS			E	E				F

Intersection Summary

HCM Average Control Delay	77.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↗	↖	↑↑		↘	↑	↗	↖	↑	↗
Volume (vph)	40	429	36	79	289	42	89	213	93	275	575	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.95	1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt		1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5103	1496	1765	3520		1780	1881	1555	1767	1827	1570
Flt Permitted		0.88	1.00	0.42	1.00		0.30	1.00	1.00	0.61	1.00	1.00
Satd. Flow (perm)		4496	1496	785	3520		570	1881	1555	1134	1827	1570
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	466	39	86	314	46	97	232	101	299	625	75
RTOR Reduction (vph)	0	0	27	0	14	0	0	0	43	0	0	17
Lane Group Flow (vph)	0	509	12	86	346	0	97	232	58	299	625	58
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	1%	3%	1%	0%	0%	1%	1%	1%	1%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		2
Actuated Green, G (s)		26.0	26.0	26.0	26.0		49.0	49.0	49.0	49.0	49.0	49.0
Effective Green, g (s)		26.0	26.0	26.0	26.0		49.0	49.0	49.0	49.0	49.0	49.0
Actuated g/C Ratio		0.31	0.31	0.31	0.31		0.58	0.58	0.58	0.58	0.58	0.58
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		1375	458	240	1077		329	1084	896	654	1053	905
v/s Ratio Prot					0.10			0.12			c0.34	
v/s Ratio Perm		c0.11	0.01	0.11			0.17		0.04	0.26		0.04
v/c Ratio		0.37	0.03	0.36	0.32		0.29	0.21	0.06	0.46	0.59	0.06
Uniform Delay, d1		23.1	20.6	23.0	22.7		9.2	8.7	7.9	10.4	11.6	7.9
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.8	0.1	4.1	0.8		2.3	0.5	0.1	2.3	2.5	0.1
Delay (s)		23.9	20.7	27.1	23.5		11.5	9.1	8.1	12.6	14.1	8.0
Level of Service		C	C	C	C		B	A	A	B	B	A
Approach Delay (s)		23.6			24.2			9.4			13.2	
Approach LOS		C			C			A			B	

Intersection Summary

HCM Average Control Delay	16.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	501	203	130	426	31	288	134	55	37	388	85
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.98		1.00	1.00		1.00	0.99		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3297		1770	3527		1770	1783		1787	1827	1546
Flt Permitted	0.95	1.00		0.95	1.00		0.22	1.00		0.63	1.00	1.00
Satd. Flow (perm)	1770	3297		1770	3527		414	1783		1183	1827	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	545	221	141	463	34	313	146	60	40	422	92
RTOR Reduction (vph)	0	62	0	0	8	0	0	20	0	0	0	54
Lane Group Flow (vph)	183	704	0	141	489	0	313	186	0	40	422	38
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	2%	3%	3%	2%	1%	0%	2%	1%	1%	1%	4%	2%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	7.1	19.6		6.1	18.6		24.1	24.1		21.3	21.3	28.4
Effective Green, g (s)	7.1	19.6		6.1	18.6		24.1	24.1		21.3	21.3	28.4
Actuated g/C Ratio	0.10	0.28		0.09	0.27		0.35	0.35		0.31	0.31	0.41
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	182	935		156	949		264	622		394	563	725
v/s Ratio Prot	c0.10	c0.21		0.08	0.14		c0.10	0.10		0.00	c0.23	0.01
v/s Ratio Perm							c0.31			0.03		0.02
v/c Ratio	1.01	0.75		0.90	0.52		1.19	0.30		0.10	0.75	0.05
Uniform Delay, d1	31.0	22.5		31.2	21.4		21.3	16.4		17.1	21.5	12.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	68.1	3.5		44.8	0.5		115.1	0.3		0.1	5.4	0.0
Delay (s)	99.1	26.0		76.0	21.9		136.4	16.6		17.2	26.9	12.3
Level of Service	F	C		E	C		F	B		B	C	B
Approach Delay (s)		40.1			33.9			88.9			23.8	
Approach LOS		D			C			F			C	

Intersection Summary

HCM Average Control Delay	44.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	69.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/23/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	209	193	157	733	29	250	883	69	91	1804	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	3247		1787	3574	1577	1787	3539	1578	1787	3471	1562
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	3247		1787	3574	1577	1787	3539	1578	1787	3471	1562
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	227	210	171	797	32	272	960	75	99	1961	79
RTOR Reduction (vph)	0	161	0	0	0	7	0	0	15	0	0	8
Lane Group Flow (vph)	72	276	0	171	797	25	272	960	60	99	1961	71
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	2%	2%	1%	1%	0%	1%	2%	0%	1%	4%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	6.7	23.5		9.0	25.8	25.8	16.6	43.5	43.5	9.0	35.9	35.9
Effective Green, g (s)	6.7	23.5		9.0	25.8	25.8	16.6	43.5	43.5	9.0	35.9	35.9
Actuated g/C Ratio	0.07	0.24		0.09	0.26	0.26	0.17	0.44	0.44	0.09	0.36	0.36
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	117	763		161	922	407	297	1539	686	161	1246	561
v/s Ratio Prot	0.04	0.09		c0.10	c0.22		c0.15	0.27		0.06	c0.56	
v/s Ratio Perm						0.02			0.04			0.05
v/c Ratio	0.62	0.36		1.06	0.86	0.06	0.92	0.62	0.09	0.61	1.57	0.13
Uniform Delay, d1	45.4	32.0		45.5	35.4	28.0	41.0	21.9	16.6	43.8	32.0	21.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.3	0.3		88.4	8.5	0.1	31.0	1.9	0.3	6.8	262.1	0.5
Delay (s)	54.6	32.3		133.9	43.9	28.0	72.0	23.8	16.8	50.6	294.2	22.0
Level of Service	D	C		F	D	C	E	C	B	D	F	C
Approach Delay (s)		35.4			58.8			33.5			272.9	
Approach LOS		D			E			C			F	

Intersection Summary

HCM Average Control Delay	142.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	102.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	751	275	242	1232	36	682	21	460	64	13	71
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1641	3505	1034	1517	3513		1309	1305	1416	1736	1618	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1641	3505	1034	1517	3513		1309	1305	1416	1736	1618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	816	299	263	1339	39	741	23	500	70	14	77
RTOR Reduction (vph)	0	0	199	0	1	0	0	0	303	0	70	0
Lane Group Flow (vph)	20	816	101	263	1377	0	378	386	197	70	21	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	10%	3%	53%	19%	2%	10%	31%	50%	11%	4%	0%	3%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	3.1	40.2	40.2	24.3	61.4		28.4	28.4	28.4	10.2	10.2	
Effective Green, g (s)	3.1	40.2	40.2	24.3	61.4		28.4	28.4	28.4	10.2	10.2	
Actuated g/C Ratio	0.03	0.34	0.34	0.20	0.51		0.24	0.24	0.24	0.09	0.09	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	43	1178	348	308	1803		311	310	336	148	138	
v/s Ratio Prot	0.01	0.23		c0.17	c0.39		0.29	c0.30		c0.04	0.01	
v/s Ratio Perm			0.10						0.14			
v/c Ratio	0.47	0.69	0.29	0.85	0.76		1.22	1.25	0.58	0.47	0.15	
Uniform Delay, d1	57.4	34.4	29.2	45.9	23.3		45.6	45.6	40.4	52.1	50.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.8	2.1	0.8	19.9	2.2		122.7	134.5	3.1	2.4	0.5	
Delay (s)	65.2	36.4	30.0	65.9	25.5		168.3	180.1	43.4	54.5	51.2	
Level of Service	E	D	C	E	C		F	F	D	D	D	
Approach Delay (s)		35.2			32.0			122.5			52.6	
Approach LOS		D			C			F			D	






















Intersection Summary

HCM Average Control Delay	60.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	119.6	Sum of lost time (s)	11.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/24/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	224	692	361	397	989	212	363	423	717	138	266	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.91		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	3291		1517	3471	1583	1736	2686		1736	3103	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1703	3291		1517	3471	1583	1736	2686		1736	3103	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	243	752	392	432	1075	230	395	460	779	150	289	84
RTOR Reduction (vph)	0	84	0	0	0	161	0	276	0	0	33	0
Lane Group Flow (vph)	243	1060	0	432	1075	69	395	963	0	150	340	0
Heavy Vehicles (%)	6%	2%	8%	19%	4%	2%	4%	28%	18%	4%	16%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	11.9	25.0		11.0	24.1	24.1	16.0	16.7		10.6	11.3	
Effective Green, g (s)	11.9	25.0		11.0	24.1	24.1	16.0	16.7		10.6	11.3	
Actuated g/C Ratio	0.15	0.31		0.14	0.30	0.30	0.20	0.21		0.13	0.14	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	254	1031		209	1048	478	348	562		231	439	
v/s Ratio Prot	0.14	c0.32		c0.28	0.31		c0.23	c0.36		0.09	0.11	
v/s Ratio Perm						0.04						
v/c Ratio	0.96	1.03		2.07	1.03	0.15	1.14	1.71		0.65	0.77	
Uniform Delay, d1	33.7	27.4		34.4	27.8	20.3	31.9	31.5		32.8	33.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	44.4	35.5		496.3	34.5	0.2	90.1	328.6		6.4	8.5	
Delay (s)	78.1	62.9		530.7	62.4	20.6	122.0	360.2		39.3	41.5	
Level of Service	E	E		F	E	C	F	F		D	D	
Approach Delay (s)		65.6			173.3			302.6			40.9	
Approach LOS		E			F			F			D	
Intersection Summary												
HCM Average Control Delay			171.9			HCM Level of Service				F		
HCM Volume to Capacity ratio			1.33									
Actuated Cycle Length (s)			79.8			Sum of lost time (s)			11.5			
Intersection Capacity Utilization			109.3%			ICU Level of Service				H		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑		↖	↑↑						↖	
Volume (vph)	0	1500	59	229	1166	0	0	0	0	305	177	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0						5.0	
Lane Util. Factor		0.91		1.00	0.95						0.95	
Frbp, ped/bikes		1.00		1.00	1.00						0.99	
Flpb, ped/bikes		1.00		1.00	1.00						1.00	
Frt		0.99		1.00	1.00						0.94	
Flt Protected		1.00		0.95	1.00						0.98	
Satd. Flow (prot)		4957		1787	3438						3129	
Flt Permitted		1.00		0.09	1.00						0.98	
Satd. Flow (perm)		4957		163	3438						3129	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1630	64	249	1267	0	0	0	0	332	192	395
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	1690	0	249	1267	0	0	0	0	0	898	0
Confl. Peds. (#/hr)			10	10						10		10
Heavy Vehicles (%)	8%	4%	2%	1%	5%	5%	1%	4%	1%	3%	7%	5%
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		4			8						6	
Permitted Phases				8						6		
Actuated Green, G (s)		47.3		47.3	47.3						30.4	
Effective Green, g (s)		47.3		47.3	47.3						30.4	
Actuated g/C Ratio		0.54		0.54	0.54						0.35	
Clearance Time (s)		5.0		5.0	5.0						5.0	
Vehicle Extension (s)		2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)		2674		88	1854						1085	
v/s Ratio Prot		0.34			0.37							
v/s Ratio Perm				c1.53							0.29	
v/c Ratio		0.63		2.83	0.68						0.83	
Uniform Delay, d1		14.1		20.2	14.7						26.3	
Progression Factor		1.00		0.49	0.31						1.00	
Incremental Delay, d2		0.4		849.2	0.7						5.1	
Delay (s)		14.5		859.2	5.3						31.3	
Level of Service		B		F	A						C	
Approach Delay (s)		14.5			145.5			0.0			31.3	
Approach LOS		B			F			A			C	

Intersection Summary

HCM Average Control Delay	66.3	HCM Level of Service	E
HCM Volume to Capacity ratio	2.05		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	10.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

333: W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↑↑				
Volume (vph)	378	1427	0	0	1284	106	111	209	211	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0			5.0				
Lane Util. Factor		0.91			0.91			0.95				
Frbp, ped/bikes		1.00			1.00			0.99				
Flpb, ped/bikes		1.00			1.00			1.00				
Frt		1.00			0.99			0.94				
Flt Protected		0.99			1.00			0.99				
Satd. Flow (prot)		5031			5016			3265				
Flt Permitted		0.65			1.00			0.99				
Satd. Flow (perm)		3326			5016			3265				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	411	1551	0	0	1396	115	121	227	229	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	1962	0	0	1502	0	0	568	0	0	0	0
Confl. Peds. (#/hr)	10					10			10			
Turn Type	Perm	NA			NA		Perm	NA				
Protected Phases		4			8			2				
Permitted Phases	4						2					
Actuated Green, G (s)		47.3			47.3			30.4				
Effective Green, g (s)		47.3			47.3			30.4				
Actuated g/C Ratio		0.54			0.54			0.35				
Clearance Time (s)		5.0			5.0			5.0				
Vehicle Extension (s)		2.0			2.0			2.0				
Lane Grp Cap (vph)		1794			2705			1132				
v/s Ratio Prot					0.30							
v/s Ratio Perm		c0.59						0.17				
v/c Ratio		3.54dl			0.56			0.50				
Uniform Delay, d1		20.2			13.3			22.7				
Progression Factor		0.57			1.00			1.00				
Incremental Delay, d2		49.8			0.1			0.1				
Delay (s)		61.2			13.4			22.8				
Level of Service		E			B			C				
Approach Delay (s)		61.2			13.4			22.8			0.0	
Approach LOS		E			B			C			A	

Intersection Summary

HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	10.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔			↔↕↔			↔↕			↔↕	
Volume (vph)	36	1473	114	64	864	62	68	661	76	128	714	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.99			0.99	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		4971			4872			3155			3421	
Flt Permitted		0.89			0.74			0.54			0.53	
Satd. Flow (perm)		4424			3607			1705			1816	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1601	124	70	939	67	74	718	83	139	776	77
RTOR Reduction (vph)	0	10	0	0	9	0	0	10	0	0	8	0
Lane Group Flow (vph)	0	1754	0	0	1067	0	0	865	0	0	984	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	4%	9%	5%	0%	9%	11%	24%	0%	4%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1		1		1		2		2		2
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5		48.5		23.0		23.0		23.0		23.0
Effective Green, g (s)		48.5		48.5		23.0		23.0		23.0		23.0
Actuated g/C Ratio		0.61		0.61		0.29		0.29		0.29		0.29
Clearance Time (s)		3.5		3.5		5.0		5.0		5.0		5.0
Lane Grp Cap (vph)		2682		2187		490		522				
v/s Ratio Prot												
v/s Ratio Perm		c0.40		0.30		0.51		c0.54				
v/c Ratio		0.65		0.49		1.77		1.89				
Uniform Delay, d1		10.3		8.8		28.5		28.5				
Progression Factor		1.00		1.00		1.00		1.00				
Incremental Delay, d2		1.3		0.8		352.7		405.6				
Delay (s)		11.5		9.6		381.2		434.1				
Level of Service		B		A		F		F				F
Approach Delay (s)		11.5		9.6		381.2		434.1				
Approach LOS		B		A		F		F				F

Intersection Summary

HCM Average Control Delay	168.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	128.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕	↗
Volume (vph)	176	1423	332	126	811	54	360	544	142	70	572	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.96		1.00	0.96	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		0.99	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3484	1488		3355	1532	1719	1810	1485		1841	1514
Flt Permitted		0.60	1.00		0.50	1.00	0.12	1.00	1.00		0.43	1.00
Satd. Flow (perm)		2097	1488		1704	1532	213	1810	1485		793	1514
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	1547	361	137	882	59	391	591	154	76	622	127
RTOR Reduction (vph)	0	0	55	0	0	19	0	0	11	0	0	36
Lane Group Flow (vph)	0	1738	306	0	1019	40	391	591	143	0	698	91
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	3%	3%	4%	19%	5%	1%	5%	5%	6%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Effective Green, g (s)		47.0	47.0		47.0	47.0	34.0	34.0	34.0		34.0	34.0
Actuated g/C Ratio		0.52	0.52		0.52	0.52	0.38	0.38	0.38		0.38	0.38
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1095	777		890	800	80	684	561		300	572
v/s Ratio Prot								0.33				
v/s Ratio Perm		c0.83	0.21		0.60	0.03	c1.84		0.10		0.88	0.06
v/c Ratio		1.59	0.39		1.93dl	0.05	4.89	0.86	0.25		2.33	0.16
Uniform Delay, d1		21.5	12.9		21.5	10.6	28.0	25.9	19.3		28.0	18.5
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		268.6	1.5		78.5	0.1	1777.2	10.7	0.1		607.3	0.0
Delay (s)		290.1	14.4		100.0	10.7	1805.2	36.5	19.4		635.3	18.6
Level of Service		F	B		F	B	F	D	B		F	B
Approach Delay (s)		242.7			95.1			643.0			540.4	
Approach LOS		F			F			F			F	

Intersection Summary

HCM Average Control Delay	348.0	HCM Level of Service	F
HCM Volume to Capacity ratio	2.96		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	149.0%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗	↖	↕↕	↗	↖	↕↕		↖	↕↕	
Volume (vph)	122	1384	142	71	885	170	108	788	30	152	662	145
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00	0.97	1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3490	1525	1805	3406	1555	1764	3519		1764	3369	
Flt Permitted		0.63	1.00	0.10	1.00	1.00	0.23	1.00		0.22	1.00	
Satd. Flow (perm)		2216	1525	197	3406	1555	420	3519		410	3369	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	1504	154	77	962	185	117	857	33	165	720	158
RTOR Reduction (vph)	0	0	44	0	0	60	0	2	0	0	18	0
Lane Group Flow (vph)	0	1637	110	77	962	125	117	888	0	165	860	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	3%	3%	3%	0%	6%	1%	2%	2%	0%	2%	4%	3%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4		4	4		4	2			6		
Actuated Green, G (s)		38.6	38.6	38.6	38.6	38.6	36.9	36.9		36.9	36.9	
Effective Green, g (s)		38.6	38.6	38.6	38.6	38.6	36.9	36.9		36.9	36.9	
Actuated g/C Ratio		0.45	0.45	0.45	0.45	0.45	0.43	0.43		0.43	0.43	
Clearance Time (s)		4.0	4.0	4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1006	693	89	1547	706	182	1528		178	1463	
v/s Ratio Prot					0.28			0.25				0.26
v/s Ratio Perm		c0.74	0.07	0.39		0.08	0.28			c0.40		
v/c Ratio		1.63	0.16	0.87	0.62	0.18	0.64	0.58		0.93	0.59	
Uniform Delay, d1		23.2	13.6	20.9	17.6	13.8	18.9	18.2		22.8	18.3	
Progression Factor		1.00	1.00	0.59	0.56	0.23	1.00	1.00		1.00	1.00	
Incremental Delay, d2		286.8	0.5	56.3	1.6	0.5	10.2	0.9		46.9	0.7	
Delay (s)		310.0	14.1	68.6	11.5	3.7	29.1	19.1		69.7	19.0	
Level of Service		F	B	E	B	A	C	B		E	B	
Approach Delay (s)		284.6			13.9			20.2			27.0	
Approach LOS		F			B			C			C	

Intersection Summary

HCM Average Control Delay	113.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	115.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

7: MLK Jr. Way & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗		↕	↗		↕	
Volume (vph)	69	1404	19	40	1161	10	37	197	327	38	88	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98		1.00	0.98		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99	1.00		0.99	
Satd. Flow (prot)	1803	3539	1579	1751	3471	1579		3548	1533		3289	
Flt Permitted	0.15	1.00	1.00	0.09	1.00	1.00		0.87	1.00		0.87	
Satd. Flow (perm)	292	3539	1579	172	3471	1579		3124	1533		2897	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	1526	21	43	1262	11	40	214	355	41	96	123
RTOR Reduction (vph)	0	0	3	0	0	2	0	0	8	0	19	0
Lane Group Flow (vph)	75	1526	18	43	1262	9	0	254	347	0	241	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	2%	0%	3%	4%	0%	0%	1%	3%	0%	0%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4		4	4		4	2		2	2		
Actuated Green, G (s)	51.0	51.0	51.0	51.0	51.0	51.0		25.5	25.5		25.5	
Effective Green, g (s)	51.0	51.0	51.0	51.0	51.0	51.0		25.5	25.5		25.5	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60		0.30	0.30		0.30	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5		4.0	4.0		4.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	
Lane Grp Cap (vph)	175	2123	947	103	2083	947		937	460		869	
v/s Ratio Prot		c0.43			0.36							
v/s Ratio Perm	0.26		0.01	0.25		0.01		0.08	c0.23		0.08	
v/c Ratio	0.43	0.72	0.02	0.42	0.61	0.01		0.27	0.75		0.28	
Uniform Delay, d1	9.2	12.0	6.9	9.1	10.7	6.8		22.7	26.9		22.7	
Progression Factor	1.16	1.15	1.48	1.29	1.35	0.96		1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.2	0.0	5.4	0.6	0.0		0.1	6.1		0.1	
Delay (s)	11.3	13.9	10.2	17.1	15.0	6.6		22.7	33.0		22.8	
Level of Service	B	B	B	B	B	A		C	C		C	
Approach Delay (s)		13.7			15.0			28.7			22.8	
Approach LOS		B			B			C			C	

Intersection Summary

HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: W. Grand Avenue & Northgate Avenue

