APPENDIX B

Traffic Impact Analysis

Traffic Impact Analysis

The Creamery
Sacramento, California

Final
September 16, 2008

Prepared for:

City of Sacramento, California

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EXECUTIVE SUMMARY

This report documents the results of a traffic impact analysis completed for a proposed residential/commercial mixed-use development to be located at the existing Crystal Cream & Butter Company processing facility site in downtown Sacramento, California (the "proposed project" or "project"). The purpose of this analysis is to identify potential environmental impacts to transportation facilities as required by the California Environmental Quality Act (CEQA).

The proposed project will consist of a total of 272 high-density residential dwelling units, and 101,180 sf of retail space on 8.2 developed acres. The proposed project is generally bounded by Union Pacific Rail Road (UPRR) tracks to the north, E Street to the south, 10th Street to the west, and 11th Street to the east. Access to the site will be provided via numerous proposed driveways along 10th Street, 11th Street, and D Street.

The following facilities are included in this traffic impact analysis:

Intersections

1. C Street at 12th Street
2. C Street at 14th Street
3. C Street at 16th Street
4. D Street at 10th Street
5. D Street at 11th Street
6. D Street at 12th Street
7. E Street at 10th Street
8. E Street at 11th Street
9. E Street at 12th Street
10. G Street at 7th Street
11. G Street at 10th Street
12. I Street at 5th Street
13. I Street at 9th Street
14. I Street at 10th Street
15. J Street at 3rd Street
16. J Street at 9th Street
17. J Street at 10th Street

Freeway Mainline Segments

1. I-5 between Capitol Avenue and J Street

Freeway Merge and Diverge Areas

1. I Street On-Ramp to Northbound I-5
2. I Street On-Ramp to Southbound I-5
3. Southbound I-5 to J Street Off-Ramp
4. Northbound I-5 to J Street Off-Ramp

Freeway Off-Ramp Queuing

1. I-5 Northbound J Street Off-Ramp
2. I-5 Southbound J Street Off-Ramp

A Level of Service (LOS) analysis was conducted for the above facilities for both weekday AM and PM peak-hours for the following scenarios:

A. Existing Conditions
B. Baseline Conditions
C. Baseline plus Proposed Project Conditions
D. Cumulative (2030) Conditions
E. Cumulative (2030) plus Proposed Project

Significant findings of this study include:

- The proposed project is expected to generate 4,465 new daily trips, including 145 AM peak-hour trips and 366 PM peak-hour trips.
- The proposed project does not result in any impacts that cannot be mitigated to be less than significant.
- The proposed project is not anticipated to adversely affect pedestrian, bicycle, or transit facilities in the vicinity of the project site.
- The peak-hour traffic signal warrant is not satisfied for any unsignalized study intersections under any of the analysis scenarios.
- Locations of proposed driveways are not expected to significantly affect intersection operations.

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INTRODUCTION

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The remaining sections of this report document the proposed project, analysis methodologies, impacts and mitigation measures, and general study conclusions.

PROJECT DESCRIPTION

The proposed project will consist of a total of 272 high-density residential dwelling units, and 101,180 sf of retail space on 8.2 developed acres. The project applicant has indicated to the City that up to 81,040 sf of the non-residential uses could be occupied as office space which would leave 20,140 sf of retail use in this scenario. The proposed project is generally bounded by Union Pacific Rail Road (UPRR) facilities to the north, E Street to the south, 10th Street to the west, and 11th Street to the east. Access to the site will be provided via numerous proposed driveways along 10th Street, 11th Street, and D Street. The project location is shown in Figure 1 and the project site plan is shown in Figure 2.

The following facilities are included in this traffic impact analysis:

Intersections

1. C Street at 12th Street
2. C Street at 14th Street
3. C Street at 16th Street
4. D Street at 10th Street
5. D Street at 11th Street
6. D Street at 12th Street
7. E Street at 10th Street
8. E Street at 11th Street
9. E Street at 12th Street
10. G Street at 7th Street
11. G Street at 10th Street
12. I Street at 5th Street
13. I Street at 9th Street
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Freeway Merge and Diverge Areas

1. I Street On-Ramp to Northbound I-5
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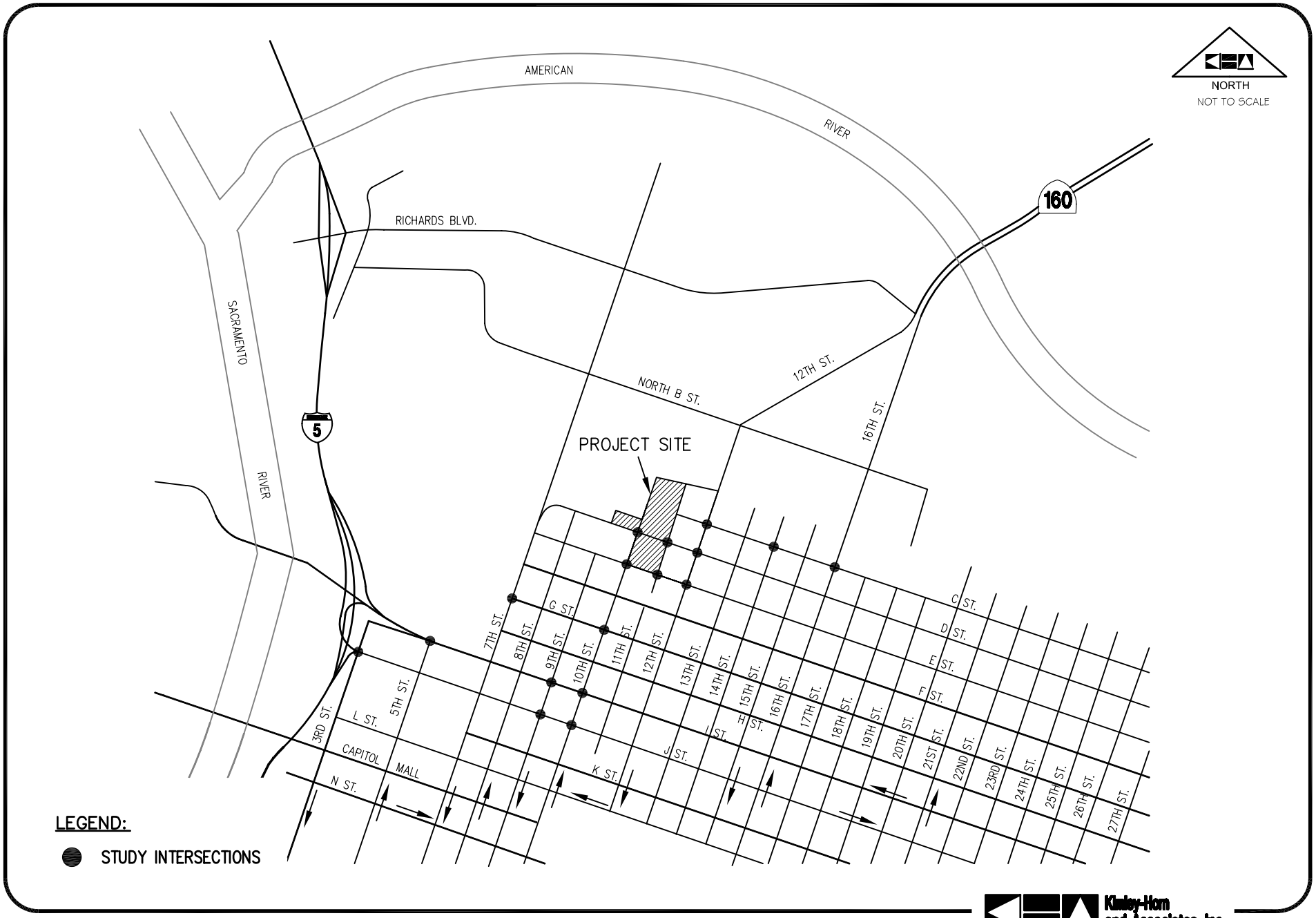
4. Northbound I-5 to J Street Off-Ramp

Freeway Off-Ramp Queuing

1. I-5 Northbound J Street Off-Ramp
2. I-5 Southbound J Street Off-Ramp

Figure 3 illustrates the study facilities, existing traffic control, and existing lane configurations.



Kimley-Horn and Associates, Inc.