4/24/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	705	1441	1142	453	186	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	0.91
Frbp, ped/bikes	1.00	1.00	1.00	0.97	0.99	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	0.97	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (prot)	1770	3505	3610	1554	3294	1395
Flt Permitted	0.95	1.00	1.00	1.00	0.96	1.00
Satd. Flow (perm)	1770	3505	3610	1554	3294	1395
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	766	1566	1241	492	202	175
RTOR Reduction (vph)	0	0	0	160	37	102
Lane Group Flow (vph)	766	1566	1241	332	221	17
Confl. Peds. (#/hr)				15	15	15
Heavy Vehicles (%)	2%	3%	0%	0%	4%	2%
Bus Blockages (#/hr)	0	0	0	2	0	1
Turn Type	Prot	NA	NA	Perm	NA	Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	30.9	64.9	30.0	30.0	12.1	12.1
Effective Green, g (s)	30.9	64.9	30.0	30.0	12.1	12.1
Actuated g/C Ratio	0.36	0.76	0.35	0.35	0.14	0.14
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	643	2676	1274	548	469	199
v/s Ratio Prot	c0.43	0.45	c0.34		c0.07	
v/s Ratio Perm				0.21		0.01
v/c Ratio	1.19	0.59	0.97	0.61	0.47	0.09
Uniform Delay, d1	27.1	4.3	27.1	22.6	33.5	31.6
Progression Factor	0.84	1.13	1.00	1.00	1.00	1.00
Incremental Delay, d2	98.8	0.8	19.7	4.9	0.3	0.1
Delay (s)	121.6	5.7	46.8	27.6	33.8	31.7
Level of Service	F	A	D	C	C	C
Approach Delay (s)		43.7	41.4		33.1	
Approach LOS		D	D		C	

Intersection Summary

HCM Average Control Delay	41.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↔	↔↔	↑↑	↔		↔↔↔	↔		↔↔↔	↔
Volume (vph)	202	567	400	311	722	105	55	2121	851	122	746	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	3610	1514	3467	3574	1529		5125	1577		5107	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.83	1.00		0.67	1.00
Satd. Flow (perm)	3467	3610	1514	3467	3574	1529		4263	1577		3460	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	616	435	338	785	114	60	2305	925	133	811	248
RTOR Reduction (vph)	0	0	25	0	0	18	0	0	0	0	0	109
Lane Group Flow (vph)	220	616	410	338	785	96	0	2365	925	0	944	139
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	1%	0%	1%	1%	1%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	10.7	33.1	33.1	12.0	34.4	34.4		34.9	95.0		34.9	34.9
Effective Green, g (s)	10.7	33.1	33.1	12.0	34.4	34.4		34.9	95.0		34.9	34.9
Actuated g/C Ratio	0.11	0.35	0.35	0.13	0.36	0.36		0.37	1.00		0.37	0.37
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	390	1258	528	438	1294	554		1566	1577		1271	562
v/s Ratio Prot	0.06	0.17		0.10	0.22							
v/s Ratio Perm			c0.27			0.06		c0.55	c0.59		0.27	0.09
v/c Ratio	0.56	0.49	0.78	0.77	0.61	0.17		1.51	0.59		1.66dl	0.25
Uniform Delay, d1	39.9	24.3	27.6	40.2	24.8	20.6		30.1	0.0		26.1	20.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.9	1.4	10.7	8.2	2.1	0.7		233.0	1.6		2.4	0.2
Delay (s)	41.8	25.7	38.3	48.4	26.9	21.3		263.0	1.6		28.5	21.1
Level of Service	D	C	D	D	C	C		F	A		C	C
Approach Delay (s)		32.8			32.2			189.5			27.0	
Approach LOS		C			C			F			C	

Intersection Summary

HCM Average Control Delay	105.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	111.6%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

10: Maritime Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑	↑	↑↑		↑	↑↑			↑↑	
Volume (vph)	1	657	127	140	433	5	88	2	167	14	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Lane Util. Factor		0.95	1.00	1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes		1.00	1.00	1.00	1.00		1.00	0.98			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Frt		1.00	0.85	1.00	1.00		1.00	0.85			0.98	
Flt Protected		1.00	1.00	0.95	1.00		0.95	1.00			0.96	
Satd. Flow (prot)		2421	873	945	2214		926	1667			2769	
Flt Permitted		0.95	1.00	0.95	1.00		0.95	1.00			0.95	
Satd. Flow (perm)		2312	873	945	2214		926	1667			2755	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	714	138	152	471	5	96	2	182	15	1	2
RTOR Reduction (vph)	0	0	71	0	0	0	0	141	0	0	2	0
Lane Group Flow (vph)	0	715	67	152	476	0	96	43	0	0	16	0
Confl. Peds. (#/hr)						5			5			
Heavy Vehicles (%)	100%	49%	85%	91%	63%	40%	95%	100%	81%	21%	100%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									
Actuated Green, G (s)		38.7	38.7	22.0	64.7		15.5	22.8			3.3	
Effective Green, g (s)		38.7	38.7	22.0	64.7		15.5	22.8			3.3	
Actuated g/C Ratio		0.40	0.40	0.23	0.67		0.16	0.24			0.03	
Clearance Time (s)		5.0	5.0	4.0	5.0		4.0	4.0			4.0	
Vehicle Extension (s)		3.0	3.0	3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		927	350	215	1484		149	394			94	
v/s Ratio Prot				c0.16	0.21		c0.10	c0.03				
v/s Ratio Perm		c0.31	0.08								0.01	
v/c Ratio		0.77	0.19	0.71	0.32		0.64	0.11			7.50dl	
Uniform Delay, d1		25.1	18.8	34.3	6.7		37.9	28.9			45.3	
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2		4.0	0.3	10.1	0.1		9.2	0.1			0.9	
Delay (s)		29.1	19.0	44.4	6.8		47.1	29.0			46.1	
Level of Service		C	B	D	A		D	C			D	
Approach Delay (s)		27.5			15.9			35.2			46.1	
Approach LOS		C			B			D			D	

Intersection Summary

HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	96.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

11: I-880 SB On-Ramp & 7th Street

4/24/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↔	↑↑		
Volume (vph)	402	444	330	581	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		
Lane Util. Factor	0.95		0.97	0.95		
Frt	0.92		1.00	1.00		
Flt Protected	1.00		0.95	1.00		
Satd. Flow (prot)	2145		3213	2136		
Flt Permitted	1.00		0.95	1.00		
Satd. Flow (perm)	2145		3213	2136		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	437	483	359	632	0	0
RTOR Reduction (vph)	62	0	0	0	0	0
Lane Group Flow (vph)	858	0	359	632	0	0
Heavy Vehicles (%)	54%	56%	9%	69%	2%	2%
Turn Type	NA		Prot	NA		
Protected Phases	2		1	6		
Permitted Phases						
Actuated Green, G (s)	18.9		8.3	35.2		
Effective Green, g (s)	18.9		8.3	35.2		
Actuated g/C Ratio	0.54		0.24	1.00		
Clearance Time (s)	4.0		4.0	4.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	1152		758	2136		
v/s Ratio Prot	c0.40		c0.11	0.30		
v/s Ratio Perm						
v/c Ratio	0.75		0.47	0.30		
Uniform Delay, d1	6.3		11.6	0.0		
Progression Factor	1.00		1.00	1.00		
Incremental Delay, d2	2.7		0.5	0.1		
Delay (s)	9.0		12.0	0.1		
Level of Service	A		B	A		
Approach Delay (s)	9.0			4.4	0.0	
Approach LOS	A			A	A	

Intersection Summary

HCM Average Control Delay	6.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	35.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	237	166	0	0	156	187	184	577	109	293	0	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.98		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1094	2674			2813		903	3211		1752		2137
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1094	2674			2813		903	3211		1752		2137
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	258	180	0	0	170	203	200	627	118	318	0	438
RTOR Reduction (vph)	0	0	0	0	169	0	0	15	0	0	0	338
Lane Group Flow (vph)	258	180	0	0	204	0	180	750	0	318	0	100
Heavy Vehicles (%)	65%	35%	0%	0%	38%	1%	82%	3%	3%	3%	0%	33%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	10.1	26.0			11.9		16.1	16.1		16.1		16.1
Effective Green, g (s)	10.1	26.0			11.9		16.1	16.1		16.1		16.1
Actuated g/C Ratio	0.14	0.37			0.17		0.23	0.23		0.23		0.23
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	157	990			477		207	736		402		490
v/s Ratio Prot	c0.24	0.07			c0.07		0.20	c0.23		c0.18		0.05
v/s Ratio Perm												
v/c Ratio	1.64	0.18			0.43		0.87	1.02		0.79		0.21
Uniform Delay, d1	30.1	14.9			26.1		26.0	27.1		25.5		21.9
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	316.3	0.1			0.6		29.8	37.9		10.2		0.2
Delay (s)	346.3	15.0			26.7		55.9	64.9		35.7		22.1
Level of Service	F	B			C		E	E		D		C
Approach Delay (s)		210.2			26.7			63.2			27.8	
Approach LOS		F			C			E			C	

Intersection Summary

HCM Average Control Delay	72.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	70.2	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Peralta Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕	↕		↕	
Volume (vph)	40	623	18	7	363	37	14	15	10	62	17	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		0.95			0.95			1.00	1.00		1.00	
Frbp, ped/bikes		1.00			1.00			1.00	0.98		0.99	
Flpb, ped/bikes		1.00			1.00			1.00	1.00		0.99	
Frt		1.00			0.99			1.00	0.85		0.95	
Flt Protected		1.00			1.00			0.98	1.00		0.98	
Satd. Flow (prot)		3310			3058			1245	1577		1609	
Flt Permitted		0.91			0.94			0.88	1.00		0.85	
Satd. Flow (perm)		3006			2888			1121	1577		1402	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	677	20	8	395	40	15	16	11	67	18	51
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	8	0	24	0
Lane Group Flow (vph)	0	738	0	0	435	0	0	31	3	0	112	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	13%	8%	5%	0%	18%	0%	100%	0%	0%	0%	0%	21%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2				2
Permitted Phases	4			4			2		2	2		
Actuated Green, G (s)		59.0			59.0			23.0	23.0		23.0	
Effective Green, g (s)		59.0			59.0			23.0	23.0		23.0	
Actuated g/C Ratio		0.66			0.66			0.26	0.26		0.26	
Clearance Time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)		1971			1893			286	403		358	
v/s Ratio Prot												
v/s Ratio Perm		c0.25			0.15			0.03	0.00		c0.08	
v/c Ratio		0.37			0.23			0.11	0.01		0.31	
Uniform Delay, d1		7.1			6.3			25.6	25.0		27.1	
Progression Factor		1.00			1.54			1.00	1.00		1.00	
Incremental Delay, d2		0.5			0.3			0.8	0.0		2.3	
Delay (s)		7.6			9.9			26.4	25.0		29.4	
Level of Service		A			A			C	C		C	
Approach Delay (s)		7.6			9.9			26.0			29.4	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

14: Mandela Parkway & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	787	13	112	684	72	18	54	97	77	75	47
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95			1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.99			0.92		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1805	1772		1787	3236			1708		1739	1773	
Flt Permitted	0.95	1.00		0.95	1.00			0.95		0.34	1.00	
Satd. Flow (perm)	1805	1772		1787	3236			1639		615	1773	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	77	855	14	122	743	78	20	59	105	84	82	51
RTOR Reduction (vph)	0	0	0	0	5	0	0	70	0	0	33	0
Lane Group Flow (vph)	77	869	0	122	816	0	0	114	0	84	100	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	7%	0%	1%	10%	7%	0%	0%	0%	3%	0%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.8	54.3		12.8	62.3			11.9		11.9	11.9	
Effective Green, g (s)	4.8	54.3		12.8	62.3			11.9		11.9	11.9	
Actuated g/C Ratio	0.05	0.60		0.14	0.69			0.13		0.13	0.13	
Clearance Time (s)	3.0	4.0		3.0	4.0			4.0		4.0	4.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0			2.0		2.0	2.0	
Lane Grp Cap (vph)	96	1069		254	2240			217		81	234	
v/s Ratio Prot	0.04	c0.49		c0.07	0.25						0.06	
v/s Ratio Perm								0.07		c0.14		
v/c Ratio	0.80	0.81		0.48	0.36			0.52		1.04	0.43	
Uniform Delay, d1	42.1	13.9		35.5	5.7			36.4		39.0	35.9	
Progression Factor	0.89	0.79		1.48	0.13			1.00		1.00	1.00	
Incremental Delay, d2	34.1	6.6		0.4	0.4			1.1		110.5	0.5	
Delay (s)	71.8	17.5		53.1	1.1			37.5		149.6	36.4	
Level of Service	E	B		D	A			D		F	D	
Approach Delay (s)		21.9			7.8			37.5			80.2	
Approach LOS		C			A			D			F	

Intersection Summary

HCM Average Control Delay	22.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

15: Union Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	934	24	95	840	22	38	77	149	10	10	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00	1.00		1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00			1.00	0.97		0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00		1.00	1.00			1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00			0.98	1.00		0.99	
Satd. Flow (prot)	1805	3427		1752	3331			1861	1527		1728	
Flt Permitted	0.20	1.00		0.16	1.00			0.92	1.00		0.94	
Satd. Flow (perm)	375	3427		292	3331			1731	1527		1651	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	1015	26	103	913	24	41	84	162	11	11	17
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	28	0	9	0
Lane Group Flow (vph)	49	1039	0	103	935	0	0	125	134	0	30	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	5%	0%	3%	8%	1%	0%	0%	3%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2		2	2		2
Actuated Green, G (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Effective Green, g (s)	41.0	41.0		41.0	41.0			41.0	41.0		41.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.46	0.46		0.46	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0	4.0		4.0	
Lane Grp Cap (vph)	171	1561		133	1517			789	696		752	
v/s Ratio Prot		0.30			0.28							
v/s Ratio Perm	0.13			c0.35				0.07	c0.09		0.02	
v/c Ratio	0.29	0.67		0.77	0.62			0.16	0.19		0.04	
Uniform Delay, d1	15.3	19.1		20.6	18.5			14.4	14.6		13.6	
Progression Factor	1.41	1.42		0.86	0.91			1.00	1.00		1.00	
Incremental Delay, d2	3.0	1.6		28.6	1.5			0.4	0.6		0.1	
Delay (s)	24.6	28.8		46.2	18.3			14.8	15.2		13.7	
Level of Service	C	C		D	B			B	B		B	
Approach Delay (s)		28.6			21.1			15.0			13.7	
Approach LOS		C			C			B			B	

Intersection Summary

HCM Average Control Delay	23.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

16: Adeline Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗			↗	
Volume (vph)	74	688	52	89	1226	70	47	91	124	42	70	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00			1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.91			0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.99	
Satd. Flow (prot)	1768	3398		1042	3406	1541	1445	1972			2855	
Flt Permitted	0.13	1.00		0.30	1.00	1.00	0.63	1.00			0.84	
Satd. Flow (perm)	248	3398		331	3406	1541	964	1972			2429	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	80	748	57	97	1333	76	51	99	135	46	76	65
RTOR Reduction (vph)	0	6	0	0	0	30	0	93	0	0	37	0
Lane Group Flow (vph)	80	799	0	97	1333	46	51	141	0	0	150	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	2%	4%	18%	73%	6%	3%	24%	53%	74%	0%	40%	3%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1		1	2			2		
Actuated Green, G (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Effective Green, g (s)	54.0	54.0		54.0	54.0	54.0	28.0	28.0			28.0	
Actuated g/C Ratio	0.60	0.60		0.60	0.60	0.60	0.31	0.31			0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0			4.0	
Lane Grp Cap (vph)	149	2039		199	2044	925	300	614			756	
v/s Ratio Prot		0.24			c0.39			c0.07				
v/s Ratio Perm	0.32			0.29		0.03	0.05				0.06	
v/c Ratio	0.54	0.39		0.49	0.65	0.05	0.17	0.23			0.20	
Uniform Delay, d1	10.6	9.4		10.2	11.8	7.4	22.5	23.0			22.8	
Progression Factor	0.47	0.27		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	10.7	0.5		8.3	1.6	0.1	1.2	0.9			0.6	
Delay (s)	15.7	3.0		18.5	13.5	7.5	23.8	23.9			23.4	
Level of Service	B	A		B	B	A	C	C			C	
Approach Delay (s)		4.1			13.5			23.9			23.4	
Approach LOS		A			B			C			C	

Intersection Summary

HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

17: Market Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑↑		↗	↑↑↑		↗	↑	↗	↗	↑↑	↗
Volume (vph)	180	577	43	109	909	50	204	216	111	264	210	235
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1527	4526		1799	4694		1725	1810	1493	1726	3505	1330
Flt Permitted	0.21	1.00		0.36	1.00		0.61	1.00	1.00	0.57	1.00	1.00
Satd. Flow (perm)	342	4526		684	4694		1107	1810	1493	1027	3505	1330
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	196	627	47	118	988	54	222	235	121	287	228	255
RTOR Reduction (vph)	0	10	0	0	7	0	0	0	66	0	0	33
Lane Group Flow (vph)	196	664	0	118	1035	0	222	235	55	287	228	222
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	18%	14%	3%	0%	10%	1%	4%	5%	6%	4%	3%	19%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Effective Green, g (s)	39.0	39.0		39.0	39.0		36.5	36.5	36.5	36.5	36.5	36.5
Actuated g/C Ratio	0.46	0.46		0.46	0.46		0.43	0.43	0.43	0.43	0.43	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	157	2077		314	2154		475	777	641	441	1505	571
v/s Ratio Prot		0.15			0.22			0.13				0.07
v/s Ratio Perm	c0.57			0.17			0.20		0.04	c0.28		0.17
v/c Ratio	1.25	0.32		0.38	0.48		0.47	0.30	0.09	0.65	0.15	0.39
Uniform Delay, d1	23.0	14.6		15.0	16.0		17.3	15.9	14.4	19.2	14.8	16.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	153.7	0.4		0.3	0.1		3.3	1.0	0.3	7.3	0.2	2.0
Delay (s)	176.7	15.0		15.3	16.0		20.6	16.9	14.6	26.5	15.0	18.6
Level of Service	F	B		B	B		C	B	B	C	B	B
Approach Delay (s)		51.4			16.0			17.8			20.5	
Approach LOS		D			B			B			C	

Intersection Summary

HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	368	787	0	0	0	0	0	1425	1551	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.95	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4739						4597	1375			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4739						4597	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	855	0	0	0	0	0	1549	1686	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	110	59	0	0	0
Lane Group Flow (vph)	0	1255	0	0	0	0	0	2282	784	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	8%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						16.0	36.5			
Effective Green, g (s)		34.0						16.0	36.5			
Actuated g/C Ratio		0.57						0.27	0.61			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2685						1226	836			
v/s Ratio Prot								c0.50				
v/s Ratio Perm		0.26							c0.57			
v/c Ratio		0.47						1.86	0.94			
Uniform Delay, d1		7.7						22.0	10.7			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		0.6						390.7	17.7			
Delay (s)		8.2						412.7	28.4			
Level of Service		A						F	C			
Approach Delay (s)		8.2			0.0			312.6			0.0	
Approach LOS		A			A			F			A	

Intersection Summary

HCM Average Control Delay	227.5	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

19: Jackson Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		←↑↑↑	↑					↑			↑	
Volume (vph)	51	1171	827	0	0	0	0	321	73	33	308	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	4.0					4.0			4.0	
Lane Util. Factor		0.86	0.86					1.00			1.00	
Frbp, ped/bikes		0.99	0.99					0.99			1.00	
Flpb, ped/bikes		1.00	1.00					1.00			1.00	
Frt		0.97	0.85					0.98			1.00	
Flt Protected		1.00	1.00					1.00			1.00	
Satd. Flow (prot)		4451	1355					1802			1823	
Flt Permitted		1.00	1.00					1.00			0.88	
Satd. Flow (perm)		4451	1355					1802			1619	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	1273	899	0	0	0	0	349	79	36	335	0
RTOR Reduction (vph)	0	96	0	0	0	0	0	12	0	0	0	0
Lane Group Flow (vph)	0	1628	503	0	0	0	0	416	0	0	371	0
Confl. Peds. (#/hr)	20		10						20	20		
Heavy Vehicles (%)	3%	7%	1%	0%	0%	0%	0%	2%	3%	0%	4%	0%
Turn Type	Perm	NA	Free					NA		Perm	NA	
Protected Phases		2						4			4	
Permitted Phases	2		Free							4		
Actuated Green, G (s)		30.3	60.0					20.7			20.7	
Effective Green, g (s)		30.3	60.0					20.7			20.7	
Actuated g/C Ratio		0.51	1.00					0.34			0.34	
Clearance Time (s)		5.0						4.0			4.0	
Vehicle Extension (s)		2.0						2.0			2.0	
Lane Grp Cap (vph)		2248	1355					622			559	
v/s Ratio Prot								c0.23				
v/s Ratio Perm		0.37	0.37								0.23	
v/c Ratio		0.72	0.37					0.67			0.66	
Uniform Delay, d1		11.6	0.0					16.7			16.7	
Progression Factor		0.44	1.00					0.90			1.00	
Incremental Delay, d2		0.1	0.1					5.4			6.1	
Delay (s)		5.1	0.1					20.4			22.8	
Level of Service		A	A					C			C	
Approach Delay (s)		4.0			0.0			20.4			22.8	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

20: Jackson Street & 6th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Volume (vph)	0	0	0	15	666	93	345	327	0	0	220	1196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.5	5.5	5.5	5.5	5.5			5.5	4.0
Lane Util. Factor				1.00	1.00	1.00	1.00	1.00			0.95	0.95
Frbp, ped/bikes				1.00	1.00	0.94	1.00	1.00			0.98	0.98
Flpb, ped/bikes				0.96	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			0.90	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1730	1759	1473	1767	1863			1570	1477
Flt Permitted				0.95	1.00	1.00	0.19	1.00			1.00	1.00
Satd. Flow (perm)				1730	1759	1473	351	1863			1570	1477
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	16	724	101	375	355	0	0	239	1300
RTOR Reduction (vph)	0	0	0	0	0	77	0	0	0	0	6	0
Lane Group Flow (vph)	0	0	0	16	724	24	375	355	0	0	779	754
Confl. Peds. (#/hr)				20		20	10					20
Heavy Vehicles (%)	0%	0%	0%	0%	8%	3%	2%	2%	0%	0%	0%	2%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Free
Protected Phases					8			2			2	
Permitted Phases				8		8	2					Free
Actuated Green, G (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Effective Green, g (s)				14.5	14.5	14.5	34.5	34.5			34.5	60.0
Actuated g/C Ratio				0.24	0.24	0.24	0.58	0.58			0.58	1.00
Clearance Time (s)				5.5	5.5	5.5	5.5	5.5			5.5	
Lane Grp Cap (vph)				418	425	356	202	1071			903	1477
v/s Ratio Prot					c0.41			0.19			0.50	
v/s Ratio Perm				0.01		0.02	c1.07					0.51
v/c Ratio				0.04	1.70	0.07	1.86	0.33			0.86	0.51
Uniform Delay, d1				17.4	22.8	17.5	12.8	6.7			10.8	0.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.04	1.00
Incremental Delay, d2				0.2	326.5	0.4	403.8	0.8			9.9	1.2
Delay (s)				17.6	349.3	17.9	416.6	7.5			21.1	1.2
Level of Service				B	F	B	F	A			C	A
Approach Delay (s)		0.0			303.2			217.7			11.3	
Approach LOS		A			F			F			B	

Intersection Summary

HCM Average Control Delay	138.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	151	26	320	64	19	17	271	600	7	96	6
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90			0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1823		1583	3470		1711	2516			3471	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.90	
Satd. Flow (perm)	1805	1823		1583	3470		1711	2516			3124	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	348	70	21	18	295	652	8	104	7
RTOR Reduction (vph)	0	8	0	0	13	0	0	415	0	0	5	0
Lane Group Flow (vph)	32	184	0	348	78	0	18	532	0	0	114	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	2%	0%	14%	0%	0%	5%	3%	38%	0%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	2.6	16.5		8.8	22.7		0.5	21.3			16.8	
Effective Green, g (s)	2.6	16.5		8.8	22.7		0.5	21.3			16.8	
Actuated g/C Ratio	0.04	0.28		0.15	0.39		0.01	0.36			0.29	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	80	513		238	1344		15	915			896	
v/s Ratio Prot	0.02	c0.10		c0.22	0.02		0.01	c0.21				
v/s Ratio Perm											0.04	
v/c Ratio	0.40	0.36		1.46	0.06		1.20	0.58			0.13	
Uniform Delay, d1	27.2	16.8		24.9	11.3		29.1	15.1			15.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	3.3	0.4		229.7	0.0		303.5	0.9			0.1	
Delay (s)	30.5	17.3		254.6	11.3		332.6	16.0			15.5	
Level of Service	C	B		F	B		F	B			B	
Approach Delay (s)		19.1			204.1			21.9			15.5	
Approach LOS		B			F			C			B	

Intersection Summary

HCM Average Control Delay	66.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Adeline Street & 5th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	58	729	65	24	151	14	174	264	203	138	112	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		0.91	0.91	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.93		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (prot)	1805	3255		1805	3557		1805	1937		1643	2296	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	0.99	
Satd. Flow (perm)	1805	3255		1805	3557		1805	1937		1643	2296	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	792	71	26	164	15	189	287	221	150	122	36
RTOR Reduction (vph)	0	5	0	0	6	0	0	110	0	0	15	0
Lane Group Flow (vph)	63	858	0	26	173	0	189	398	0	102	191	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	8%	24%	0%	0%	0%	0%	62%	86%	0%	75%	0%
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		3	3	
Permitted Phases												
Actuated Green, G (s)	7.1	30.4		2.8	26.6		23.3	23.3		13.9	13.9	
Effective Green, g (s)	7.1	30.4		2.8	26.6		23.3	23.3		13.9	13.9	
Actuated g/C Ratio	0.08	0.35		0.03	0.31		0.27	0.27		0.16	0.16	
Clearance Time (s)	3.5	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	148	1145		58	1095		487	522		264	369	
v/s Ratio Prot	c0.03	c0.26		0.01	0.05		0.10	c0.21		0.06	c0.08	
v/s Ratio Perm												
v/c Ratio	0.43	0.75		0.45	0.16		0.39	0.76		0.39	0.52	
Uniform Delay, d1	37.7	24.6		41.0	21.8		25.7	29.0		32.4	33.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.0	2.9		5.4	0.1		0.7	6.9		1.3	1.6	
Delay (s)	39.7	27.6		46.5	21.8		26.4	35.9		33.7	34.8	
Level of Service	D	C		D	C		C	D		C	C	
Approach Delay (s)		28.4			25.0			33.4			34.4	
Approach LOS		C			C			C			C	

Intersection Summary

HCM Average Control Delay	30.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	11.5
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

23: Market Street & 5th Street/I-880 Off-Ramp

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕↕	↗	↖	↑			↕↕	↗
Volume (vph)	0	0	0	30	117	178	56	646	0	0	449	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Lane Util. Factor					0.95	1.00	1.00	1.00			0.95	1.00
Frbp, ped/bikes					1.00	0.98	1.00	1.00			1.00	0.98
Flpb, ped/bikes					1.00	1.00	0.99	1.00			1.00	1.00
Frt					1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected					0.99	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)					3566	1581	1795	1152			2756	1579
Flt Permitted					0.99	1.00	0.47	1.00			1.00	1.00
Satd. Flow (perm)					3566	1581	896	1152			2756	1579
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	33	127	193	61	702	0	0	488	59
RTOR Reduction (vph)	0	0	0	0	0	139	0	0	0	0	0	15
Lane Group Flow (vph)	0	0	0	0	160	54	61	702	0	0	488	44
Confl. Peds. (#/hr)				10		10	10					10
Heavy Vehicles (%)	0%	26%	90%	0%	0%	0%	0%	65%	85%	1%	31%	0%
Turn Type				Perm	NA	Perm	Perm	NA			NA	Perm
Protected Phases					4			6			2	
Permitted Phases				4		4	6					2
Actuated Green, G (s)					12.8	12.8	67.7	67.7			67.7	67.7
Effective Green, g (s)					12.8	12.8	67.7	67.7			67.7	67.7
Actuated g/C Ratio					0.14	0.14	0.75	0.75			0.75	0.75
Clearance Time (s)					5.0	5.0	4.5	4.5			4.5	4.5
Vehicle Extension (s)					3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)					507	225	674	867			2073	1188
v/s Ratio Prot								c0.61			0.18	
v/s Ratio Perm					0.04	0.03	0.07					0.03
v/c Ratio					0.32	0.24	0.09	0.81			0.24	0.04
Uniform Delay, d1					34.7	34.3	3.0	7.1			3.4	2.8
Progression Factor					1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2					0.4	0.6	0.3	8.1			0.3	0.1
Delay (s)					35.0	34.8	3.2	15.1			3.6	2.9
Level of Service					D	C	A	B			A	A
Approach Delay (s)		0.0			34.9			14.2			3.5	
Approach LOS		A			C			B			A	

Intersection Summary

HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

24: Broadway & 5th Street & Webster Tube

4/24/2012



Movement	EBL	EBT	EBR	NBT	NBR	SBL2	SBL	SBT
Lane Configurations								
Volume (vph)	896	489	197	391	454	0	568	545
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Lane Util. Factor	0.91	0.91	1.00	0.91			1.00	1.00
Frbp, ped/bikes	1.00	1.00	1.00	0.97			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	0.92			1.00	1.00
Flt Protected	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (prot)	1626	3072	1553	4572			1752	1881
Flt Permitted	0.95	0.98	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1626	3072	1553	4572			1752	1881
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	974	532	214	425	493	0	617	592
RTOR Reduction (vph)	0	0	47	0	0	0	0	0
Lane Group Flow (vph)	497	1009	167	918	0	0	617	592
Confl. Peds. (#/hr)					20			
Heavy Vehicles (%)	1%	18%	4%	1%	1%	3%	3%	1%
Turn Type	Perm	NA	Perm	NA		Prot	Prot	NA
Protected Phases		4		2		1	1	6
Permitted Phases	4		4					
Actuated Green, G (s)	32.2	32.2	32.2	22.8			21.5	47.8
Effective Green, g (s)	32.2	32.2	32.2	22.8			21.5	47.8
Actuated g/C Ratio	0.36	0.36	0.36	0.25			0.24	0.53
Clearance Time (s)	5.5	5.5	5.5	3.5			4.5	4.5
Vehicle Extension (s)	2.0	2.0	2.0	2.0			2.0	2.0
Lane Grp Cap (vph)	582	1099	556	1158			419	999
v/s Ratio Prot				c0.20			c0.35	0.31
v/s Ratio Perm	0.31	0.33	0.11					
v/c Ratio	0.85	0.92	0.30	1.23dr			1.47	0.59
Uniform Delay, d1	26.7	27.6	20.8	31.4			34.2	14.4
Progression Factor	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	11.3	11.7	0.1	5.6			225.3	0.6
Delay (s)	38.0	39.3	20.9	37.0			259.5	15.1
Level of Service	D	D	C	D			F	B
Approach Delay (s)		36.6		37.0				139.8
Approach LOS		D		D				F

Intersection Summary

HCM Average Control Delay	69.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		





















dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

25: Adeline Street & 3rd Street

4/24/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	45	84	12	37	143	114	60	348	158	36	116	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	91	13	40	155	124	65	378	172	39	126	36
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2				
Volume Total (vph)	140	13	196	124	254	361	102	99				
Volume Left (vph)	49	0	40	0	65	0	39	0				
Volume Right (vph)	0	13	0	124	0	172	0	36				
Hadj (s)	0.17	-0.70	0.45	-0.67	1.11	1.07	1.03	0.61				
Departure Headway (s)	7.7	6.8	7.6	6.5	7.5	7.5	8.1	7.7				
Degree Utilization, x	0.30	0.02	0.42	0.22	0.53	0.75	0.23	0.21				
Capacity (veh/h)	444	494	451	524	460	470	423	444				
Control Delay (s)	12.7	8.8	14.7	10.2	17.6	28.5	12.3	11.6				
Approach Delay (s)	12.3		13.0		24.0		12.0					
Approach LOS	B		B		C		B					
Intersection Summary												
Delay			18.0									
HCM Level of Service			C									
Intersection Capacity Utilization			54.6%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

26: Market Street & 3rd Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗		↕		↗	↕	↗
Volume (veh/h)	14	367	13	16	164	16	47	17	41	34	21	56
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	399	14	17	178	17	51	18	45	37	23	61
Pedestrians		5			5			5			5	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	201			418			725	670	409	706	667	188
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			418			725	670	409	706	667	188
tC, single (s)	4.1			4.8			7.8	7.4	7.2	7.1	7.3	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.8			4.2	4.8	4.2	3.5	4.8	3.3
p0 queue free %	99			98			77	93	91	87	92	93
cM capacity (veh/h)	1378			868			221	276	472	292	281	844

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2	SB 3
Volume Total	414	14	196	17	114	37	15	68
Volume Left	15	0	17	0	51	37	0	0
Volume Right	0	14	0	17	45	0	0	61
cSH	1378	1700	868	1700	291	292	281	690
Volume to Capacity	0.01	0.01	0.02	0.01	0.39	0.13	0.05	0.10
Queue Length 95th (ft)	1	0	2	0	45	11	4	8
Control Delay (s)	0.4	0.0	1.0	0.0	25.1	19.1	18.5	10.8
Lane LOS	A		A		D	C	C	B
Approach Delay (s)	0.4		0.9		25.1	14.3		
Approach LOS					D	B		

Intersection Summary

Average Delay		5.7						
Intersection Capacity Utilization		50.3%		ICU Level of Service		A		
Analysis Period (min)		15						

HCM Signalized Intersection Capacity Analysis

27: Mandela Parkway & 14th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
Volume (vph)	0	156	12	13	126	0	0	0	0	28	136	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5		3.5						5.0	
Lane Util. Factor		0.95	1.00		0.95						0.95	
Frbp, ped/bikes		1.00	0.96		1.00						1.00	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		1.00						0.98	
Flt Protected		1.00	1.00		1.00						0.99	
Satd. Flow (prot)		3406	1550		3035						3425	
Flt Permitted		1.00	1.00		0.93						0.99	
Satd. Flow (perm)		3406	1550		2848						3425	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	170	13	14	137	0	0	0	0	30	148	35
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	0	0	29	0
Lane Group Flow (vph)	0	170	9	0	151	0	0	0	0	0	184	0
Confl. Peds. (#/hr)	20		20	20						20		20
Heavy Vehicles (%)	0%	6%	0%	0%	20%	0%	0%	4%	0%	0%	2%	0%
Turn Type		NA	Perm	Perm	NA						Perm	NA
Protected Phases		2			6							8
Permitted Phases			2	6						8		
Actuated Green, G (s)		54.6	54.6		54.6						13.4	
Effective Green, g (s)		54.6	54.6		54.6						13.4	
Actuated g/C Ratio		0.71	0.71		0.71						0.18	
Clearance Time (s)		3.5	3.5		3.5						5.0	
Vehicle Extension (s)		3.0	3.0		3.0						3.0	
Lane Grp Cap (vph)		2431	1106		2033						600	
v/s Ratio Prot		0.05										
v/s Ratio Perm			0.01		0.05						0.05	
v/c Ratio		0.07	0.01		0.07						0.31	
Uniform Delay, d1		3.3	3.2		3.3						27.5	
Progression Factor		1.00	1.00		0.25						1.00	
Incremental Delay, d2		0.1	0.0		0.1						0.3	
Delay (s)		3.4	3.2		0.9						27.8	
Level of Service		A	A		A						C	
Approach Delay (s)		3.3			0.9			0.0			27.8	
Approach LOS		A			A			A			C	
Intersection Summary												
HCM Average Control Delay			12.2								HCM Level of Service	B
HCM Volume to Capacity ratio			0.12									
Actuated Cycle Length (s)			76.5							Sum of lost time (s)	8.5	
Intersection Capacity Utilization			42.8%							ICU Level of Service	A	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

270: Mandela Parkway & 14th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔			↑↑	↗		↔↔				
Volume (vph)	14	142	0	0	139	46	5	194	57	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5	3.5		5.0				
Lane Util. Factor		0.95			0.95	1.00		0.95				
Frbp, ped/bikes		1.00			1.00	0.96		1.00				
Flpb, ped/bikes		1.00			1.00	1.00		1.00				
Frt		1.00			1.00	0.85		0.97				
Flt Protected		1.00			1.00	1.00		1.00				
Satd. Flow (prot)		3516			3539	1520		3418				
Flt Permitted		0.93			1.00	1.00		1.00				
Satd. Flow (perm)		3302			3539	1520		3418				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	154	0	0	151	50	5	211	62	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	14	0	51	0	0	0	0
Lane Group Flow (vph)	0	169	0	0	151	36	0	227	0	0	0	0
Confl. Peds. (#/hr)	20					20						
Turn Type	Perm	NA			NA	Perm	Perm	NA				
Protected Phases		2			6			4				
Permitted Phases	2					6	4					
Actuated Green, G (s)		54.6			54.6	54.6		13.4				
Effective Green, g (s)		54.6			54.6	54.6		13.4				
Actuated g/C Ratio		0.71			0.71	0.71		0.18				
Clearance Time (s)		3.5			3.5	3.5		5.0				
Vehicle Extension (s)		3.0			3.0	3.0		3.0				
Lane Grp Cap (vph)		2357			2526	1085		599				
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.05				0.02		0.07				
v/c Ratio		0.07			0.06	0.03		0.38				
Uniform Delay, d1		3.3			3.3	3.2		27.9				
Progression Factor		0.56			1.00	1.00		1.00				
Incremental Delay, d2		0.1			0.0	0.1		0.4				
Delay (s)		1.9			3.3	3.3		28.3				
Level of Service		A			A	A		C				
Approach Delay (s)		1.9			3.3			28.3			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	76.5	Sum of lost time (s)	8.5
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 28: West Street/I-980 SB Off-Ramp & Brush Street & 12th Street

4/24/2012



Movement	WBL2	WBL	WBT	SBT	SBR	NER2	SWL	SWT
Lane Configurations	↵	↵↵	↑	↑↑↑	↵	↵	↵	↵
Volume (vph)	104	508	0	294	74	0	1202	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Lane Util. Factor	1.00	0.97		0.91	1.00		0.95	0.95
Frbp, ped/bikes	1.00	1.00		1.00	0.97		1.00	1.00
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00		1.00	0.85		1.00	1.00
Flt Protected	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (prot)	1697	3335		5085	1296		1681	1703
Flt Permitted	0.95	0.95		1.00	1.00		0.95	0.96
Satd. Flow (perm)	1697	3335		5085	1296		1681	1703
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	552	0	320	80	0	1307	162
RTOR Reduction (vph)	33	0	0	0	0	0	0	0
Lane Group Flow (vph)	80	552	0	320	80	0	732	737
Confl. Peds. (#/hr)	10				10			
Heavy Vehicles (%)	5%	5%	6%	2%	21%	2%	2%	2%
Turn Type	Perm	Perm		NA	Perm	custom	Split	NA
Protected Phases			4	5			6	6
Permitted Phases	4	4			5	4		
Actuated Green, G (s)	19.8	19.8		11.6	11.6		39.6	39.6
Effective Green, g (s)	19.8	19.8		11.6	11.6		39.6	39.6
Actuated g/C Ratio	0.23	0.23		0.14	0.14		0.47	0.47
Clearance Time (s)	4.5	4.5		4.5	4.5		5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	395	777		694	177		783	793
v/s Ratio Prot				c0.06			c0.44	0.43
v/s Ratio Perm	0.05	c0.17			0.06			
v/c Ratio	0.20	0.71		0.46	0.45		0.93	0.93
Uniform Delay, d1	26.2	30.0		33.8	33.8		21.5	21.4
Progression Factor	0.44	0.65		1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	2.4		0.5	1.8		19.7	18.8
Delay (s)	11.6	22.0		34.3	35.6		41.2	40.2
Level of Service	B	C		C	D		D	D
Approach Delay (s)			20.3	34.6				40.7
Approach LOS			C	C				D

Intersection Summary			
HCM Average Control Delay		34.4	HCM Level of Service C
HCM Volume to Capacity ratio		0.79	
Actuated Cycle Length (s)		85.0	Sum of lost time (s) 14.0
Intersection Capacity Utilization		71.0%	ICU Level of Service C
Analysis Period (min)		15	
c	Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 29: Castro Street & 12th Street & I-980 NB On-Ramp

4/24/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	605	895	105	1888	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.94	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3115	1470	1493	1480	4439
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3115	1470	1493	1480	4439
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	658	973	114	2052	0
RTOR Reduction (vph)	0	0	47	1	0
Lane Group Flow (vph)	1125	506	56	1036	1026
Heavy Vehicles (%)	7%	0%	4%	4%	3%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	47.0	47.0	28.5	28.5	28.5
Effective Green, g (s)	47.0	47.0	28.5	28.5	28.5
Actuated g/C Ratio	0.55	0.55	0.34	0.34	0.34
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1722	813	501	496	1488
v/s Ratio Prot	c0.36		0.04	c0.70	0.23
v/s Ratio Perm		0.34			
v/c Ratio	0.65	0.62	0.11	2.09	1.84dl
Uniform Delay, d1	13.3	13.0	19.5	28.2	24.4
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	3.6	0.1	497.1	1.4
Delay (s)	15.2	16.5	19.6	525.3	25.8
Level of Service	B	B	B	F	C
Approach Delay (s)	15.6				264.7
Approach LOS	B				F

Intersection Summary

HCM Average Control Delay	157.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 30: Northgate Avenue/SR-24 Off-Ramp & 27th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑					↘	↑↑	↗
Volume (vph)	0	889	38	10	304	0	0	0	0	442	418	432
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5			5.5					6.5	6.5	6.5
Lane Util. Factor		0.91			0.91					1.00	0.95	1.00
Frbp, ped/bikes		1.00			1.00					1.00	1.00	0.97
Flpb, ped/bikes		1.00			1.00					1.00	1.00	1.00
Frt		0.99			1.00					1.00	1.00	0.85
Flt Protected		1.00			1.00					0.95	1.00	1.00
Satd. Flow (prot)		5097			5128					1805	3574	1555
Flt Permitted		1.00			0.90					0.95	1.00	1.00
Satd. Flow (perm)		5097			4623					1805	3574	1555
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	966	41	11	330	0	0	0	0	480	454	470
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	183
Lane Group Flow (vph)	0	1001	0	0	341	0	0	0	0	480	454	287
Confl. Peds. (#/hr)	20		20	20								20
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	0%	0%	1%	1%
Turn Type		NA		Perm	NA					Perm	NA	Perm
Protected Phases		1			1						2	
Permitted Phases				1						2		2
Actuated Green, G (s)		30.0			30.0					38.0	38.0	38.0
Effective Green, g (s)		30.0			30.0					38.0	38.0	38.0
Actuated g/C Ratio		0.38			0.38					0.48	0.48	0.48
Clearance Time (s)		5.5			5.5					6.5	6.5	6.5
Lane Grp Cap (vph)		1911			1734					857	1698	739
v/s Ratio Prot		c0.20									0.13	
v/s Ratio Perm					0.07					c0.27		0.18
v/c Ratio		0.52			0.20					0.56	0.27	0.39
Uniform Delay, d1		19.4			16.9					15.0	12.6	13.5
Progression Factor		1.00			0.18					1.00	1.00	1.00
Incremental Delay, d2		1.0			0.2					2.6	0.4	1.5
Delay (s)		20.5			3.3					17.7	13.0	15.1
Level of Service		C			A					B	B	B
Approach Delay (s)		20.5			3.3			0.0			15.3	
Approach LOS		C			A			A			B	