FIGURE 1

PROJECT VICINITY MAP

THE CREAMERY

SACRAMENTO, CALIFORNIA

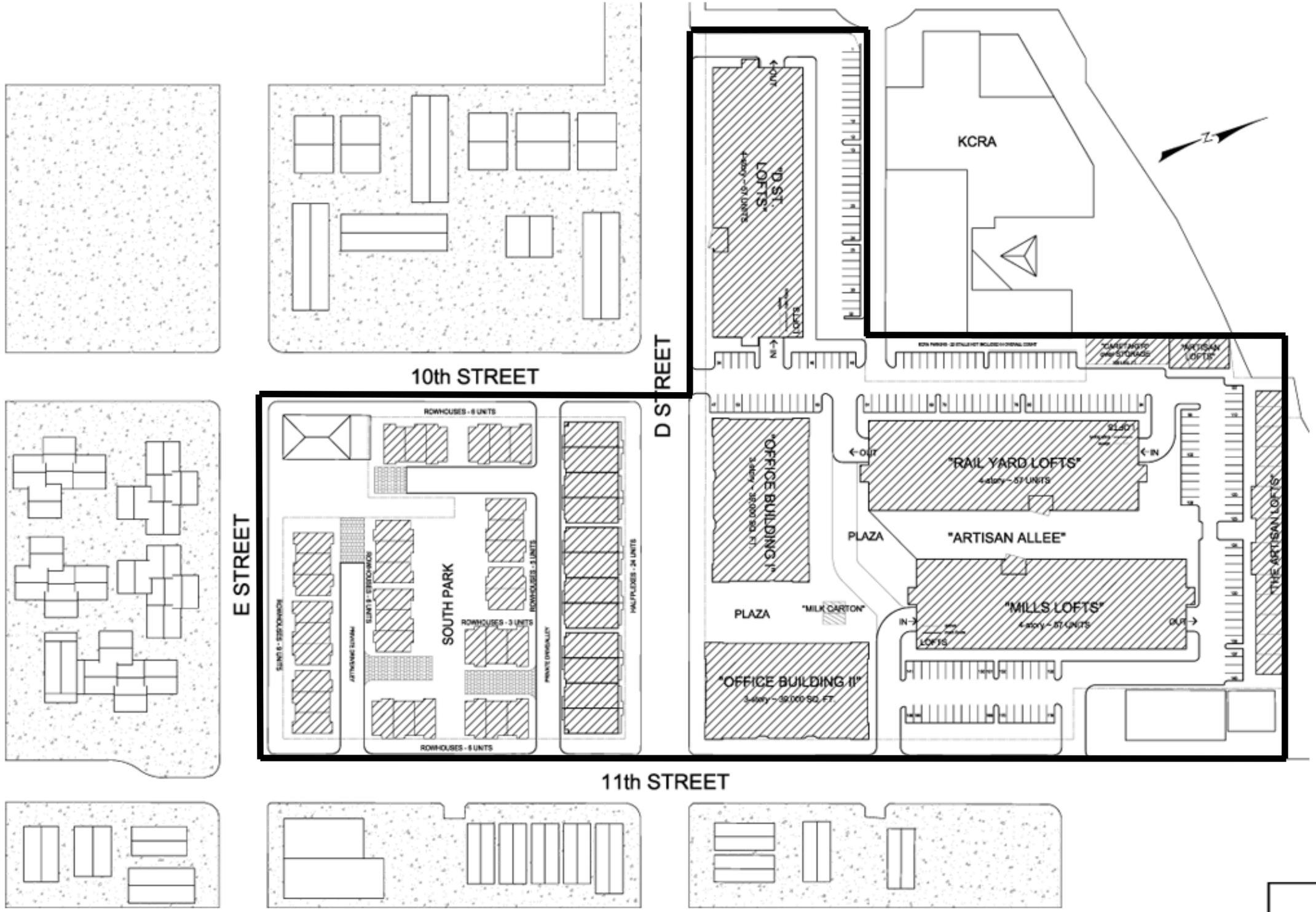


FIGURE 2 - PROPOSED PROJECT SITE PLAN

The Old Crystal Cream & Butter Company for MetroNova Development

pha architects - 1400 s street - sacramento, california - 916.554.6411

SUBCOMMITTEE WORKSHOP - 02.08.2008

JOB #: 06094

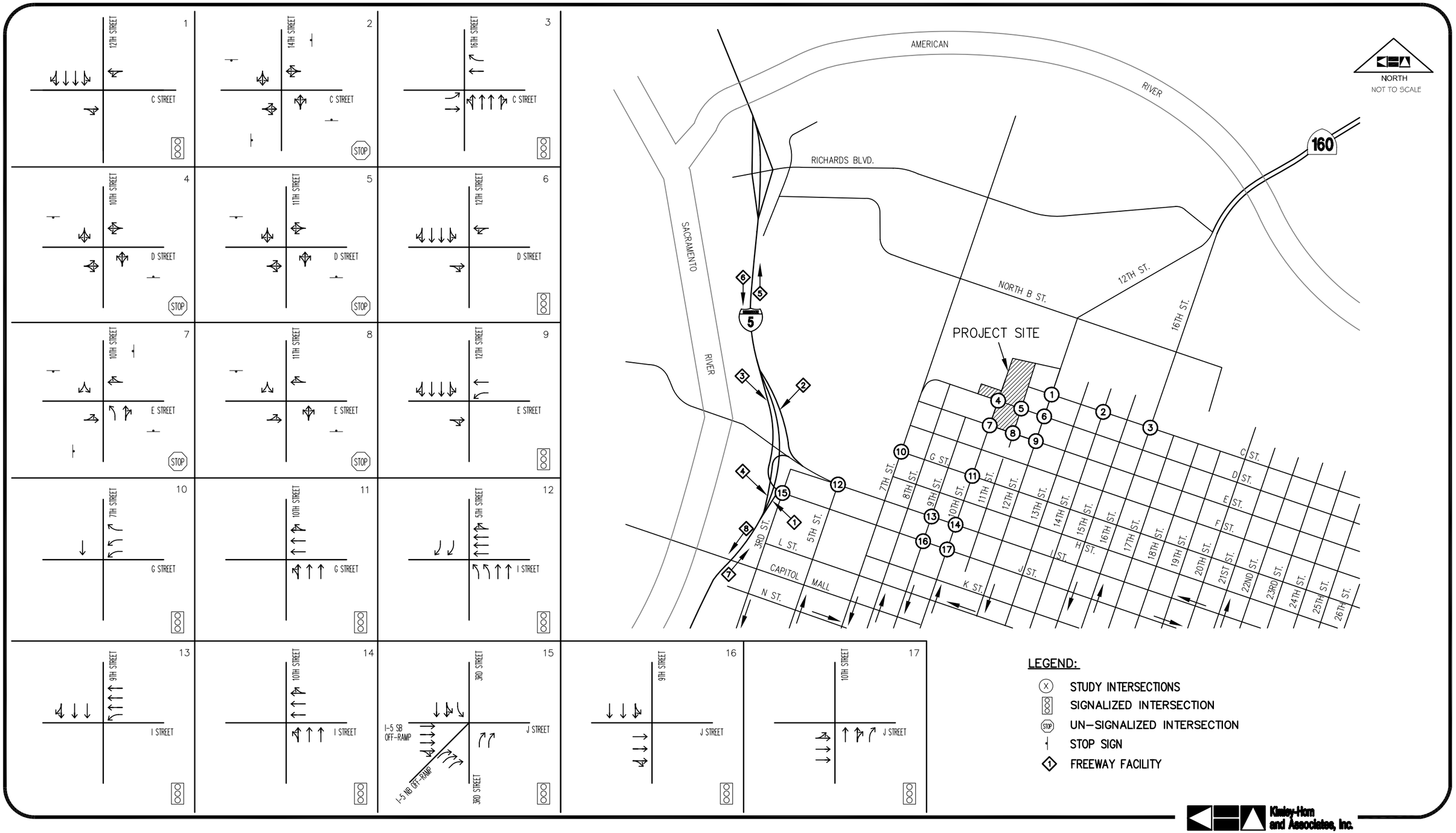


FIGURE 3

PROJECT LOCATION AND STUDY INTERSECTIONS

THE CREAMERY
SACRAMENTO, CALIFORNIA

PROJECT AREA FACILITIES

Major Roadways

The following are descriptions of the major roadways in the vicinity of the project:

Interstate 5 (I-5) is a north-south freeway located west of the project site. Primary access to the project site from I-5 is provided at the I Street/J Street interchange. Within the project area, I-5 currently serves approximately 190,000 vehicles per day[1] (vpd) with four travel lanes in each direction.

I Street is a one-way, westbound arterial roadway located south of the project site. I Street extends from the Sacramento River to the west to 53rd Street to the east. In the vicinity of the project site, this roadway provides three westbound travel lanes.

J Street is a one-way, eastbound arterial roadway located south of the project site. J Street extends from the Sacramento River to the west to M Street at California State University-Sacramento to the east, where it becomes Fair Oaks Boulevard. In the vicinity of the project site, this roadway provides three eastbound travel lanes.