Intersection Summary

HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 31: Northgate Avenue/SR 24 On-Ramp & 27th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕↕↕			↕↕↕	↗		↕↕↕				
Volume (vph)	535	816	0	0	306	935	18	1138	83	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Util. Factor	0.86	0.86			0.86	0.86		0.91				
Frbp, ped/bikes	1.00	1.00			0.98	0.97		1.00				
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00				
Frt	1.00	1.00			0.91	0.85		0.99				
Flt Protected	0.95	0.99			1.00	1.00		1.00				
Satd. Flow (prot)	1537	4805			4334	1334		5061				
Flt Permitted	0.95	0.66			1.00	1.00		1.00				
Satd. Flow (perm)	1537	3209			4334	1334		5061				
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	582	887	0	0	333	1016	20	1237	90	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	5	0	10	0	0	0	0
Lane Group Flow (vph)	355	1114	0	0	836	503	0	1337	0	0	0	0
Confl. Peds. (#/hr)						20			20			
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	0%	1%	4%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Perm	NA				
Protected Phases	5	2			6			8				
Permitted Phases						6	8					
Actuated Green, G (s)	12.0	42.0			26.5	26.5		27.0				
Effective Green, g (s)	12.0	42.0			26.5	26.5		27.0				
Actuated g/C Ratio	0.15	0.52			0.33	0.33		0.34				
Clearance Time (s)	3.5	5.5			5.5	5.5		5.5				
Lane Grp Cap (vph)	231	1924			1436	442		1708				
v/s Ratio Prot	c0.23	0.09			0.19							
v/s Ratio Perm		0.22				c0.38		0.26				
v/c Ratio	1.54	1.07dl			1.02dr	1.14		0.78				
Uniform Delay, d1	34.0	13.0			22.2	26.8		23.9				
Progression Factor	1.00	2.17			1.00	1.00		1.00				
Incremental Delay, d2	259.4	1.1			1.7	86.0		3.7				
Delay (s)	293.5	29.2			23.9	112.7		27.5				
Level of Service	F	C			C	F		C				
Approach Delay (s)		93.1			57.3			27.5			0.0	
Approach LOS		F			E			C			A	

Intersection Summary

















HCM Average Control Delay	60.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		

- dl Defacto Left Lane. Recode with 1 though lane as a left lane.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.
- c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Adeline Street & San Pablo Avenue

4/24/2012

												
Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	0	880	1081	0	1433	173	110	16	182	21	168	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frbp, ped/bikes		0.98			0.99			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.92			0.98			0.91			0.99	
Flt Protected		1.00			1.00			0.98			0.99	
Satd. Flow (prot)		3211			3471			3161			3493	
Flt Permitted		1.00			1.00			0.98			0.99	
Satd. Flow (perm)		3211			3471			3161			3493	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	957	1175	0	1558	188	120	17	198	23	183	20
RTOR Reduction (vph)	0	341	0	0	14	0	0	180	0	0	11	0
Lane Group Flow (vph)	0	1791	0	0	1732	0	0	155	0	0	215	0
Confl. Peds. (#/hr)			30			30						30
Heavy Vehicles (%)	2%	2%	1%	1%	2%	0%	1%	2%	3%	0%	1%	2%
Turn Type		NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		8			4		2	2		1	1	
Permitted Phases				4								
Actuated Green, G (s)		33.0			33.0			6.0			14.0	
Effective Green, g (s)		33.0			33.0			6.0			14.0	
Actuated g/C Ratio		0.51			0.51			0.09			0.22	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Lane Grp Cap (vph)		1630			1762			292			752	
v/s Ratio Prot		c0.56			0.50			c0.05			c0.06	
v/s Ratio Perm												
v/c Ratio		1.10			0.98			0.53			0.29	
Uniform Delay, d1		16.0			15.7			28.2			21.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		54.5			17.7			6.8			1.0	
Delay (s)		70.5			33.5			34.9			22.3	
Level of Service		E			C			C			C	
Approach Delay (s)		70.5			33.5			34.9			22.3	
Approach LOS		E			C			C			C	

Intersection Summary

HCM Average Control Delay	50.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

33: Market Street & MacArthur Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑	↑	↑	↑↑		↑	↑	↑	↑	↑	↑
Volume (vph)	138	811	29	219	593	466	17	620	105	314	392	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes		1.00	0.96	1.00	0.98		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		5140	1528	1760	3287		1796	1863	1541	1805	1827	1572
Flt Permitted		0.66	1.00	0.24	1.00		0.25	1.00	1.00	0.17	1.00	1.00
Satd. Flow (perm)		3401	1528	449	3287		471	1863	1541	317	1827	1572
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	882	32	238	645	507	18	674	114	341	426	60
RTOR Reduction (vph)	0	0	14	0	21	0	0	0	23	0	0	22
Lane Group Flow (vph)	0	1032	18	238	1131	0	18	674	91	341	426	38
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	1%	0%	1%	2%	1%	0%	0%	2%	2%	0%	4%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4		4	4			2			2	
Permitted Phases	4		4	4			2		2	2		2
Actuated Green, G (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		46.0	46.0	46.0	46.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio		0.58	0.58	0.58	0.58		0.30	0.30	0.30	0.30	0.30	0.30
Clearance Time (s)		5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)		1956	879	258	1890		141	559	462	95	548	472
v/s Ratio Prot					0.34			0.36			0.23	
v/s Ratio Perm		0.30	0.01	c0.53			0.04		0.06	c1.08		0.02
v/c Ratio		0.53	0.02	0.92	0.60		0.13	1.21	0.20	3.59	0.78	0.08
Uniform Delay, d1		10.4	7.3	15.4	11.0		20.4	28.0	20.8	28.0	25.6	20.1
Progression Factor		1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.0	0.0	39.1	1.4		1.9	108.7	1.0	1191.0	10.4	0.3
Delay (s)		11.4	7.4	54.5	12.4		22.2	136.7	21.8	1219.0	36.0	20.4
Level of Service		B	A	D	B		C	F	C	F	D	C
Approach Delay (s)		11.3			19.6			117.9			522.6	
Approach LOS		B			B			F			F	

Intersection Summary

HCM Average Control Delay	138.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.84		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	117.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 34: I-80 SB On-Ramp/Frontage Road & Powell Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	408	594	0	616	1602	0	0	0	553	0	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95			0.91	0.91				0.97		1.00
Frbp, ped/bikes	1.00	0.95			0.98	0.98				1.00		0.97
Flpb, ped/bikes	1.00	1.00			1.00	1.00				1.00		1.00
Frt	1.00	0.91			0.92	0.85				1.00		0.85
Flt Protected	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (prot)	1787	3097			3037	1401				3433		1552
Flt Permitted	0.95	1.00			1.00	1.00				0.95		1.00
Satd. Flow (perm)	1787	3097			3037	1401				3433		1552
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	263	443	646	0	670	1741	0	0	0	601	0	295
RTOR Reduction (vph)	0	223	0	0	244	0	0	0	0	0	0	222
Lane Group Flow (vph)	263	866	0	0	1297	870	0	0	0	601	0	73
Confl. Peds. (#/hr)			20			20						20
Heavy Vehicles (%)	1%	1%	1%	0%	1%	3%	0%	0%	0%	2%	16%	1%
Turn Type	Prot	NA			NA	Free				Prot		custom
Protected Phases	5	2			6					4		
Permitted Phases						Free						4
Actuated Green, G (s)	14.1	54.2			36.1	82.7				20.5		20.5
Effective Green, g (s)	14.1	54.2			36.1	82.7				20.5		20.5
Actuated g/C Ratio	0.17	0.66			0.44	1.00				0.25		0.25
Clearance Time (s)	4.0	4.0			4.0					4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0					3.0		3.0
Lane Grp Cap (vph)	305	2030			1326	1401				851		385
v/s Ratio Prot	c0.15	0.28			c0.43					0.18		
v/s Ratio Perm						c0.62						0.05
v/c Ratio	0.86	0.43			0.98	0.62				0.71		0.19
Uniform Delay, d1	33.4	6.8			22.9	0.0				28.4		24.5
Progression Factor	1.00	1.00			1.00	1.00				1.00		1.00
Incremental Delay, d2	21.3	0.1			19.4	2.1				2.7		0.2
Delay (s)	54.7	7.0			42.3	2.1				31.0		24.8
Level of Service	D	A			D	A				C		C
Approach Delay (s)		16.2			27.8		0.0				29.0	
Approach LOS		B			C		A				C	

Intersection Summary		
HCM Average Control Delay	24.7	HCM Level of Service C
HCM Volume to Capacity ratio	0.84	
Actuated Cycle Length (s)	82.7	Sum of lost time (s) 8.0
Intersection Capacity Utilization	74.2%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis
 35: I-80 NB Off-Ramp/I-80 NB On-Ramp & Powell Street

4/24/2012

































Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑			↑↑↑	↗	↘	↕	↗			
Volume (vph)	134	707	0	0	1424	592	401	194	910	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Lane Util. Factor	1.00	0.91			0.91	1.00	0.95	0.91	0.95			
Frbp, ped/bikes	1.00	1.00			1.00	0.97	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	0.91	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	1787	5136			5136	1549	1649	1521	1490			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	1787	5136			5136	1549	1649	1521	1490			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	146	768	0	0	1548	643	436	211	989	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	228	0	90	128	0	0	0
Lane Group Flow (vph)	146	768	0	0	1548	415	392	551	475	0	0	0
Confl. Peds. (#/hr)						20						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	1%	4%	3%	3%	0%	0%	0%
Turn Type	Prot	NA			NA	Perm	Split	NA	Prot			
Protected Phases	5	2			6		8	8	8			
Permitted Phases						6						
Actuated Green, G (s)	5.4	32.6			23.2	23.2	18.1	18.1	18.1			
Effective Green, g (s)	5.4	32.6			23.2	23.2	18.1	18.1	18.1			
Actuated g/C Ratio	0.09	0.56			0.40	0.40	0.31	0.31	0.31			
Clearance Time (s)	4.0	4.0			4.0	4.0	4.0	4.0	4.0			
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0	3.0	3.0			
Lane Grp Cap (vph)	164	2852			2030	612	508	469	459			
v/s Ratio Prot	c0.08	0.15			c0.30		0.24	c0.36	0.32			
v/s Ratio Perm						0.27						
v/c Ratio	0.89	0.27			0.76	0.68	0.77	1.18	1.03			
Uniform Delay, d1	26.4	6.8			15.4	14.7	18.4	20.3	20.3			
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Incremental Delay, d2	40.4	0.1			1.7	3.0	7.1	99.2	51.3			
Delay (s)	66.7	6.9			17.1	17.7	25.6	119.5	71.6			
Level of Service	E	A			B	B	C	F	E			
Approach Delay (s)		16.4			17.3			79.4			0.0	
Approach LOS		B			B			E			A	

Intersection Summary		
HCM Average Control Delay	38.5	HCM Level of Service D
HCM Volume to Capacity ratio	0.94	
Actuated Cycle Length (s)	58.7	Sum of lost time (s) 12.0
Intersection Capacity Utilization	81.5%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

36: Christie Avenue & Powell Street

4/24/2012

														
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations	 	 			 			 			 	 		
Volume (vph)	440	789	573	161	1175	151	496	52	188	134	67	623		
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
Lane Util. Factor	0.97	0.91	0.91	1.00	0.95	1.00	0.95	0.95	1.00		1.00	0.88		
Frpb, ped/bikes	1.00	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.97		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	0.97	0.85	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00		
Satd. Flow (prot)	3433	3266	1411	1787	3574	1599	1698	1721	1615		1827	2731		
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.96	1.00		0.97	1.00		
Satd. Flow (perm)	3433	3266	1411	1787	3574	1599	1698	1721	1615		1827	2731		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92		
Adj. Flow (vph)	478	858	623	175	1277	164	539	57	204	146	73	677		
RTOR Reduction (vph)	0	16	292	0	0	45	0	0	175	0	0	248		
Lane Group Flow (vph)	478	1016	157	175	1277	119	296	300	29	0	219	429		
Confl. Peds. (#/hr)			20									20		
Heavy Vehicles (%)	2%	3%	1%	1%	1%	1%	1%	0%	0%	1%	0%	1%		
Turn Type	Prot	NA	Perm	Prot	NA	Prot	Split	NA	Prot	Split	NA	Perm		
Protected Phases	5	2		1	6	6	8	8	8	7	7			
Permitted Phases			2									7		
Actuated Green, G (s)	10.1	30.2	30.2	8.1	28.2	28.2	12.1	12.1	12.1		20.2	20.2		
Effective Green, g (s)	10.1	30.2	30.2	8.1	28.2	28.2	12.1	12.1	12.1		20.2	20.2		
Actuated g/C Ratio	0.12	0.35	0.35	0.09	0.33	0.33	0.14	0.14	0.14		0.23	0.23		
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	400	1139	492	167	1164	521	237	240	226		426	637		
v/s Ratio Prot	c0.14	0.31		0.10	c0.36	0.07	c0.17	0.17	0.02		0.12			
v/s Ratio Perm			0.11									c0.16		
v/c Ratio	1.20	0.89	0.32	1.05	1.10	0.23	1.25	1.25	0.13		0.51	0.67		
Uniform Delay, d1	38.2	26.7	20.7	39.2	29.2	21.3	37.2	37.2	32.6		28.9	30.2		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	109.8	9.0	0.4	82.9	57.1	0.2	142.1	142.2	0.3		1.0	2.8		
Delay (s)	148.0	35.7	21.0	122.1	86.3	21.5	179.3	179.4	32.9		30.0	33.0		
Level of Service	F	D	C	F	F	C	F	F	C		C	C		
Approach Delay (s)		59.8			83.6			142.0			32.3			
Approach LOS		E			F			F			C			
Intersection Summary														
HCM Average Control Delay			74.9									HCM Level of Service	E	
HCM Volume to Capacity ratio			0.96											
Actuated Cycle Length (s)			86.6								12.0		Sum of lost time (s)	
Intersection Capacity Utilization			81.5%										ICU Level of Service	D
Analysis Period (min)			15											
c Critical Lane Group														

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	154	748	186	94	602	70	596	554	84	104	385	255
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3386		1770	3498		1787	1820		1787	1810	1541
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.40	1.00	1.00
Satd. Flow (perm)	1719	3386		1770	3498		1787	1820		755	1810	1541
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	167	813	202	102	654	76	648	602	91	113	418	277
RTOR Reduction (vph)	0	24	0	0	10	0	0	6	0	0	0	20
Lane Group Flow (vph)	167	991	0	102	720	0	648	687	0	113	418	257
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	5%	2%	2%	2%	1%	0%	1%	2%	1%	1%	5%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases										4		4
Actuated Green, G (s)	9.0	24.0		5.0	20.0		24.0	40.6		21.8	21.8	30.8
Effective Green, g (s)	9.0	24.0		5.0	20.0		24.0	40.6		21.8	21.8	30.8
Actuated g/C Ratio	0.10	0.26		0.06	0.22		0.26	0.45		0.24	0.24	0.34
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	170	895		97	770		472	814		240	435	591
v/s Ratio Prot	c0.10	c0.29		0.06	0.21		c0.36	0.38		0.03	c0.23	0.04
v/s Ratio Perm										0.09		0.12
v/c Ratio	0.98	1.11		1.05	0.93		1.37	0.84		0.47	0.96	0.44
Uniform Delay, d1	40.8	33.4		42.9	34.8		33.4	22.3		30.8	34.1	23.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	63.5	63.8		106.0	18.3		180.8	8.0		1.5	33.1	0.5
Delay (s)	104.3	97.2		148.9	53.1		214.2	30.3		32.3	67.1	23.8
Level of Service	F	F		F	D		F	C		C	E	C
Approach Delay (s)		98.2			64.8			119.2			47.4	
Approach LOS		F			E			F			D	

Intersection Summary

HCM Average Control Delay	88.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 38: San Pablo Avenue & Powell Street/Stanford Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗	↗	↖	↗	↗
Volume (vph)	276	680	213	101	357	49	224	1146	109	202	1263	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3402		1770	3574	1564	1787	3505	1580	1787	3539	1564
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3402		1770	3574	1564	1787	3505	1580	1787	3539	1564
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	300	739	232	110	388	53	243	1246	118	220	1373	146
RTOR Reduction (vph)	0	33	0	0	0	28	0	0	22	0	0	24
Lane Group Flow (vph)	300	938	0	110	388	25	243	1246	96	220	1373	122
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	2%	2%	1%	2%	1%	1%	1%	3%	0%	1%	2%	1%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	26.3		7.5	24.3	24.3	13.3	29.5	29.5	11.7	27.9	27.9
Effective Green, g (s)	9.5	26.3		7.5	24.3	24.3	13.3	29.5	29.5	11.7	27.9	27.9
Actuated g/C Ratio	0.11	0.29		0.08	0.27	0.27	0.15	0.33	0.33	0.13	0.31	0.31
Clearance Time (s)	3.0	4.5		3.0	4.5	4.5	3.0	4.5	4.5	3.0	4.5	4.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	187	994		148	965	422	264	1149	518	232	1097	485
v/s Ratio Prot	c0.17	c0.28		0.06	0.11		c0.14	0.36		0.12	c0.39	
v/s Ratio Perm						0.02			0.06			0.08
v/c Ratio	1.60	0.94		0.74	0.40	0.06	0.92	1.08	0.19	0.95	1.25	0.25
Uniform Delay, d1	40.2	31.1		40.3	26.9	24.4	37.8	30.2	21.7	38.8	31.1	23.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	295.4	16.5		18.1	0.3	0.1	34.9	52.5	0.8	44.3	120.9	1.2
Delay (s)	335.7	47.7		58.4	27.2	24.4	72.7	82.8	22.5	83.1	151.9	24.5
Level of Service	F	D		E	C	C	E	F	C	F	F	C
Approach Delay (s)		115.6			33.2			76.8			132.5	
Approach LOS		F			C			E			F	

Intersection Summary

HCM Average Control Delay	100.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

39: Market Street & Stanford Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Volume (vph)	219	541	8	127	288	29	184	1239	22	61	918	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	3565		1805	3501		1787	3564		1787	3523	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1752	3565		1805	3501		1787	3564		1787	3523	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	238	588	9	138	313	32	200	1347	24	66	998	29
RTOR Reduction (vph)	0	1	0	0	8	0	0	1	0	0	2	0
Lane Group Flow (vph)	238	596	0	138	337	0	200	1370	0	66	1025	0
Confl. Peds. (#/hr)			10			10			10			10
Heavy Vehicles (%)	3%	1%	1%	0%	1%	6%	1%	1%	0%	1%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	14.2	23.0		11.8	20.6		13.9	41.7		7.6	35.4	
Effective Green, g (s)	14.2	23.0		11.8	20.6		13.9	41.7		7.6	35.4	
Actuated g/C Ratio	0.14	0.23		0.12	0.21		0.14	0.43		0.08	0.36	
Clearance Time (s)	4.0	3.0		4.0	3.0		4.0	3.0		4.0	3.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	254	836		217	735		253	1515		138	1271	
v/s Ratio Prot	c0.14	c0.17		0.08	0.10		c0.11	c0.38		0.04	0.29	
v/s Ratio Perm												
v/c Ratio	0.94	0.71		0.64	0.46		0.79	0.90		0.48	0.81	
Uniform Delay, d1	41.5	34.5		41.1	33.9		40.7	26.3		43.4	28.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	39.3	2.9		6.0	0.5		15.4	8.0		2.6	3.8	
Delay (s)	80.8	37.4		47.1	34.3		56.1	34.3		46.0	32.1	
Level of Service	F	D		D	C		E	C		D	C	
Approach Delay (s)		49.8			38.0			37.1			32.9	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	38.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	98.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 40: MLK Jr. Way/Adeline Street & Stanford Avenue

4/24/2012



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	673	536	214	2321	1486	322
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	
Lane Util. Factor	0.97	1.00		0.91	0.91	
Frbp, ped/bikes	1.00	0.96		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	3433	1538		5101	4927	
Flt Permitted	0.95	1.00		0.63	1.00	
Satd. Flow (perm)	3433	1538		3224	4927	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	732	583	233	2523	1615	350
RTOR Reduction (vph)	0	21	0	0	29	0
Lane Group Flow (vph)	732	562	0	2756	1937	0
Confl. Peds. (#/hr)	20	20				20
Heavy Vehicles (%)	2%	1%	4%	1%	2%	1%
Turn Type	NA	Perm	Perm	NA	NA	
Protected Phases	2			8	4	
Permitted Phases		2	8			
Actuated Green, G (s)	37.0	37.0		75.0	75.0	
Effective Green, g (s)	37.0	37.0		75.0	75.0	
Actuated g/C Ratio	0.31	0.31		0.62	0.62	
Clearance Time (s)	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	1059	474		2015	3079	
v/s Ratio Prot	0.21				0.39	
v/s Ratio Perm		c0.37		c0.85		
v/c Ratio	0.69	1.19		3.19dl	0.63	
Uniform Delay, d1	36.5	41.5		22.5	13.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	103.4		168.7	1.0	
Delay (s)	40.2	144.9		191.2	14.9	
Level of Service	D	F		F	B	
Approach Delay (s)	86.6			191.2	14.9	
Approach LOS	F			F	B	

Intersection Summary

HCM Average Control Delay	111.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	117.9%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

41: 7th Street & Ashby Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖	↖
Volume (vph)	271	685	142	134	690	46	180	490	69	120	255	492
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.99		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3420		1787	3439		1719	3463		1787	1845	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3420		1787	3439		1719	3463		1787	1845	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	295	745	154	146	750	50	196	533	75	130	277	535
RTOR Reduction (vph)	0	22	0	0	6	0	0	14	0	0	0	210
Lane Group Flow (vph)	295	877	0	146	794	0	196	594	0	130	277	325
Confl. Peds. (#/hr)			20			20			20			
Heavy Vehicles (%)	2%	2%	2%	1%	4%	1%	5%	2%	1%	1%	3%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	12.1	26.3		8.7	22.9		7.0	18.8		6.0	17.8	17.8
Effective Green, g (s)	12.1	26.3		8.7	22.9		7.0	18.8		6.0	17.8	17.8
Actuated g/C Ratio	0.16	0.35		0.11	0.30		0.09	0.25		0.08	0.23	0.23
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	283	1187		205	1039		159	859		141	433	372
v/s Ratio Prot	c0.17	c0.26		0.08	0.23		c0.11	0.17		0.07	0.15	
v/s Ratio Perm												c0.21
v/c Ratio	1.04	0.74		0.71	0.76		1.23	0.69		0.92	0.64	0.87
Uniform Delay, d1	31.8	21.7		32.3	24.0		34.4	25.9		34.7	26.1	27.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	65.0	2.4		11.1	3.4		147.3	2.4		52.6	3.1	19.8
Delay (s)	96.8	24.2		43.4	27.4		181.7	28.3		87.3	29.2	47.7
Level of Service	F	C		D	C		F	C		F	C	D
Approach Delay (s)		42.1			29.9			65.7			47.7	
Approach LOS		D			C			E			D	

Intersection Summary

HCM Average Control Delay	45.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	75.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

42: San Pablo Avenue & Ashby Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	684	279	102	579	106	268	1082	177	216	1373	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	10	10	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frbp, ped/bikes	1.00	0.99			1.00		1.00	1.00	0.96	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96			0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1711	3389			3179		1770	3471	1537	1787	3438	1530
Flt Permitted	0.25	1.00			0.63		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	454	3389			2022		1770	3471	1537	1787	3438	1530
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	743	303	111	629	115	291	1176	192	235	1492	117
RTOR Reduction (vph)	0	61	0	0	17	0	0	0	31	0	0	14
Lane Group Flow (vph)	145	985	0	0	838	0	291	1176	161	235	1492	103
Confl. Peds. (#/hr)	20		20	20		20			20			20
Heavy Vehicles (%)	5%	1%	1%	2%	3%	2%	2%	4%	1%	1%	5%	2%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7		4
Permitted Phases	2			6					8			4
Actuated Green, G (s)	35.6	35.6			35.6		5.1	17.3	17.3	8.2	20.4	20.4
Effective Green, g (s)	35.6	35.6			35.6		5.1	17.3	17.3	8.2	20.4	20.4
Actuated g/C Ratio	0.49	0.49			0.49		0.07	0.24	0.24	0.11	0.28	0.28
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	1650			985		123	821	364	200	959	427
v/s Ratio Prot		0.29					c0.16	c0.34		0.13	c0.43	
v/s Ratio Perm	0.32				c0.41				0.11			0.07
v/c Ratio	0.66	0.60			0.85		2.37	1.43	0.44	1.18	1.56	0.24
Uniform Delay, d1	14.1	13.6			16.4		34.0	27.9	23.8	32.4	26.3	20.4
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8	0.6			7.2		639.0	201.6	0.9	118.8	255.3	0.3
Delay (s)	21.0	14.1			23.6		673.0	229.5	24.7	151.3	281.6	20.7
Level of Service	C	B			C		F	F	C	F	F	C
Approach Delay (s)		15.0			23.6			283.6			248.4	
Approach LOS		B			C			F			F	

Intersection Summary

HCM Average Control Delay	174.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	117.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

43: Constitution Way & Marina Village Parkway

4/24/2012



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰↰	↰↰		↰↰	↰↰
Volume (vph)	489	517	609	381	478	1526
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	0.88	0.95		0.97	0.95
Frbp, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.94		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1805	2787	3356		3433	3574
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1805	2787	3356		3433	3574
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	532	562	662	414	520	1659
RTOR Reduction (vph)	0	466	108	0	0	0
Lane Group Flow (vph)	532	96	968	0	520	1659
Confl. Peds. (#/hr)				10		
Heavy Vehicles (%)	0%	2%	1%	0%	2%	1%
Turn Type	NA	Prot	NA		Prot	NA
Protected Phases	6	6	8		7	4
Permitted Phases						
Actuated Green, G (s)	11.2	11.2	27.3		15.3	40.1
Effective Green, g (s)	11.2	11.2	27.3		15.3	40.1
Actuated g/C Ratio	0.17	0.17	0.41		0.23	0.61
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	307	474	1392		798	2178
v/s Ratio Prot	c0.29	0.03	0.29		c0.15	c0.46
v/s Ratio Perm						
v/c Ratio	1.73	0.20	0.70		0.65	0.76
Uniform Delay, d1	27.3	23.5	15.8		22.8	9.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	343.1	0.2	1.5		1.9	1.6
Delay (s)	370.4	23.7	17.4		24.8	11.0
Level of Service	F	C	B		C	B
Approach Delay (s)	192.3		17.4			14.3
Approach LOS	F		B			B

Intersection Summary

HCM Average Control Delay	59.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	65.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

44: Webster Street & Atlantic Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	200	105	107	325	62	149	462	69	109	752	375
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frbp, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3502	3574	1571	1787	3474		1805	3491		1787	3574	1573
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3502	3574	1571	1787	3474		1805	3491		1787	3574	1573
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	217	114	116	353	67	162	502	75	118	817	408
RTOR Reduction (vph)	0	0	93	0	21	0	0	12	0	0	0	200
Lane Group Flow (vph)	275	217	21	116	399	0	162	565	0	118	817	208
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	0%	1%	0%	1%	1%	1%	0%	1%	1%	1%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2									4
Actuated Green, G (s)	5.1	12.7	12.7	7.2	14.8		7.2	24.3		7.9	25.0	25.0
Effective Green, g (s)	5.1	12.7	12.7	7.2	14.8		7.2	24.3		7.9	25.0	25.0
Actuated g/C Ratio	0.07	0.19	0.19	0.11	0.22		0.11	0.36		0.12	0.37	0.37
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	262	667	293	189	755		191	1246		207	1312	577
v/s Ratio Prot	c0.08	0.06		0.06	c0.11		c0.09	0.16		0.07	c0.23	
v/s Ratio Perm			0.01									0.13
v/c Ratio	1.05	0.33	0.07	0.61	0.53		0.85	0.45		0.57	0.62	0.36
Uniform Delay, d1	31.5	24.0	22.8	29.1	23.6		29.9	16.8		28.5	17.7	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	69.2	0.3	0.1	5.8	0.7		27.8	0.3		3.8	0.9	0.4
Delay (s)	100.7	24.3	22.9	34.9	24.2		57.7	17.1		32.2	18.6	16.1
Level of Service	F	C	C	C	C		E	B		C	B	B
Approach Delay (s)		58.7			26.5			26.0			19.0	
Approach LOS		E			C			C			B	

Intersection Summary

HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

45: Constitution Way & Atlantic Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗↘	↗↘	↗	↗↘	↗↘	↗
Volume (vph)	95	119	45	68	102	384	66	438	38	416	1280	223
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95	1.00	0.97	0.95	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.88		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	3404		1805	3114		3467	3574	1576	3502	3574	1558
Flt Permitted	0.32	1.00		0.64	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	606	3404		1215	3114		3467	3574	1576	3502	3574	1558
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	129	49	74	111	417	72	476	41	452	1391	242
RTOR Reduction (vph)	0	37	0	0	244	0	0	0	22	0	0	48
Lane Group Flow (vph)	103	141	0	74	284	0	72	476	19	452	1391	194
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	1%	1%	1%	0%	1%	0%	1%	1%	0%	0%	1%	1%
Turn Type	Perm	NA		Perm	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6					8			4
Actuated Green, G (s)	14.3	14.3		14.3	14.3		2.7	27.7	27.7	5.2	30.2	30.2
Effective Green, g (s)	14.3	14.3		14.3	14.3		2.7	27.7	27.7	5.2	30.2	30.2
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.05	0.47	0.47	0.09	0.51	0.51
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	146	822		293	752		158	1672	737	308	1823	795
v/s Ratio Prot		0.04			0.09		0.02	0.13		c0.13	c0.39	
v/s Ratio Perm	c0.17			0.06					0.01			0.12
v/c Ratio	0.71	0.17		0.25	0.38		0.46	0.28	0.03	1.47	0.76	0.24
Uniform Delay, d1	20.5	17.8		18.1	18.7		27.5	9.7	8.5	27.0	11.6	8.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.4	0.1		0.5	0.3		2.1	0.1	0.0	227.4	1.9	0.2
Delay (s)	34.9	17.9		18.6	19.1		29.6	9.8	8.5	254.4	13.6	8.3
Level of Service	C	B		B	B		C	A	A	F	B	A
Approach Delay (s)		24.1			19.0			12.1			65.2	
Approach LOS		C			B			B			E	























Intersection Summary

HCM Average Control Delay	45.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

46: Maritime Street & Burma Road

4/24/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	444	0	127	96	5	259	34	373	9	69	413	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85		1.00	0.85		1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	1272		1195	1283		1087	2522		1612	2381	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1703	1272		1195	1283		1087	2522		1612	2381	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	483	0	138	104	5	282	37	405	10	75	449	283
RTOR Reduction (vph)	0	94	0	0	249	0	0	1	0	0	109	0
Lane Group Flow (vph)	483	44	0	104	38	0	37	414	0	75	623	0
Heavy Vehicles (%)	6%	0%	27%	51%	100%	25%	66%	42%	69%	12%	61%	14%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	26.0	25.4		9.9	9.3		2.7	20.3		7.5	25.1	
Effective Green, g (s)	26.0	25.4		9.9	9.3		2.7	20.3		7.5	25.1	
Actuated g/C Ratio	0.33	0.32		0.13	0.12		0.03	0.26		0.09	0.32	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	560	408		150	151		37	647		153	756	
v/s Ratio Prot	c0.28	0.03		0.09	c0.03		c0.03	0.16		0.05	c0.26	
v/s Ratio Perm												
v/c Ratio	0.86	0.11		0.69	0.25		1.00	0.64		0.49	0.82	
Uniform Delay, d1	24.9	18.9		33.1	31.7		38.2	26.1		34.0	25.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.9	0.1		13.0	0.9		148.0	2.1		2.5	7.3	
Delay (s)	37.8	19.0		46.1	32.6		186.2	28.2		36.4	32.3	
Level of Service	D	B		D	C		F	C		D	C	
Approach Delay (s)		33.6			36.2			41.2			32.7	
Approach LOS		C			D			D			C	
Intersection Summary												
HCM Average Control Delay			35.2				HCM Level of Service				D	
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			79.1				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			77.3%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

47: 14th Street & Maritime Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↕		↗	↕	
Volume (vph)	34	0	24	51	0	66	8	356	19	29	438	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.94			0.92		1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1581		1805	2084		1687	2405	
Flt Permitted		0.81			0.83		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1460			1342		1805	2084		1687	2405	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	0	26	55	0	72	9	387	21	32	476	16
RTOR Reduction (vph)	0	22	0	0	61	0	0	7	0	0	4	0
Lane Group Flow (vph)	0	41	0	0	66	0	9	401	0	32	488	0
Heavy Vehicles (%)	0%	0%	0%	12%	0%	6%	0%	74%	33%	7%	51%	0%
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		2			6		3	8		7	4	
Permitted Phases	2			6								
Actuated Green, G (s)		3.9			3.9		0.4	9.8		0.4	9.8	
Effective Green, g (s)		3.9			3.9		0.4	9.8		0.4	9.8	
Actuated g/C Ratio		0.15			0.15		0.02	0.38		0.02	0.38	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		218			201		28	782		26	903	
v/s Ratio Prot							0.00	0.19		c0.02	c0.20	
v/s Ratio Perm		0.03			c0.05							
v/c Ratio		0.19			0.33		0.32	0.51		1.23	0.54	
Uniform Delay, d1		9.7			9.9		12.7	6.3		12.9	6.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			1.0		6.6	0.6		254.5	0.7	
Delay (s)		10.1			10.9		19.3	6.9		267.4	7.0	
Level of Service		B			B		B	A		F	A	
Approach Delay (s)		10.1			10.9			7.1			22.9	
Approach LOS		B			B			A			C	

Intersection Summary

HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	26.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	33.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway/Maritime Street

4/24/2012



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	↵
Volume (vph)	127	161	568	140	159	289
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1890	864	1245	1951	1068	961
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1890	864	1245	1951	1068	961
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	175	617	152	173	314
RTOR Reduction (vph)	0	151	0	0	0	254
Lane Group Flow (vph)	138	24	617	152	173	60
Heavy Vehicles (%)	91%	87%	45%	85%	69%	68%
Turn Type	NA	Perm	Prot	NA	NA	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	11.4	11.4	44.6	60.0	16.1	16.1
Effective Green, g (s)	11.4	11.4	44.6	60.0	16.1	16.1
Actuated g/C Ratio	0.14	0.14	0.53	0.71	0.19	0.19
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	256	117	660	1392	204	184
v/s Ratio Prot	c0.07		c0.50	0.08	c0.16	
v/s Ratio Perm		0.03				0.06
v/c Ratio	0.54	0.20	0.93	0.11	0.85	0.33
Uniform Delay, d1	33.9	32.3	18.4	3.7	32.8	29.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.9	20.5	0.0	26.4	1.0
Delay (s)	36.1	33.2	38.9	3.8	59.2	30.4
Level of Service	D	C	D	A	E	C
Approach Delay (s)	34.5			31.9	40.6	
Approach LOS	C			C	D	

Intersection Summary

HCM Average Control Delay	35.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

48: 7th Street & Navy Roadway

4/23/2012



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	127	161	159	289	568	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	945	1930	2136	961	2415	873
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	945	1930	2136	961	2415	873
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	175	173	314	617	152
RTOR Reduction (vph)	0	0	0	0	0	90
Lane Group Flow (vph)	138	175	173	314	617	62
Heavy Vehicles (%)	91%	87%	69%	68%	45%	85%
Turn Type	Prot	NA	NA	Free	NA	Perm
Protected Phases	5	2	6		7	
Permitted Phases				Free		7
Actuated Green, G (s)	7.6	18.6	7.0	45.1	18.5	18.5
Effective Green, g (s)	7.6	18.6	7.0	45.1	18.5	18.5
Actuated g/C Ratio	0.17	0.41	0.16	1.00	0.41	0.41
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	159	796	332	961	991	358
v/s Ratio Prot	c0.15	0.09	c0.08		c0.26	
v/s Ratio Perm				0.33		0.07
v/c Ratio	0.87	0.22	0.52	0.33	0.62	0.17
Uniform Delay, d1	18.3	8.6	17.5	0.0	10.5	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	36.0	0.1	1.5	0.9	1.2	0.2
Delay (s)	54.2	8.7	19.0	0.9	11.8	8.7
Level of Service	D	A	B	A	B	A
Approach Delay (s)		28.8	7.3		11.2	
Approach LOS		C	A		B	

Intersection Summary


















HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	45.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

49: W. Truck Services & Burma Road

4/24/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	246	0	36	67	198	0	0	98	231	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	267	0	39	73	215	0	0	107	251	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					788							
pX, platoon unblocked												
vC, conflicting volume	288			267			526	634	134	499	526	180
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	288			267			526	634	134	499	526	180
tC, single (s)	4.1			4.3			7.5	6.5	7.0	7.9	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.7	4.0	3.3
p0 queue free %	100			97			100	100	88	29	100	100
cM capacity (veh/h)	1286			1251			429	387	888	356	445	838
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1	SB 2						
Volume Total	178	89	327	107	167	84						
Volume Left	0	0	39	0	167	84						
Volume Right	0	0	215	107	0	0						
cSH	1700	1700	1251	888	356	356						
Volume to Capacity	0.10	0.05	0.03	0.12	0.47	0.24						
Queue Length 95th (ft)	0	0	2	10	60	22						
Control Delay (s)	0.0	0.0	1.2	9.6	23.8	18.2						
Lane LOS			A	A	C	C						
Approach Delay (s)	0.0		1.2	9.6	21.9							
Approach LOS			A	A	C							
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			47.5%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

1: Maritime Street & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	751	275	242	1232	36	682	21	460	64	13	71
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.95	0.95	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1641	3505	1032	1517	3513		1309	1305	1414	1736	1618	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	1641	3505	1032	1517	3513		1309	1305	1414	1736	1618	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	816	299	263	1339	39	741	23	500	70	14	77
RTOR Reduction (vph)	0	0	199	0	2	0	0	0	281	0	73	0
Lane Group Flow (vph)	20	816	100	263	1376	0	378	386	219	70	18	0
Confl. Peds. (#/hr)			10			10	10		10	10		
Heavy Vehicles (%)	10%	3%	53%	19%	2%	10%	31%	50%	11%	4%	0%	3%
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Perm	Split	NA	
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2						8			
Actuated Green, G (s)	3.4	37.4	37.4	25.5	59.5		42.4	42.4	42.4	7.5	7.5	
Effective Green, g (s)	3.4	37.4	37.4	25.5	59.5		42.4	42.4	42.4	7.5	7.5	
Actuated g/C Ratio	0.03	0.29	0.29	0.20	0.46		0.33	0.33	0.33	0.06	0.06	
Clearance Time (s)	3.5	5.5	5.5	3.5	5.5		4.0	4.0	4.0	3.5	3.5	
Vehicle Extension (s)	3.0	4.5	4.5	3.0	4.5		4.0	4.0	4.0	3.0	3.0	
Lane Grp Cap (vph)	43	1014	299	299	1617		429	428	464	101	94	
v/s Ratio Prot	0.01	0.23		c0.17	c0.39		0.29	c0.30		c0.04	0.01	
v/s Ratio Perm			0.10						0.15			
v/c Ratio	0.47	0.80	0.33	0.88	0.85		0.88	0.90	0.47	0.69	0.20	
Uniform Delay, d1	62.1	42.6	36.2	50.4	31.0		41.1	41.5	34.6	59.8	58.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.8	5.2	1.1	24.1	4.9		19.1	22.1	1.0	18.6	1.0	
Delay (s)	69.8	47.8	37.3	74.5	35.8		60.1	63.6	35.6	78.4	59.1	
Level of Service	E	D	D	E	D		E	E	D	E	E	
Approach Delay (s)		45.4			42.0			51.5			67.4	
Approach LOS		D			D			D			E	

Intersection Summary

HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	129.3	Sum of lost time (s)	11.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

2: Frontage Road & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗	↗	↖	↗		↖	↗	
Volume (vph)	224	692	361	397	989	212	363	423	717	138	266	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.91		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1703	3291		1517	3471	1583	1736	2686		1736	3103	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1703	3291		1517	3471	1583	1736	2686		1736	3103	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	243	752	392	432	1075	230	395	460	779	150	289	84
RTOR Reduction (vph)	0	56	0	0	0	154	0	254	0	0	23	0
Lane Group Flow (vph)	243	1088	0	432	1075	76	395	985	0	150	350	0
Heavy Vehicles (%)	6%	2%	8%	19%	4%	2%	4%	28%	18%	4%	16%	0%
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	18.1	32.0		25.5	39.4	39.4	27.0	34.5		11.5	19.0	
Effective Green, g (s)	18.1	32.0		25.5	39.4	39.4	27.0	34.5		11.5	19.0	
Actuated g/C Ratio	0.15	0.27		0.21	0.33	0.33	0.22	0.29		0.10	0.16	
Clearance Time (s)	3.5	5.0		3.5	5.0	5.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.5	4.5		3.5	4.5	4.5	3.5	3.5		3.5	3.5	
Lane Grp Cap (vph)	257	878		322	1140	520	391	772		166	491	
v/s Ratio Prot	0.14	c0.33		c0.28	0.31		c0.23	c0.37		0.09	0.11	
v/s Ratio Perm						0.05						
v/c Ratio	0.95	1.24		1.34	0.94	0.15	1.01	1.28		0.90	0.71	
Uniform Delay, d1	50.5	44.0		47.2	39.2	28.4	46.5	42.8		53.7	47.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	41.4	117.5		173.2	15.2	0.2	48.1	133.9		43.6	5.0	
Delay (s)	91.9	161.5		220.5	54.4	28.6	94.6	176.7		97.3	53.0	
Level of Service	F	F		F	D	C	F	F		F	D	
Approach Delay (s)		149.3			92.3			156.8			65.7	
Approach LOS		F			F			F			E	