12th Street is a one-way, southbound arterial roadway located east of the project site. 12th Street extends from Richards Boulevard to the north to Riverside Boulevard to the south. In the vicinity of the project site, this roadway provides four southbound travel lanes. Between the 12th Street intersection with Sunbeam Avenue/Sproule Avenue and the K Street pedestrian mall, the 12th Street right-of-way includes two sets of light rail tracks. The southbound track is located in a shared, southbound travel lane. The northbound tracks are in a dedicated light rail lane. There are two light rail stations along this segment of 12the Street. The Alkalai Flat/La Valentina station is located between D Street and E Street, and the 12th and I station is located between H Street and I Street. At both station, the southbound train occupies the southbound travel lane while loading and unloading passengers.

16th Street is a one-way, northbound arterial roadway located east of the project site. 16th Street extends from Broadway to the south to Richards Boulevard to the north, where it then becomes State Route 160 (SR-160). In the vicinity of the project site, this roadway provides four northbound travel lanes.

Bicycle and Pedestrian Facilities

There are currently on-street bike lanes along portions of C Street, E Street, and 11th Street, and 13th Street in the immediate vicinity of the project site. The immediate project area does not have dedicated on-street bicycle facilities. Placement of bikeways is guided by the City's *Pedestrian Friendly Street Standards* (adopted in 2004), which requires bike lanes on all collector and arterial streets.

Sidewalks are currently located along all streets in the immediate vicinity of the project site. Pedestrian crosswalks are also currently provided at most of the major signalized intersections within downtown Sacramento.

Transit Facilities

The Sacramento Regional Transit District (RT) provides public transit service within the project area. The Sacramento Valley Station Light Rail Transit (LRT)/Bus Transfer Station, located southwest of the project site at the 5th Street at I Street intersection, also serves as Amtrak's boarding station for its Capitol Corridor line. The RT Light Rail Transit Gold Line operates from the Sacramento Valley Station to Folsom. Additionally, the nearby Alkali Flat/La Valentina Light Rail Station, located along 12th Street between D Street and E Street, also provides access to light rail transit. The Alkali Flat/La Valentina station is one of the ten stops along light rail's Blue Line. RT also provides bus transit service that operates routes adjacent to the proposed project site. The following summarizes these bus routes:

[1] Caltrans Traffic and Vehicle Data Systems Unit, http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/2006all.htm.

Route 11 provides bus service connecting North Natomas to the 3rd Street & J Street bus stop in Downtown Sacramento, and provides direct access to the project site via 7th Street. Route 11 operates at 30 minute headways during the peak-hours with a total of 35 trips per day. This bus route averages 739 boardings per day[2] with a maximum capacity of 68 passengers per bus.

Route 29 provides express bus service connecting Fair Oaks to the 7th Street & O Street bus stop in Downtown Sacramento. Route 29 operates with a total of only 4 trips per day, all of which run during the peak periods. This bus route averages 117 boardings per day[2] with a maximum capacity of 68 passengers per bus.

Route 33 provides bus service connecting neighborhoods adjacent to Richards Boulevard and SR-160 to the Alkali Flat/La Valentina light rail station in Downtown Sacramento. Route 33 operates at 20 minute headways during the peak-hours with a total of 103 trips per day. This bus route averages 607 boardings per day[2] with a maximum capacity of 68 passengers per bus.

Route 34 provides bus service connecting the 65th Street Station in East Sacramento to the 8th Street & O Street bus stop in Downtown Sacramento. Route 34 operates at 30 minute headways during the peak-hours with a total of 56 trips per day. This bus route averages 861 boardings per day[2] with a maximum capacity of 68 passengers per bus.

ASSESSMENT OF PROPOSED PROJECT

Proposed Project Trip Generation

The number of trips anticipated to be generated by the proposed project was derived using data included in the *Trip Generation, 7th Edition*, and *Trip Generation Manual, 2nd Edition,* both published by the Institute of Transportation Engineers (ITE). The anticipated trip generation and appropriate reductions, which were reviewed by the City, are presented in Table 1.

Table 1 indicates the trip generation for the project assuming the site is built-out with residential and retail uses. As shown in Table 1, the proposed project is estimated to generate 4,465 total new daily trips with 145 new trips occurring during the AM peak-hour and 366 new trips occurring during the PM peak-hour. The trip generation was adjusted to account for internal site trips, pass-by trips, and alternate mode trips. The internal reduction factor accounts for the interaction of the proposed residential and commercial use within the project site. These trips would not be expected to use the surrounding roadway network to access other parts of the site. The percentage reduction for internal trips was calculated for daily and PM peak hour trips in accordance with procedures outlined in *Trip Generation Handbook, 2nd Edition*, published by ITE.