Intersection Summary

HCM Average Control Delay	124.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	109.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4: Adeline Street & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔			↔↕↔			↔↕			↔↕	
Volume (vph)	36	1473	114	64	864	62	68	661	76	128	714	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5			5.0			5.0	
Lane Util. Factor		0.91			0.91			0.95			0.95	
Frbp, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.99			0.99	
Flt Protected		1.00			1.00			1.00			0.99	
Satd. Flow (prot)		4971			4871			3154			3420	
Flt Permitted		0.88			0.70			0.66			0.59	
Satd. Flow (perm)		4387			3399			2090			2016	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1601	124	70	939	67	74	718	83	139	776	77
RTOR Reduction (vph)	0	9	0	0	7	0	0	6	0	0	6	0
Lane Group Flow (vph)	0	1755	0	0	1069	0	0	869	0	0	986	0
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	0%	3%	4%	9%	5%	0%	9%	11%	24%	0%	4%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		48.5			48.5			43.0			43.0	
Effective Green, g (s)		48.5			48.5			43.0			43.0	
Actuated g/C Ratio		0.48			0.48			0.43			0.43	
Clearance Time (s)		3.5			3.5			5.0			5.0	
Lane Grp Cap (vph)		2128			1649			899			867	
v/s Ratio Prot												
v/s Ratio Perm		c0.40			0.31			0.42			c0.49	
v/c Ratio		0.82			0.91dl			0.97			1.14	
Uniform Delay, d1		22.1			19.3			27.8			28.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.8			2.0			22.9			75.7	
Delay (s)		25.9			21.3			50.7			104.2	
Level of Service		C			C			D			F	
Approach Delay (s)		25.9			21.3			50.7			104.2	
Approach LOS		C			C			D			F	

Intersection Summary

HCM Average Control Delay	46.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	128.0%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

5: Market Street & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕	↗		↕↕	↗	↗	↕	↗		↕	↗
Volume (vph)	176	1423	332	126	811	54	360	544	142	70	572	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Lane Util. Factor		0.95	1.00		0.95	1.00	1.00	1.00	1.00		1.00	1.00
Frbp, ped/bikes		1.00	0.95		1.00	0.95	1.00	1.00	0.97		1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85		1.00	0.85
Flt Protected		0.99	1.00		0.99	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (prot)		3484	1476		3355	1520	1719	1810	1478		1841	1507
Flt Permitted		0.61	1.00		0.49	1.00	0.95	1.00	1.00		0.99	1.00
Satd. Flow (perm)		2123	1476		1651	1520	1719	1810	1478		1841	1507
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	191	1547	361	137	882	59	391	591	154	76	622	127
RTOR Reduction (vph)	0	0	130	0	0	14	0	0	40	0	0	27
Lane Group Flow (vph)	0	1738	231	0	1019	45	391	591	114	0	698	100
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Heavy Vehicles (%)	3%	3%	4%	19%	5%	1%	5%	5%	6%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2		2	6		6			8			4
Actuated Green, G (s)		71.5	71.5		71.5	71.5	14.5	14.5	14.5		21.5	21.5
Effective Green, g (s)		71.5	71.5		71.5	71.5	14.5	14.5	14.5		21.5	21.5
Actuated g/C Ratio		0.60	0.60		0.60	0.60	0.12	0.12	0.12		0.18	0.18
Clearance Time (s)		5.5	5.5		5.5	5.5	3.5	3.5	3.5		3.5	3.5
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0	2.0		2.0	2.0
Lane Grp Cap (vph)		1265	879		984	906	208	219	179		330	270
v/s Ratio Prot							0.23	c0.33			c0.38	
v/s Ratio Perm		c0.82	0.16		0.62	0.03			0.08			0.07
v/c Ratio		1.37	0.26		2.58dl	0.05	1.88	2.70	0.63		2.12	0.37
Uniform Delay, d1		24.2	11.6		24.2	10.1	52.8	52.8	50.2		49.2	43.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		173.3	0.7		38.3	0.1	413.6	777.2	5.3		512.0	0.3
Delay (s)		197.6	12.3		62.5	10.2	466.4	830.0	55.5		561.2	43.6
Level of Service		F	B		E	B	F	F	E		F	D
Approach Delay (s)		165.7			59.7			599.8			481.5	
Approach LOS		F			E			F			F	

Intersection Summary

HCM Average Control Delay	290.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	149.0%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: San Pablo Avenue & W. Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↕↔		↔	↕↕	↔	↔	↕↔		↔	↕↔	
Volume (vph)	122	1384	142	71	885	170	108	788	30	152	662	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Lane Util. Factor		0.91		1.00	0.95	1.00	1.00	0.95		1.00	0.95	
Frbp, ped/bikes		1.00		1.00	1.00	0.97	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.99		1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		4940		1804	3406	1555	1765	3519		1764	3369	
Flt Permitted		0.71		0.10	1.00	1.00	0.21	1.00		0.21	1.00	
Satd. Flow (perm)		3518		185	3406	1555	393	3519		383	3369	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	1504	154	77	962	185	117	857	33	165	720	158
RTOR Reduction (vph)	0	13	0	0	0	31	0	3	0	0	22	0
Lane Group Flow (vph)	0	1778	0	77	962	154	117	887	0	165	856	0
Confl. Peds. (#/hr)	15		15	15		15	15		15	15		15
Heavy Vehicles (%)	3%	3%	3%	0%	6%	1%	2%	2%	0%	2%	4%	3%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4		4	2			6		
Actuated Green, G (s)		41.0		41.0	41.0	41.0	34.5	34.5		34.5	34.5	
Effective Green, g (s)		41.0		41.0	41.0	41.0	34.5	34.5		34.5	34.5	
Actuated g/C Ratio		0.48		0.48	0.48	0.48	0.41	0.41		0.41	0.41	
Clearance Time (s)		4.0		4.0	4.0	4.0	5.5	5.5		5.5	5.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0		4.0	4.0	
Lane Grp Cap (vph)		1697		89	1643	750	160	1428		155	1367	
v/s Ratio Prot					0.28			0.25				0.25
v/s Ratio Perm		c0.51		0.42		0.10	0.30			c0.43		
v/c Ratio		1.05		0.87	0.59	0.21	0.73	0.62		1.06	0.63	
Uniform Delay, d1		22.0		19.5	15.9	12.6	21.3	20.1		25.2	20.1	
Progression Factor		1.00		0.46	0.44	0.54	1.00	1.00		1.00	1.00	
Incremental Delay, d2		35.6		56.3	1.3	0.5	18.8	1.2		90.5	1.0	
Delay (s)		57.6		65.3	8.3	7.4	40.1	21.3		115.8	21.1	
Level of Service		E		E	A	A	D	C		F	C	
Approach Delay (s)		57.6			11.8			23.5			36.1	
Approach LOS		E			B			C			D	

Intersection Summary

HCM Average Control Delay	35.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	105.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

9: Harrison Street & Grand Avenue

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔	↑↑	↗	↔↔	↑↑	↗		↔↔↔	↗		↔↔↔	↗
Volume (vph)	202	567	400	311	722	105	55	2121	851	122	746	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5	4.0		5.5	5.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00		0.91	1.00		0.91	1.00
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.98		1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00	1.00		0.99	1.00
Satd. Flow (prot)	3467	3610	1514	3467	3574	1529		5125	1577		5107	1529
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.86	1.00		0.67	1.00
Satd. Flow (perm)	3467	3610	1514	3467	3574	1529		4436	1577		3426	1529
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	220	616	435	338	785	114	60	2305	925	133	811	248
RTOR Reduction (vph)	0	0	54	0	0	1	0	0	0	0	0	108
Lane Group Flow (vph)	220	616	381	338	785	113	0	2365	925	0	944	140
Confl. Peds. (#/hr)			40			40	40		40	40		40
Heavy Vehicles (%)	1%	0%	1%	1%	1%	0%	3%	1%	0%	0%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA	Free	Perm	NA	Perm
Protected Phases	3	8		7	4			2			6	
Permitted Phases			8			4	2		Free	6		6
Actuated Green, G (s)	5.0	29.5	29.5	6.0	30.5	30.5		44.5	95.0		44.5	44.5
Effective Green, g (s)	5.0	29.5	29.5	6.0	30.5	30.5		44.5	95.0		44.5	44.5
Actuated g/C Ratio	0.05	0.31	0.31	0.06	0.32	0.32		0.47	1.00		0.47	0.47
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.5			5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	182	1121	470	219	1147	491		2078	1577		1605	716
v/s Ratio Prot	c0.06	0.17		c0.10	0.22							
v/s Ratio Perm			c0.25			0.07		c0.53	0.59		0.28	0.09
v/c Ratio	1.21	0.55	0.81	1.54	0.68	0.23		1.14	0.59		1.66dl	0.19
Uniform Delay, d1	45.0	27.2	30.2	44.5	28.1	23.6		25.2	0.0		18.5	14.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	134.1	1.9	14.0	266.0	3.3	1.1		68.6	1.6		0.6	0.1
Delay (s)	179.1	29.2	44.2	310.5	31.4	24.7		93.9	1.6		19.1	14.9
Level of Service	F	C	D	F	C	C		F	A		B	B
Approach Delay (s)		60.2			107.0			67.9			18.2	
Approach LOS		E			F			E			B	

Intersection Summary

HCM Average Control Delay	65.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	111.6%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗			↖↖		↗	↖↖		↗		↖↖
Volume (vph)	237	166	0	0	156	187	184	577	109	293	0	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Lane Util. Factor	1.00	0.95			0.95		0.91	0.91		1.00		0.88
Frt	1.00	1.00			0.92		1.00	0.98		1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (prot)	1094	2674			2813		903	3211		1752		2137
Flt Permitted	0.95	1.00			1.00		0.95	1.00		0.95		1.00
Satd. Flow (perm)	1094	2674			2813		903	3211		1752		2137
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	258	180	0	0	170	203	200	627	118	318	0	438
RTOR Reduction (vph)	0	0	0	0	175	0	0	16	0	0	0	350
Lane Group Flow (vph)	258	180	0	0	198	0	180	749	0	318	0	88
Heavy Vehicles (%)	65%	35%	0%	0%	38%	1%	82%	3%	3%	3%	0%	33%
Turn Type	Prot	NA			NA		Split	NA		Prot		custom
Protected Phases	5	2			6		8	8		4		4
Permitted Phases												
Actuated Green, G (s)	19.0	34.0			11.0		18.0	18.0		16.0		16.0
Effective Green, g (s)	19.0	34.0			11.0		18.0	18.0		16.0		16.0
Actuated g/C Ratio	0.24	0.42			0.14		0.22	0.22		0.20		0.20
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0		4.0
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Lane Grp Cap (vph)	260	1136			387		203	722		350		427
v/s Ratio Prot	c0.24	0.07			c0.07		0.20	c0.23		c0.18		0.04
v/s Ratio Perm												
v/c Ratio	0.99	0.16			0.51		0.89	1.04		0.91		0.21
Uniform Delay, d1	30.4	14.2			32.0		30.0	31.0		31.3		26.7
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00		1.00
Incremental Delay, d2	53.5	0.1			1.1		33.7	43.4		26.2		0.2
Delay (s)	83.9	14.2			33.1		63.8	74.4		57.5		26.9
Level of Service	F	B			C		E	E		E		C
Approach Delay (s)		55.3			33.1			72.4			39.8	
Approach LOS		E			C			E			D	

Intersection Summary

HCM Average Control Delay	53.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

18: Harrison Street & 7th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑						↑↑↑	↑			
Volume (vph)	368	787	0	0	0	0	0	1425	1551	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0						5.0	5.0			
Lane Util. Factor		0.91						0.86	0.86			
Frbp, ped/bikes		1.00						1.00	1.00			
Flpb, ped/bikes		1.00						1.00	1.00			
Frt		1.00						0.95	0.85			
Flt Protected		0.98						1.00	1.00			
Satd. Flow (prot)		4734						4597	1375			
Flt Permitted		0.98						1.00	1.00			
Satd. Flow (perm)		4734						4597	1375			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	855	0	0	0	0	0	1549	1686	0	0	0
RTOR Reduction (vph)	0	6	0	0	0	0	0	41	26	0	0	0
Lane Group Flow (vph)	0	1249	0	0	0	0	0	2351	817	0	0	0
Confl. Peds. (#/hr)	20											
Heavy Vehicles (%)	6%	8%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA	custom			
Protected Phases		2						1				
Permitted Phases	2								5			
Actuated Green, G (s)		34.0						36.0	52.3			
Effective Green, g (s)		34.0						36.0	52.3			
Actuated g/C Ratio		0.42						0.45	0.65			
Clearance Time (s)		5.0						5.0	5.0			
Vehicle Extension (s)		3.0						3.0	3.0			
Lane Grp Cap (vph)		2012						2069	899			
v/s Ratio Prot								c0.51				
v/s Ratio Perm		0.26							c0.59			
v/c Ratio		0.62						1.16dr	0.91			
Uniform Delay, d1		18.0						22.0	11.8			
Progression Factor		1.00						1.00	1.00			
Incremental Delay, d2		1.5						67.8	12.8			
Delay (s)		19.4						89.8	24.6			
Level of Service		B						F	C			
Approach Delay (s)		19.4			0.0			72.8			0.0	
Approach LOS		B			A			E			A	

Intersection Summary

HCM Average Control Delay	57.9	HCM Level of Service	E
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

21: I-880 Ramps/Union Street & 5th Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↕		↖	↕			↕	
Volume (vph)	29	151	26	320	64	19	17	271	600	7	96	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95		1.00	0.95			0.95	
Frbp, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00			1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.90			0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1805	1822		1583	3469		1709	2513			3471	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00			0.90	
Satd. Flow (perm)	1805	1822		1583	3469		1709	2513			3121	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	164	28	348	70	21	18	295	652	8	104	7
RTOR Reduction (vph)	0	7	0	0	11	0	0	427	0	0	4	0
Lane Group Flow (vph)	32	185	0	348	80	0	18	520	0	0	115	0
Confl. Peds. (#/hr)			10			10	10		10	10		10
Heavy Vehicles (%)	0%	2%	0%	14%	0%	0%	5%	3%	38%	0%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Perm	NA	
Protected Phases	5	2		1	6		3	8			4	
Permitted Phases										4		
Actuated Green, G (s)	2.6	17.2		19.2	33.8		0.5	23.1			18.6	
Effective Green, g (s)	2.6	17.2		19.2	33.8		0.5	23.1			18.6	
Actuated g/C Ratio	0.04	0.24		0.27	0.47		0.01	0.32			0.26	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	66	438		425	1640		12	812			812	
v/s Ratio Prot	0.02	c0.10		c0.22	0.02		0.01	c0.21				
v/s Ratio Perm											0.04	
v/c Ratio	0.48	0.42		0.82	0.05		1.50	0.64			0.14	
Uniform Delay, d1	33.8	23.0		24.5	10.2		35.5	20.7			20.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	5.5	0.7		11.7	0.0		450.0	1.7			0.1	
Delay (s)	39.3	23.6		36.2	10.2		485.5	22.4			20.4	
Level of Service	D	C		D	B		F	C			C	
Approach Delay (s)		25.9			30.8			31.0			20.4	
Approach LOS		C			C			C			C	

Intersection Summary		
HCM Average Control Delay	29.6	HCM Level of Service C
HCM Volume to Capacity ratio	0.63	
Actuated Cycle Length (s)	71.5	Sum of lost time (s) 12.0
Intersection Capacity Utilization	70.0%	ICU Level of Service C
Analysis Period (min)	15	
c Critical Lane Group		

HCM Signalized Intersection Capacity Analysis

29: Castro Street & 12th Street & I-980 NB On-Ramp

4/24/2012



Movement	WBT	WBR	NBL2	NBL	NBT
Lane Configurations	↑↑	↑↓	↑	↑↓	↑↑↑
Volume (vph)	605	895	105	1888	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	0.91	0.91	0.86	0.81	0.81
Frt	0.94	0.85	1.00	1.00	1.00
Flt Protected	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3115	1470	1493	1480	4439
Flt Permitted	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3115	1470	1493	1480	4439
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	658	973	114	2052	0
RTOR Reduction (vph)	0	0	36	0	0
Lane Group Flow (vph)	1125	506	67	1037	1026
Heavy Vehicles (%)	7%	0%	4%	4%	3%
Turn Type	NA	Perm	Split	Split	NA
Protected Phases	4		2	2	2
Permitted Phases		4			
Actuated Green, G (s)	28.5	28.5	47.0	47.0	47.0
Effective Green, g (s)	28.5	28.5	47.0	47.0	47.0
Actuated g/C Ratio	0.34	0.34	0.55	0.55	0.55
Clearance Time (s)	4.5	4.5	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1044	493	826	818	2455
v/s Ratio Prot	c0.36		0.05	c0.70	0.23
v/s Ratio Perm		0.34			
v/c Ratio	1.08	1.03	0.08	1.27	1.12dl
Uniform Delay, d1	28.2	28.2	8.9	19.0	11.0
Progression Factor	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.2	47.4	0.0	129.9	0.1
Delay (s)	79.5	75.7	8.9	148.9	11.2
Level of Service	E	E	A	F	B
Approach Delay (s)	78.3				77.0
Approach LOS	E				E

Intersection Summary

HCM Average Control Delay	77.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

37: Hollis Street & Powell Street

4/24/2012



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	154	748	186	94	602	70	596	554	84	104	385	255
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	3386		1770	3499		1787	1820		1787	1810	1542
Flt Permitted	0.95	1.00		0.95	1.00		0.22	1.00		0.34	1.00	1.00
Satd. Flow (perm)	1719	3386		1770	3499		413	1820		636	1810	1542
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	167	813	202	102	654	76	648	602	91	113	418	277
RTOR Reduction (vph)	0	25	0	0	10	0	0	6	0	0	0	20
Lane Group Flow (vph)	167	990	0	102	720	0	648	687	0	113	418	257
Confl. Peds. (#/hr)			20			20			20			20
Heavy Vehicles (%)	5%	2%	2%	2%	1%	0%	1%	2%	1%	1%	5%	2%
Turn Type	Prot	NA		Prot	NA		pm+pt	NA		pm+pt	NA	pm+ov
Protected Phases	5	2		1	6		3	8		7	4	5
Permitted Phases							8			4		4
Actuated Green, G (s)	10.0	25.0		5.0	20.0		39.2	39.2		23.1	23.1	33.1
Effective Green, g (s)	10.0	25.0		5.0	20.0		39.2	39.2		23.1	23.1	33.1
Actuated g/C Ratio	0.11	0.28		0.06	0.22		0.44	0.44		0.26	0.26	0.37
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	191	940		98	777		500	792		226	464	635
v/s Ratio Prot	c0.10	c0.29		0.06	0.21		c0.30	0.38		0.03	c0.23	0.04
v/s Ratio Perm							c0.26			0.10		0.12
v/c Ratio	0.87	1.05		1.04	0.93		1.30	0.87		0.50	0.90	0.40
Uniform Delay, d1	39.4	32.5		42.5	34.3		24.0	23.1		31.9	32.4	21.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	32.9	44.5		102.4	16.9		147.4	9.9		1.7	20.3	0.4
Delay (s)	72.3	77.1		144.9	51.2		171.4	33.0		33.6	52.7	21.6
Level of Service	E	E		F	D		F	C		C	D	C
Approach Delay (s)		76.4			62.7			99.9			39.4	
Approach LOS		E			E			F			D	

Intersection Summary

HCM Average Control Delay	74.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	90.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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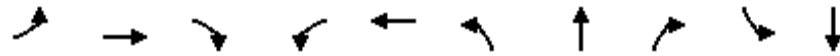
APPENDIX B - 6

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Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	165	193	237	584	26	26	71	22	33
v/c Ratio	0.09	0.19	0.51	0.54	0.28	0.08	0.12	0.33	0.09	0.13
Control Delay	32.8	24.0	10.3	26.3	10.7	24.9	26.0	12.0	32.5	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	24.0	10.3	26.3	10.7	24.9	26.0	12.0	32.5	26.1
Queue Length 50th (ft)	6	25	0	68	53	8	8	0	7	7
Queue Length 95th (ft)	34	72	63	199	175	34	34	34	36	41
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	739	3073	874	836	3143	936	609	480	591	592
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.05	0.22	0.28	0.19	0.03	0.04	0.15	0.04	0.06

Intersection Summary

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	43	230	116	584	240	129	309	161	203
v/c Ratio	0.21	0.23	0.61	0.44	0.32	0.38	0.61	0.65	0.41
Control Delay	28.2	12.2	43.6	13.4	3.4	30.7	15.8	41.9	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	12.2	43.6	13.4	3.4	30.7	15.8	41.9	17.1
Queue Length 50th (ft)	12	24	32	59	0	35	16	45	16
Queue Length 95th (ft)	44	45	#127	122	37	#124	60	#159	51
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	205	1698	189	1803	935	343	560	248	577
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.14	0.61	0.32	0.26	0.38	0.55	0.65	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012

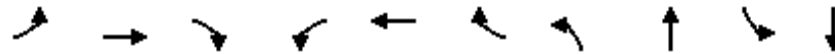


Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	563	186	677	327
v/c Ratio	0.22	0.44	0.39	0.41
Control Delay	5.7	6.5	3.0	10.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.7	6.6	3.0	10.4
Queue Length 50th (ft)	16	7	12	15
Queue Length 95th (ft)	65	112	28	64
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	4448	738	3044	2762
Starvation Cap Reductn	0	39	461	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.13	0.27	0.26	0.12
Intersection Summary				

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	91	128	33	75	135	160	21	191	86	82
v/c Ratio	0.45	0.30	0.16	0.38	0.32	0.47	0.15	0.46	0.42	0.13
Control Delay	38.6	29.5	12.8	38.5	31.7	11.1	41.3	23.4	38.4	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	29.5	12.8	38.5	31.7	11.1	41.3	23.4	38.4	21.7
Queue Length 50th (ft)	31	22	0	26	24	0	8	20	30	9
Queue Length 95th (ft)	118	68	26	103	74	59	42	76	113	44
Internal Link Dist (ft)		1364			917			505		565
Turn Bay Length (ft)	100			100		275	170			
Base Capacity (vph)	503	1153	499	544	1244	685	553	1083	583	1133
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.11	0.07	0.14	0.11	0.23	0.04	0.18	0.15	0.07

Intersection Summary

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	176	173	668
v/c Ratio	0.18	0.12	0.35
Control Delay	3.7	5.4	0.6
Queue Delay	0.0	0.0	0.0
Total Delay	3.7	5.4	0.6
Queue Length 50th (ft)	3	6	0
Queue Length 95th (ft)	11	14	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1694	2224	2075
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.10	0.08	0.32

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	37	33	295	205	407	90	207
v/c Ratio	0.24	0.05	0.40	0.66	0.45	0.32	0.49
Control Delay	29.4	11.3	11.6	34.2	17.3	27.6	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	11.3	11.6	34.2	17.3	27.6	9.5
Queue Length 50th (ft)	8	3	18	45	35	20	0
Queue Length 95th (ft)	44	10	53	#241	130	83	32
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	152	1616	1612	309	903	280	425
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.02	0.18	0.66	0.45	0.32	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



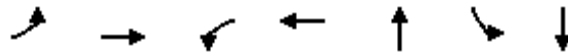
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	399	359	60	5	62
v/c Ratio	0.20	0.17	0.18	0.01	0.17
Control Delay	5.7	4.8	32.7	18.4	25.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	4.8	32.7	18.4	25.2
Queue Length 50th (ft)	41	18	31	0	23
Queue Length 95th (ft)	58	17	66	10	58
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	2004	2114	334	366	374
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.17	0.18	0.01	0.17

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	39	374	187	383	128	78	129
v/c Ratio	0.38	0.35	0.70	0.15	0.53	0.77	0.56
Control Delay	51.0	11.2	39.2	14.8	32.8	84.8	44.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.0	11.2	39.2	14.8	32.8	84.8	44.4
Queue Length 50th (ft)	24	96	116	105	48	49	69
Queue Length 95th (ft)	58	175	196	168	97	93	117
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	108	1054	297	2528	456	212	467
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.35	0.63	0.15	0.28	0.37	0.28

Intersection Summary

Queues

27: Mandela Parkway & 14th Street

4/27/2012



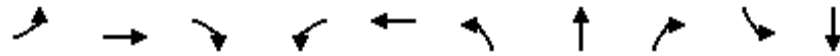
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	198	14	134	226
v/c Ratio	0.08	0.01	0.06	0.36
Control Delay	4.9	3.8	1.5	25.2
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	4.9	3.8	2.0	25.2
Queue Length 50th (ft)	9	0	2	47
Queue Length 95th (ft)	40	8	5	55
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2591	1116	2338	1717
Starvation Cap Reductn	0	0	1871	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.08	0.01	0.29	0.13

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	243	73	62	596	176	180	213	35	44
v/c Ratio	0.03	0.25	0.24	0.27	0.45	0.39	0.44	0.53	0.15	0.17
Control Delay	32.2	21.4	8.9	30.6	16.8	23.0	24.3	9.2	30.9	17.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.2	21.4	8.9	30.6	16.8	23.0	24.3	9.2	30.9	17.2
Queue Length 50th (ft)	2	39	0	20	76	53	55	0	11	4
Queue Length 95th (ft)	16	85	32	66	182	137	144	58	45	35
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	711	2970	784	739	3166	884	799	584	569	554
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.08	0.09	0.08	0.19	0.20	0.23	0.36	0.06	0.08

Intersection Summary

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	125	365	170	558	230	68	395	93	93
v/c Ratio	0.45	0.37	0.71	0.46	0.32	0.29	0.66	0.38	0.15
Control Delay	35.3	18.3	51.0	21.5	4.7	33.1	20.2	34.5	20.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.3	18.3	51.0	21.5	4.7	33.1	20.2	34.5	20.2
Queue Length 50th (ft)	50	55	72	104	0	27	42	37	13
Queue Length 95th (ft)	110	98	#200	172	48	67	92	87	35
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	349	1385	242	1322	766	451	796	318	665
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.26	0.70	0.42	0.30	0.15	0.50	0.29	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012

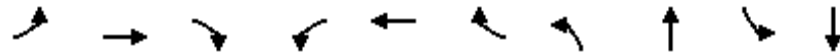


Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	561	239	773	295
v/c Ratio	0.21	0.54	0.42	0.35
Control Delay	6.0	9.0	3.5	12.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.0	9.0	3.6	12.6
Queue Length 50th (ft)	21	12	19	22
Queue Length 95th (ft)	67	158	40	65
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	4232	706	2878	2624
Starvation Cap Reductn	0	20	433	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.13	0.35	0.32	0.11
Intersection Summary				

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	196	139	18	34	38	86	3	369	210	75
v/c Ratio	0.59	0.35	0.10	0.33	0.17	0.50	0.04	0.72	0.66	0.07
Control Delay	48.8	41.0	18.5	58.1	48.4	21.5	56.7	38.2	45.8	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.8	41.0	18.5	58.1	48.4	21.5	56.7	38.2	45.8	11.5
Queue Length 50th (ft)	110	40	0	20	11	0	2	87	109	7
Queue Length 95th (ft)	247	88	23	66	34	53	14	191	#297	32
Internal Link Dist (ft)		1364			917			505		555
Turn Bay Length (ft)	100			100		275	170			
Base Capacity (vph)	672	826	351	350	914	435	388	812	451	1141
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.17	0.05	0.10	0.04	0.20	0.01	0.45	0.47	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	454	179	371
v/c Ratio	0.40	0.14	0.18
Control Delay	3.5	7.3	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	3.5	7.3	0.2
Queue Length 50th (ft)	7	6	0
Queue Length 95th (ft)	23	24	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1697	1886	2006
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.27	0.09	0.18
Intersection Summary			

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	101	100	234	87	353	90	179
v/c Ratio	0.59	0.11	0.35	0.50	0.57	0.32	0.40
Control Delay	43.7	11.0	11.5	33.6	20.9	27.5	8.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	11.0	11.5	33.6	20.9	27.5	8.0
Queue Length 50th (ft)	29	9	15	26	41	25	0
Queue Length 95th (ft)	#136	26	45	92	109	81	29
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	171	1545	1545	251	858	502	662
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.06	0.15	0.35	0.41	0.18	0.27

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



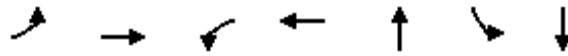
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	431	295	31	11	89
v/c Ratio	0.22	0.15	0.07	0.03	0.22
Control Delay	6.5	7.7	26.1	13.6	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	7.7	26.1	13.6	22.7
Queue Length 50th (ft)	45	40	13	0	31
Queue Length 95th (ft)	65	60	36	13	70
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	1926	2029	431	411	409
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.22	0.15	0.07	0.03	0.22

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	57	476	122	319	181	74	117
v/c Ratio	0.49	0.44	0.48	0.13	0.65	0.89	0.47
Control Delay	51.7	10.4	55.3	1.5	30.5	108.8	32.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	10.4	55.3	1.5	30.5	108.8	32.9
Queue Length 50th (ft)	32	98	75	6	54	43	49
Queue Length 95th (ft)	#73	286	104	11	107	84	90
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	120	1094	254	2367	626	230	637
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.44	0.48	0.13	0.29	0.32	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

27: Mandela Parkway & 14th Street

4/27/2012



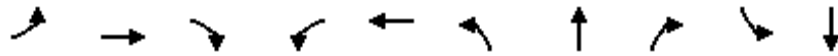
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	167	13	149	179
v/c Ratio	0.06	0.01	0.06	0.30
Control Delay	4.8	3.9	1.2	22.0
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	4.8	3.9	1.6	22.0
Queue Length 50th (ft)	7	0	2	34
Queue Length 95th (ft)	35	8	4	43
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2619	1128	2446	1690
Starvation Cap Reductn	0	0	1937	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.06	0.01	0.29	0.11

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	37	251	365	547	604	73	72	250	25	34
v/c Ratio	0.22	0.36	0.67	0.96	0.33	0.44	0.44	0.57	0.18	0.20
Control Delay	40.9	28.8	10.3	59.6	14.4	39.6	39.5	9.9	41.4	30.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	28.8	10.3	59.6	14.4	39.6	39.5	9.9	41.4	30.2
Queue Length 50th (ft)	17	56	0	~276	99	33	33	0	12	9
Queue Length 95th (ft)	54	104	83	#670	188	87	87	65	42	43
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	458	2271	944	570	2644	349	347	652	327	373
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.11	0.39	0.96	0.23	0.21	0.21	0.38	0.08	0.09

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	110	432	129	782	240	179	358	161	445
v/c Ratio	0.62	0.38	0.62	0.58	0.32	0.91	0.62	0.76	0.81
Control Delay	47.3	8.6	43.0	16.6	3.4	78.5	17.7	55.4	31.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.3	8.6	43.0	16.6	3.4	78.5	17.7	55.4	31.9
Queue Length 50th (ft)	43	32	49	118	0	71	31	63	58
Queue Length 95th (ft)	#115	61	#123	167	37	#187	71	#161	#138
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	176	1309	213	1605	841	197	579	211	551
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.33	0.61	0.49	0.29	0.91	0.62	0.76	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012



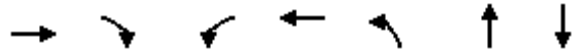
Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	618	186	820	401
v/c Ratio	0.23	0.44	0.43	0.50
Control Delay	6.1	6.4	3.0	15.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.1	6.4	3.0	15.2
Queue Length 50th (ft)	22	7	15	34
Queue Length 95th (ft)	73	115	30	96
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	4245	671	3038	2521
Starvation Cap Reductn	0	39	371	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.15	0.29	0.31	0.16

Intersection Summary

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	328	64	187	745	92	122	7
v/c Ratio	19.29	0.18	0.69	0.47	0.66	0.13	0.23
Control Delay	8143.6	10.1	50.6	12.0	66.7	0.3	53.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8143.6	10.1	50.6	12.0	66.7	0.3	53.5
Queue Length 50th (ft)	~203	0	94	72	50	0	1
Queue Length 95th (ft)	#442	41	#312	347	#152	0	12
Internal Link Dist (ft)	812			917		505	555
Turn Bay Length (ft)		250	100		170		
Base Capacity (vph)	17	353	344	1602	361	1127	49
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	19.29	0.18	0.54	0.47	0.25	0.11	0.14

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	321	226	1227
v/c Ratio	0.34	0.22	0.55
Control Delay	5.6	6.8	1.0
Queue Delay	0.0	0.0	0.0
Total Delay	5.6	6.8	1.0
Queue Length 50th (ft)	7	8	0
Queue Length 95th (ft)	33	30	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1458	1296	2242
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.22	0.17	0.55

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	97	45	355	296	597	96	523
v/c Ratio	0.72	0.05	0.51	1.09	0.87	0.41	0.76
Control Delay	60.3	10.5	14.7	107.8	37.7	31.9	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.3	10.5	14.7	107.8	37.7	31.9	12.2
Queue Length 50th (ft)	33	5	35	~126	101	31	0
Queue Length 95th (ft)	#131	12	65	#357	#269	87	#75
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	134	1496	1408	272	687	236	685
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.03	0.25	1.09	0.87	0.41	0.76

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



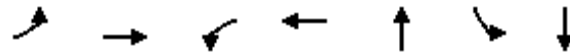
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	413	410	60	5	69
v/c Ratio	0.20	0.19	0.18	0.01	0.18
Control Delay	5.8	4.8	32.7	18.4	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	4.8	32.7	18.4	23.1
Queue Length 50th (ft)	42	19	31	0	23
Queue Length 95th (ft)	61	18	66	10	60
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	2017	2167	333	366	380
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.19	0.18	0.01	0.18

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	39	386	187	426	128	80	130
v/c Ratio	0.38	0.35	0.70	0.17	0.52	0.81	0.55
Control Delay	50.8	11.3	38.7	15.4	32.0	89.8	43.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	11.3	38.7	15.4	32.0	89.8	43.6
Queue Length 50th (ft)	24	102	116	121	48	51	70
Queue Length 95th (ft)	59	180	195	186	97	95	118
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	108	1093	297	2496	456	203	466
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.35	0.63	0.17	0.28	0.39	0.28

Intersection Summary

Queues

27: Mandela Parkway & 14th Street

4/27/2012



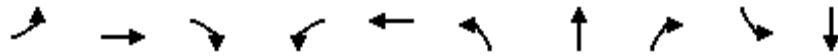
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	198	14	134	227
v/c Ratio	0.08	0.01	0.06	0.37
Control Delay	4.9	3.8	1.5	25.2
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	4.9	3.8	2.0	25.2
Queue Length 50th (ft)	9	0	2	48
Queue Length 95th (ft)	40	8	5	56
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2586	1114	2334	1677
Starvation Cap Reductn	0	0	1864	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.08	0.01	0.29	0.14

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	252	251	226	639	370	365	458	60	59
v/c Ratio	0.11	0.40	0.64	0.69	0.44	0.79	0.77	0.61	0.35	0.31
Control Delay	45.4	34.8	12.7	44.7	19.8	44.2	42.3	6.9	46.2	20.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.4	34.8	12.7	44.7	19.8	44.2	42.3	6.9	46.2	20.9
Queue Length 50th (ft)	7	66	0	116	124	198	193	0	32	6
Queue Length 95th (ft)	30	113	74	223	220	#472	#458	91	80	46
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	377	2131	730	459	2292	469	477	753	322	322
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.12	0.34	0.49	0.28	0.79	0.77	0.61	0.19	0.18

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	137	627	174	665	230	147	546	68	204
v/c Ratio	0.56	0.58	0.68	0.54	0.32	0.52	0.77	0.31	0.42
Control Delay	40.5	21.1	47.5	23.2	4.7	35.9	24.9	35.0	26.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.5	21.1	47.5	23.2	4.7	35.9	24.9	35.0	26.6
Queue Length 50th (ft)	62	113	82	143	0	66	74	31	36
Queue Length 95th (ft)	#122	173	#186	208	48	121	#143	68	72
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	290	1298	273	1260	735	397	816	299	533
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.48	0.64	0.53	0.31	0.37	0.67	0.23	0.38

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012



Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	774	239	839	339
v/c Ratio	0.25	0.59	0.40	0.45
Control Delay	6.0	12.2	3.3	16.9
Queue Delay	0.0	0.0	0.1	0.0
Total Delay	6.0	12.2	3.3	16.9
Queue Length 50th (ft)	33	14	25	41
Queue Length 95th (ft)	95	#192	42	78
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	3849	512	2635	2249
Starvation Cap Reductn	0	4	547	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.20	0.47	0.40	0.15

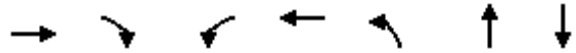
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	624	49	153	383	35	195	9
v/c Ratio	4.30	0.12	0.67	0.25	0.33	0.25	0.19
Control Delay	1509.1	7.3	44.5	4.5	46.3	0.8	49.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1509.1	7.3	44.5	4.5	46.3	0.8	49.4
Queue Length 50th (ft)	~264	0	67	20	16	0	2
Queue Length 95th (ft)	#518	27	163	76	55	0	12
Internal Link Dist (ft)	812			917		505	555
Turn Bay Length (ft)		250	100		170		
Base Capacity (vph)	145	413	388	1552	437	1134	225
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	4.30	0.12	0.39	0.25	0.08	0.17	0.04

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	825	234	622
v/c Ratio	0.60	0.27	0.30
Control Delay	5.7	12.5	0.4
Queue Delay	0.0	0.0	0.0
Total Delay	5.7	12.5	0.4
Queue Length 50th (ft)	26	17	0
Queue Length 95th (ft)	65	44	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1583	1097	2019
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.52	0.21	0.31

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	289	159	268	198	394	120	334
v/c Ratio	1.75	0.15	0.43	0.87	0.48	0.43	0.57
Control Delay	384.0	12.7	13.8	63.0	20.6	30.6	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	384.0	12.7	13.8	63.0	20.6	30.6	7.9
Queue Length 50th (ft)	~156	19	23	72	53	40	0
Queue Length 95th (ft)	#388	40	54	#269	131	103	38
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	165	1788	1343	228	818	452	739
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.75	0.09	0.20	0.87	0.48	0.27	0.45

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



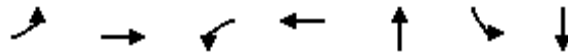
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	511	322	31	11	90
v/c Ratio	0.26	0.16	0.07	0.03	0.22
Control Delay	6.7	8.0	26.1	13.6	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	8.0	26.1	13.6	22.5
Queue Length 50th (ft)	55	45	13	0	31
Queue Length 95th (ft)	77	66	36	13	71
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	1972	1979	431	411	410
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.16	0.07	0.03	0.22

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	57	544	122	339	181	73	118
v/c Ratio	0.49	0.50	0.48	0.14	0.65	0.88	0.48
Control Delay	51.2	11.0	55.7	1.5	30.6	106.1	32.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	11.0	55.7	1.5	30.6	106.1	32.9
Queue Length 50th (ft)	32	109	75	6	54	42	49
Queue Length 95th (ft)	#72	337	105	11	107	83	90
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	120	1096	254	2364	626	231	637
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.50	0.48	0.14	0.29	0.32	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

27: Mandela Parkway & 14th Street

4/27/2012



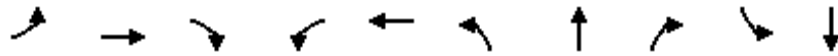
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	167	13	149	179
v/c Ratio	0.06	0.01	0.06	0.30
Control Delay	4.8	4.0	1.2	21.9
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	4.8	4.0	1.6	21.9
Queue Length 50th (ft)	7	0	2	33
Queue Length 95th (ft)	35	8	4	43
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2615	1126	2443	1679
Starvation Cap Reductn	0	0	1933	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.06	0.01	0.29	0.11

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	26	212	285	292	761	38	40	91	22	38
v/c Ratio	0.13	0.27	0.64	0.52	0.35	0.14	0.14	0.41	0.12	0.27
Control Delay	37.5	26.3	11.4	27.0	12.8	30.2	30.0	13.3	36.0	31.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.5	26.3	11.4	27.0	12.8	30.2	30.0	13.3	36.0	31.3
Queue Length 50th (ft)	10	39	0	96	77	14	15	0	8	10
Queue Length 95th (ft)	43	92	80	#293	251	49	51	43	38	48
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	599	2744	851	704	2952	774	825	464	411	298
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.08	0.33	0.41	0.26	0.05	0.05	0.20	0.05	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	48	294	259	593	246	257	484	161	324
v/c Ratio	0.26	0.28	1.22	0.42	0.32	1.18	0.76	0.74	0.62
Control Delay	30.2	9.6	162.2	14.1	3.3	148.4	22.0	50.7	25.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	9.6	162.2	14.1	3.3	148.4	22.0	50.7	25.5
Queue Length 50th (ft)	16	24	~119	84	0	~116	41	56	45
Queue Length 95th (ft)	48	47	#270	122	37	#266	#120	#161	#94
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	186	1513	213	1665	867	218	652	218	545
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.19	1.22	0.36	0.28	1.18	0.74	0.74	0.59

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012



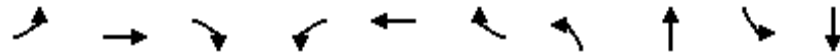
Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	619	187	768	456
v/c Ratio	0.24	0.46	0.42	0.52
Control Delay	6.3	6.9	3.0	14.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.3	7.0	3.1	14.8
Queue Length 50th (ft)	23	7	15	37
Queue Length 95th (ft)	73	115	30	107
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	4295	672	3045	2601
Starvation Cap Reductn	0	31	415	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.14	0.29	0.29	0.18

Intersection Summary

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	91	128	33	75	142	160	21	191	86	103
v/c Ratio	0.28	0.31	0.17	0.37	0.28	0.41	0.15	0.46	0.41	0.16
Control Delay	35.7	29.5	12.9	37.3	26.1	8.4	40.1	22.6	37.1	20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.7	29.5	12.9	37.3	26.1	8.4	40.1	22.6	37.1	20.4
Queue Length 50th (ft)	30	22	0	25	23	0	7	19	28	10
Queue Length 95th (ft)	117	67	26	102	68	50	42	76	112	52
Internal Link Dist (ft)		1364			917			505		565
Turn Bay Length (ft)	100			100		275	170			
Base Capacity (vph)	1034	1193	512	562	1319	745	569	1117	616	1147
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.11	0.06	0.13	0.11	0.21	0.04	0.17	0.14	0.09

Intersection Summary

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	176	205	679
v/c Ratio	0.18	0.14	0.34
Control Delay	3.7	5.4	0.5
Queue Delay	0.0	0.0	0.0
Total Delay	3.7	5.4	0.5
Queue Length 50th (ft)	3	7	0
Queue Length 95th (ft)	11	17	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1702	2217	2175
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.10	0.09	0.31

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	37	33	392	250	504	127	236
v/c Ratio	0.25	0.05	0.50	0.78	0.51	0.46	0.47
Control Delay	29.7	11.2	10.6	42.9	18.4	31.8	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.7	11.2	10.6	42.9	18.4	31.8	8.3
Queue Length 50th (ft)	8	3	20	58	47	30	0
Queue Length 95th (ft)	44	10	59	#297	162	#131	34
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	150	1598	1595	319	981	278	500
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.02	0.25	0.78	0.51	0.46	0.47

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



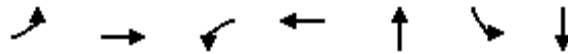
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	425	444	61	5	63
v/c Ratio	0.21	0.21	0.18	0.01	0.17
Control Delay	5.8	5.1	32.8	18.4	24.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	5.1	32.8	18.4	24.9
Queue Length 50th (ft)	44	24	31	0	23
Queue Length 95th (ft)	63	26	67	10	58
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	2014	2134	333	366	367
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.21	0.21	0.18	0.01	0.17

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	46	541	187	405	128	83	129
v/c Ratio	0.44	0.49	0.70	0.16	0.52	0.81	0.54
Control Delay	55.3	13.3	38.8	15.1	31.9	88.7	43.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.3	13.3	38.8	15.1	31.9	88.7	43.3
Queue Length 50th (ft)	29	163	116	113	48	53	69
Queue Length 95th (ft)	66	262	196	177	97	98	117
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	108	1096	297	2472	456	210	467
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.49	0.63	0.16	0.28	0.40	0.28

Intersection Summary

Queues

27: Mandela Parkway & 14th Street

4/27/2012



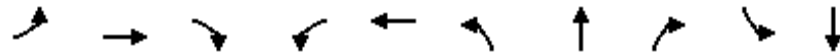
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	198	14	134	240
v/c Ratio	0.08	0.01	0.06	0.38
Control Delay	5.0	3.9	1.5	25.7
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	5.0	3.9	2.0	25.7
Queue Length 50th (ft)	10	0	2	51
Queue Length 95th (ft)	40	8	5	60
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2577	1111	2326	1704
Starvation Cap Reductn	0	0	1859	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.08	0.01	0.29	0.14

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	484	114	68	779	205	207	267	55	61
v/c Ratio	0.07	0.45	0.31	0.36	0.54	0.58	0.55	0.43	0.27	0.28
Control Delay	41.2	26.4	8.1	41.2	20.3	33.7	32.5	6.0	40.4	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	26.4	8.1	41.2	20.3	33.7	32.5	6.0	40.4	19.3
Queue Length 50th (ft)	5	106	0	31	143	88	88	0	26	6
Queue Length 95th (ft)	25	180	41	82	273	206	205	59	71	46
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	497	2450	689	562	2612	475	499	745	413	389
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.20	0.17	0.12	0.30	0.43	0.41	0.36	0.13	0.16

Intersection Summary

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	130	674	226	558	230	157	770	99	216
v/c Ratio	0.51	0.62	0.87	0.48	0.33	0.52	0.87	0.43	0.34
Control Delay	38.6	17.2	67.1	23.0	4.8	35.4	28.1	37.1	27.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.6	17.2	67.1	23.0	4.8	35.4	28.1	37.1	27.9
Queue Length 50th (ft)	57	91	108	117	0	69	105	44	44
Queue Length 95th (ft)	114	146	#257	171	48	126	#225	92	82
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	304	1356	259	1237	722	417	928	289	644
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.50	0.87	0.45	0.32	0.38	0.83	0.34	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012



Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	910	239	773	412
v/c Ratio	0.27	0.63	0.34	0.59
Control Delay	5.7	15.6	2.8	20.5
Queue Delay	0.0	0.0	0.2	0.0
Total Delay	5.7	15.6	3.0	20.5
Queue Length 50th (ft)	41	14	23	56
Queue Length 95th (ft)	114	#236	39	94
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	3326	382	2270	1890
Starvation Cap Reductn	0	0	715	0
Spillback Cap Reductn	23	0	0	7
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.63	0.50	0.22

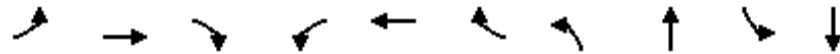
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	196	153	18	34	43	86	5	374	221	81
v/c Ratio	0.59	0.32	0.09	0.33	0.19	0.49	0.07	0.73	0.69	0.08
Control Delay	47.5	38.2	17.9	56.8	47.3	20.7	55.8	37.1	46.7	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	38.2	17.9	56.8	47.3	20.7	55.8	37.1	46.7	11.1
Queue Length 50th (ft)	102	41	0	18	12	0	3	81	111	7
Queue Length 95th (ft)	248	96	22	66	37	52	19	191	277	32
Internal Link Dist (ft)		1364			917			505		555
Turn Bay Length (ft)	100			100		275	170			
Base Capacity (vph)	662	823	346	352	906	447	382	805	513	1108
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.19	0.05	0.10	0.05	0.19	0.01	0.46	0.43	0.07

Intersection Summary

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	491	242	374
v/c Ratio	0.50	0.21	0.18
Control Delay	4.7	8.1	0.2
Queue Delay	0.0	0.0	0.0
Total Delay	4.7	8.1	0.2
Queue Length 50th (ft)	8	10	0
Queue Length 95th (ft)	26	31	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1760	1546	2087
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.28	0.16	0.18

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	132	100	262	87	433	195	249
v/c Ratio	0.80	0.10	0.40	0.47	0.62	0.57	0.39
Control Delay	66.8	12.9	12.0	33.5	25.2	31.9	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.8	12.9	12.0	33.5	25.2	31.9	6.1
Queue Length 50th (ft)	46	12	17	29	65	63	0
Queue Length 95th (ft)	#185	28	48	95	151	157	32
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	164	1621	1418	239	886	473	780
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.06	0.18	0.36	0.49	0.41	0.32

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



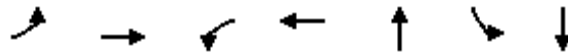
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	548	327	31	11	93
v/c Ratio	0.25	0.16	0.07	0.03	0.23
Control Delay	6.7	8.1	26.1	13.6	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	8.1	26.1	13.6	22.2
Queue Length 50th (ft)	59	49	13	0	32
Queue Length 95th (ft)	82	71	36	13	72
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	2154	1997	431	411	412
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.25	0.16	0.07	0.03	0.23

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	60	600	122	499	183	75	122
v/c Ratio	0.52	0.55	0.48	0.21	0.66	0.91	0.48
Control Delay	52.7	12.1	56.8	1.3	31.3	116.6	32.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.7	12.1	56.8	1.3	31.3	116.6	32.2
Queue Length 50th (ft)	34	121	75	8	56	43	49
Queue Length 95th (ft)	#81	385	112	12	110	#92	91
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	120	1092	254	2388	622	223	637
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.55	0.48	0.21	0.29	0.34	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

27: Mandela Parkway & 14th Street

4/27/2012



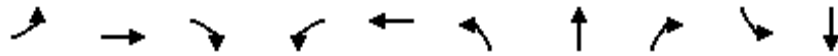
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	167	13	149	196
v/c Ratio	0.06	0.01	0.06	0.33
Control Delay	4.9	4.0	1.2	22.6
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	4.9	4.0	1.6	22.6
Queue Length 50th (ft)	7	0	2	37
Queue Length 95th (ft)	35	8	4	47
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2608	1123	2436	1683
Starvation Cap Reductn	0	0	1928	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.06	0.01	0.29	0.12

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	43	298	457	602	782	84	86	271	25	39
v/c Ratio	0.26	0.39	0.72	1.14	0.43	0.51	0.52	0.59	0.19	0.24
Control Delay	44.0	29.5	10.4	115.6	16.4	44.8	45.5	10.2	44.3	32.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	29.5	10.4	115.6	16.4	44.8	45.5	10.2	44.3	32.0
Queue Length 50th (ft)	21	69	0	~376	144	41	42	0	12	11
Queue Length 95th (ft)	63	122	95	#800	258	104	107	70	44	48
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	424	2101	935	527	2458	323	321	635	303	348
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.14	0.49	1.14	0.32	0.26	0.27	0.43	0.08	0.11

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	113	496	272	791	246	307	534	161	567
v/c Ratio	0.66	0.46	1.32	0.56	0.32	1.62	0.87	0.79	1.21
Control Delay	50.7	8.2	204.2	16.2	3.3	324.5	32.1	58.9	138.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.7	8.2	204.2	16.2	3.3	324.5	32.1	58.9	138.3
Queue Length 50th (ft)	45	32	~150	120	0	~185	57	64	~140
Queue Length 95th (ft)	#119	64	#281	170	37	#324	#147	#161	#234
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	170	1271	206	1550	824	190	614	203	469
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.39	1.32	0.51	0.30	1.62	0.87	0.79	1.21

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012

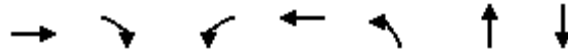


Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	675	187	911	530
v/c Ratio	0.25	0.46	0.47	0.62
Control Delay	6.8	6.9	3.2	20.6
Queue Delay	0.0	0.1	0.0	0.0
Total Delay	6.8	6.9	3.3	20.6
Queue Length 50th (ft)	33	7	18	68
Queue Length 95th (ft)	80	119	31	143
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	3916	584	2795	2246
Starvation Cap Reductn	0	32	230	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.34	0.36	0.24
Intersection Summary				

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	328	64	187	752	92	122	12
v/c Ratio	19.29	0.18	0.68	0.47	0.65	0.13	3.00
Control Delay	8243.4	10.2	50.2	12.1	66.1	0.3	1366.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8243.4	10.2	50.2	12.1	66.1	0.3	1366.5
Queue Length 50th (ft)	~203	0	94	72	50	0	~5
Queue Length 95th (ft)	#442	41	#312	352	#152	0	#33
Internal Link Dist (ft)	812			917		505	555
Turn Bay Length (ft)		250	100		170		
Base Capacity (vph)	17	351	342	1600	359	1125	4
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	19.29	0.18	0.55	0.47	0.26	0.11	3.00

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	321	259	1238
v/c Ratio	0.34	0.25	0.55
Control Delay	5.7	6.9	1.0
Queue Delay	0.0	0.0	0.0
Total Delay	5.7	6.9	1.0
Queue Length 50th (ft)	7	10	0
Queue Length 95th (ft)	33	34	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1454	1295	2242
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.22	0.20	0.55

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	97	45	453	344	689	133	552
v/c Ratio	0.72	0.05	0.58	1.27	0.96	0.57	0.78
Control Delay	61.4	10.4	13.2	175.1	50.7	38.6	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	61.4	10.4	13.2	175.1	50.7	38.6	12.5
Queue Length 50th (ft)	33	5	37	~168	121	44	0
Queue Length 95th (ft)	#131	12	72	#417	#316	#139	#78
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	134	1485	1451	270	717	234	709
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.72	0.03	0.31	1.27	0.96	0.57	0.78

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



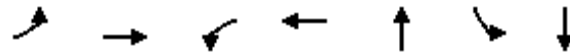
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	439	495	61	5	70
v/c Ratio	0.22	0.23	0.18	0.01	0.18
Control Delay	5.9	5.2	32.8	18.4	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.9	5.2	32.8	18.4	22.8
Queue Length 50th (ft)	46	25	31	0	23
Queue Length 95th (ft)	65	26	67	10	60
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	2009	2171	332	366	381
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.22	0.23	0.18	0.01	0.18

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	46	553	187	449	128	85	130
v/c Ratio	0.44	0.51	0.70	0.18	0.51	0.83	0.54
Control Delay	55.1	13.6	38.4	15.6	31.4	91.2	42.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.1	13.6	38.4	15.6	31.4	91.2	42.8
Queue Length 50th (ft)	29	170	116	129	48	54	69
Queue Length 95th (ft)	66	265	196	195	97	100	118
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	108	1091	297	2487	456	206	466
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.51	0.63	0.18	0.28	0.41	0.28

Intersection Summary

Queues

27: Mandela Parkway & 14th Street

4/27/2012



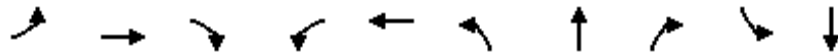
Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	198	14	134	241
v/c Ratio	0.08	0.01	0.06	0.39
Control Delay	5.0	3.9	1.6	25.7
Queue Delay	0.0	0.0	0.5	0.0
Total Delay	5.0	3.9	2.0	25.7
Queue Length 50th (ft)	10	0	2	52
Queue Length 95th (ft)	40	8	5	60
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2573	1109	2323	1678
Starvation Cap Reductn	0	0	1857	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.08	0.01	0.29	0.14

Intersection Summary

Queues

1: Maritime Street & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	18	492	292	233	822	398	393	512	80	76
v/c Ratio	0.17	0.58	0.62	0.75	0.54	1.00	0.98	0.72	0.47	0.37
Control Delay	52.4	37.4	10.2	54.1	22.9	85.3	78.1	12.5	54.4	21.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.4	37.4	10.2	54.1	22.9	85.3	78.1	12.5	54.4	21.2
Queue Length 50th (ft)	11	148	0	141	177	~293	~270	27	50	8
Queue Length 95th (ft)	37	220	80	#260	308	#582	#569	173	106	55
Internal Link Dist (ft)		875			2181		706			518
Turn Bay Length (ft)	440			925		250				
Base Capacity (vph)	319	1803	677	388	1942	397	403	707	272	293
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.27	0.43	0.60	0.42	1.00	0.98	0.72	0.29	0.26

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

2: Frontage Road & W. Grand Avenue

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	936	230	665	230	235	919	74	327
v/c Ratio	0.64	0.83	0.99	0.63	0.35	0.77	1.04	0.37	0.78
Control Delay	45.9	26.8	94.5	26.6	4.9	47.9	64.2	37.6	44.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	26.8	94.5	26.6	4.9	47.9	64.2	37.6	44.7
Queue Length 50th (ft)	67	176	~125	151	0	111	~210	35	78
Queue Length 95th (ft)	#133	#258	#259	208	48	#213	#346	72	#142
Internal Link Dist (ft)		2181		1017			858		684
Turn Bay Length (ft)	800		275		321	585		462	
Base Capacity (vph)	247	1174	232	1065	657	337	884	254	433
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.80	0.99	0.62	0.35	0.70	1.04	0.29	0.76

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: W. Grand Avenue

4/27/2012



Lane Group	EBT	WBL	WBT	SBT
Lane Group Flow (vph)	1123	239	839	455
v/c Ratio	0.34	0.83	0.38	0.64
Control Delay	6.5	36.0	3.1	23.5
Queue Delay	0.0	0.0	0.2	0.0
Total Delay	6.5	36.0	3.3	23.5
Queue Length 50th (ft)	59	69	28	72
Queue Length 95th (ft)	147	#280	43	113
Internal Link Dist (ft)	361		50	479
Turn Bay Length (ft)				
Base Capacity (vph)	3273	288	2233	1835
Starvation Cap Reductn	0	0	582	0
Spillback Cap Reductn	29	0	0	9
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.83	0.51	0.25

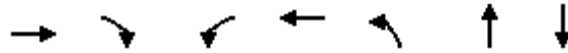
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

10: Maritime Street & 7th Street

4/27/2012



Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	638	49	153	388	37	200	21
v/c Ratio	4.62	0.12	0.68	0.26	0.36	0.25	8.50dl
Control Delay	1655.1	8.8	48.2	6.3	51.3	0.8	227.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1655.1	8.8	48.2	6.3	51.3	0.8	227.2
Queue Length 50th (ft)	~284	1	67	21	17	0	5
Queue Length 95th (ft)	#556	29	171	89	61	0	#35
Internal Link Dist (ft)	812			917		505	555
Turn Bay Length (ft)		250	100		170		
Base Capacity (vph)	138	394	369	1492	415	1095	81
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	4.62	0.12	0.41	0.26	0.09	0.18	0.26

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
- dl Defacto Left Lane. Recode with 1 though lane as a left lane.
- dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Queues

11: I-880 SB On-Ramp & 7th Street

4/27/2012



Lane Group	EBT	WBL	WBT
Lane Group Flow (vph)	861	297	625
v/c Ratio	0.63	0.36	0.30
Control Delay	7.0	13.5	0.4
Queue Delay	0.0	0.0	0.0
Total Delay	7.0	13.5	0.4
Queue Length 50th (ft)	38	25	0
Queue Length 95th (ft)	85	55	0
Internal Link Dist (ft)	936		265
Turn Bay Length (ft)			
Base Capacity (vph)	1504	976	2048
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.57	0.30	0.31

Intersection Summary

Queues

12: I-880 NB Off-Ramp/Frontage Road & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBR
Lane Group Flow (vph)	320	159	295	200	473	224	403
v/c Ratio	2.04	0.15	0.47	0.92	0.61	0.65	0.58
Control Delay	508.3	14.2	13.9	75.6	25.9	35.4	6.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	508.3	14.2	13.9	75.6	25.9	35.4	6.8
Queue Length 50th (ft)	~198	21	25	82	80	79	0
Queue Length 95th (ft)	#434	41	56	#275	#173	#182	40
Internal Link Dist (ft)		265	922		808		
Turn Bay Length (ft)						175	
Base Capacity (vph)	157	1702	1305	217	779	430	772
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	2.04	0.09	0.23	0.92	0.61	0.52	0.52

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues

13: Peralta Street & 7th Street

4/27/2012



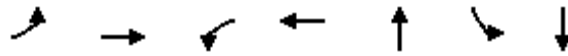
Lane Group	EBT	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	628	355	31	11	94
v/c Ratio	0.32	0.18	0.07	0.03	0.23
Control Delay	7.2	8.3	26.1	13.6	22.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	8.3	26.1	13.6	22.0
Queue Length 50th (ft)	71	54	13	0	32
Queue Length 95th (ft)	98	77	36	13	72
Internal Link Dist (ft)	714	579	571		604
Turn Bay Length (ft)				50	
Base Capacity (vph)	1981	1978	430	411	413
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.18	0.07	0.03	0.23

Intersection Summary

Queues

14: Mandela Parkway & 7th Street

4/27/2012



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT
Lane Group Flow (vph)	60	668	122	519	183	74	123
v/c Ratio	0.52	0.61	0.48	0.22	0.66	0.89	0.49
Control Delay	52.0	12.9	56.7	1.3	31.8	108.8	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	12.9	56.7	1.3	31.8	108.8	32.3
Queue Length 50th (ft)	34	132	75	8	56	43	50
Queue Length 95th (ft)	#81	447	113	13	110	84	91
Internal Link Dist (ft)		636		889	391		324
Turn Bay Length (ft)	130		175				
Base Capacity (vph)	120	1095	254	2370	621	230	637
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.61	0.48	0.22	0.29	0.32	0.19

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

27: Mandela Parkway & 14th Street

4/27/2012



Lane Group	EBT	EBR	WBT	SBT
Lane Group Flow (vph)	167	13	149	196
v/c Ratio	0.06	0.01	0.06	0.32
Control Delay	4.9	4.0	1.2	22.6
Queue Delay	0.0	0.0	0.4	0.0
Total Delay	4.9	4.0	1.6	22.6
Queue Length 50th (ft)	7	0	2	37
Queue Length 95th (ft)	35	8	4	47
Internal Link Dist (ft)	336		29	1586
Turn Bay Length (ft)		75		
Base Capacity (vph)	2604	1122	2432	1683
Starvation Cap Reductn	0	0	1924	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.06	0.01	0.29	0.12

Intersection Summary

APPENDIX B - 7

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Unsignalized Intersections Warrant Analysis

Intersection 25: Adeline & 3rd Street

Scenario	Added Project Volume	Part A1 (veh-hrs)	Part A2 (veh)	Part A3 (veh)	Warrant Met Part A?	Major Street 2-Dir. (veh)	Minor Street 1-Dir. (veh)	Warrant Met Part B?
Existing AM + Project	315	0.89	223	1105	No	773	223	No
Existing PM + Project	182	0.99	284	1161	No	736	284	No
2020 AM + Project	315	0.89	223	1109	No	777	223	No
2020 PM + Project	182	0.99	284	1166	No	741	284	No
2035 AM + Project	225	0.92	232	1028	No	687	232	No
2035 PM + Project	186	1.06	294	1186	No	751	294	No

Intersection 26: Market & 3rd Street

Scenario	Added Project Volume	Part A1 (veh-hrs)	Part A2 (veh)	Part A3 (veh)	Warrant Met Part A?	Major Street 2-Dir. (veh)	Minor Street 1-Dir. (veh)	Warrant Met Part B?
Existing AM + Project	31	0.61	172	601	No	383	172	No
Existing PM + Project	19	0.42	110	774	No	563	110	No
2020 AM + Project	31	0.61	172	603	No	385	172	No
2020 PM + Project	19	0.42	110	777	No	566	110	No
2035 AM + Project	30	0.72	187	700	No	448	187	No
2035 PM + Project	19	0.44	111	806	No	590	111	No

Intersection 49: West Truck Services & Burma Road

Scenario	Added Project Volume	Part A1 (veh-hrs)	Part A2 (veh)	Part A3 (veh)	Warrant Met Part A?	Major Street 2-Dir. (veh)	Minor Street 1-Dir. (veh)	Warrant Met Part B?
Existing AM + Project	479	0.34	69	479	No	386	69	No
Existing PM + Project	518	0.51	141	518	No	303	141	No
2020 AM + Project	773	1.29	123	773	No	609	123	No
2020 PM + Project	833	1.41	242	833	No	484	242	No
2035 AM + Project	770	1.21	126	770	No	608	126	No
2035 PM + Project	876	1.41	231	876	No	547	231	No

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