The pass-by reduction accounts for drivers on the network that access the site's commercial uses but are presumed to already be on the roadway network for some other purpose. The national average (per ITE's *Trip Generation Handbook*) for this reduction is 34 percent for that specific land use. Since the site is not along an arterial facility, a more conservative pass-by rate of 20 percent is assumed.

The alternate mode reduction accounts for the proximity of transit to the site and other trips that would be expected from other "non-single occupant" vehicles. Regional Transit operates bus lines on F Street, 7th Street, and 12th Street, and the Alkalai Flat Light Rail station is located one block east of the site on 12th Street. Alternate mode trips (transit, walk, bike, and pedestrian trips) can also be expected to access the site from the surrounding neighborhood. The alternate mode adjustment percentages shown in Table 1 were derived using the methodology developed by Dowling Associates, Inc. The methodology references data published in the *2000 SACOG Household Travel Survey* (DKS Associates, Inc.). The survey includes travel

[2] *Route Profiles: Fiscal Year 2007*, Sacramento Regional Transit.

mode choice information used primarily to aid in the development and refinement of the travel demand model maintained by the Sacramento Area Council of Governments (SACOG)[3].

Table 1 – Proposed Project Trip Generation (Residential and Retail Uses)

ITE Land Use (Code)	Size			Total Daily Trips	AM Peak Hour					PM Peak Hour				
					Total Trips	IN		OUT		Total Trips	IN		OUT	
						%	Trips	%	Trips		%	Trips	%	Trips
Residential Condominium/ Townhome (230)	272 units			1,503	115	17%	20	83%	95	137	67%	91	33%	45
Shopping Center (820)	101.2 ksf			6,843	158	61%	96	39%	61	631	48%	303	52%	328
Subtotal New Trips:				***8,346***	***273***		***116***		***157***	***767***		***394***		***373***
Internal Reduction[1] (Daily, AM, PM)	12.8%	-	13.6%	-1,066						-104		-53		-51
Retail Pass-By Reduction[1]	20%			-1,369	-32		-19		-12	-126		-61		-66
Residential Transit Adjustments (Daily, AM, PM)	2.6%	3.4%	3.1%	-39	-4		-1		-3	-4		-3		-1
Retail Transit Adjustment	2.2%			-151	-3		-2		-1	-14		-7		-7
Residential Walk, Bike & Other Non-Auto Adjustments (Daily, AM, PM)	9.6%	7.9%	8.6%	-144	-9		-2		-8	-12		-8		-4
Retail Walk, Bike & Other Non-Auto Adjustments	11.6%			-794	-18		-11		-7	-73		-35		-38
Existing Industrial Use[2]	8.2 Acre			-318	-61	93%	-57	7%	-4	-69	53%	-36	32%	-22
Net New External Trips:				***4,465***	***145***		***24***		***121***	***366***		***191***		***184***

Source: *Trip Generation, 7th Edition*, ITE.
[1] *Trip Generation Handbook, Second Edition*, ITE.
[2] Assumes Manufacturing Land use, ITE code 140.

The project site is currently developed with a manufacturing use. To avoid double counting site trips, trips for the existing industrial uses were deducted from the project trip generation. Table 1 includes an adjustment of project trips to account for the existing use.

As noted in the project description, above, up to 81,040 sf of the non-residential uses on the site could be occupied with office uses. This scenario would result in a retail use of 20,140 sf. For comparison purposes, the trip generation of the mixed office and retail uses was estimated and is shown in Table 2. As shown in Table 2, the office/retail option is estimated to generate 2,895 total new daily trips with 217 new trips occurring during the AM peak-hour and 282 new trips occurring during the PM peak-hour. The alternate mode reductions indicated in Table 2 for the office uses were developed in a manner similar to that described for Table 1.

Comparing Table 1 and Table 2 reveals the proposed project, consisting of 101,180 sf of retail uses will result in a higher number of new daily and PM peak hour trips than assuming the mix of retail and office uses . In addition, the study intersections generally serve more existing traffic and have higher delay during the PM peak hour than during the AM peak hour (as indicated by the traffic operations listed in Table 6, below). As a result, the analysis presented below assumes retail uses (Table 1) will occupy the entire non-residential area of the project.

[3] *Pre-Census Travel Behavior Report: Analysis of the 2000 SACOG Household Travel Survey*, DKS Associates, July 25, 2001.

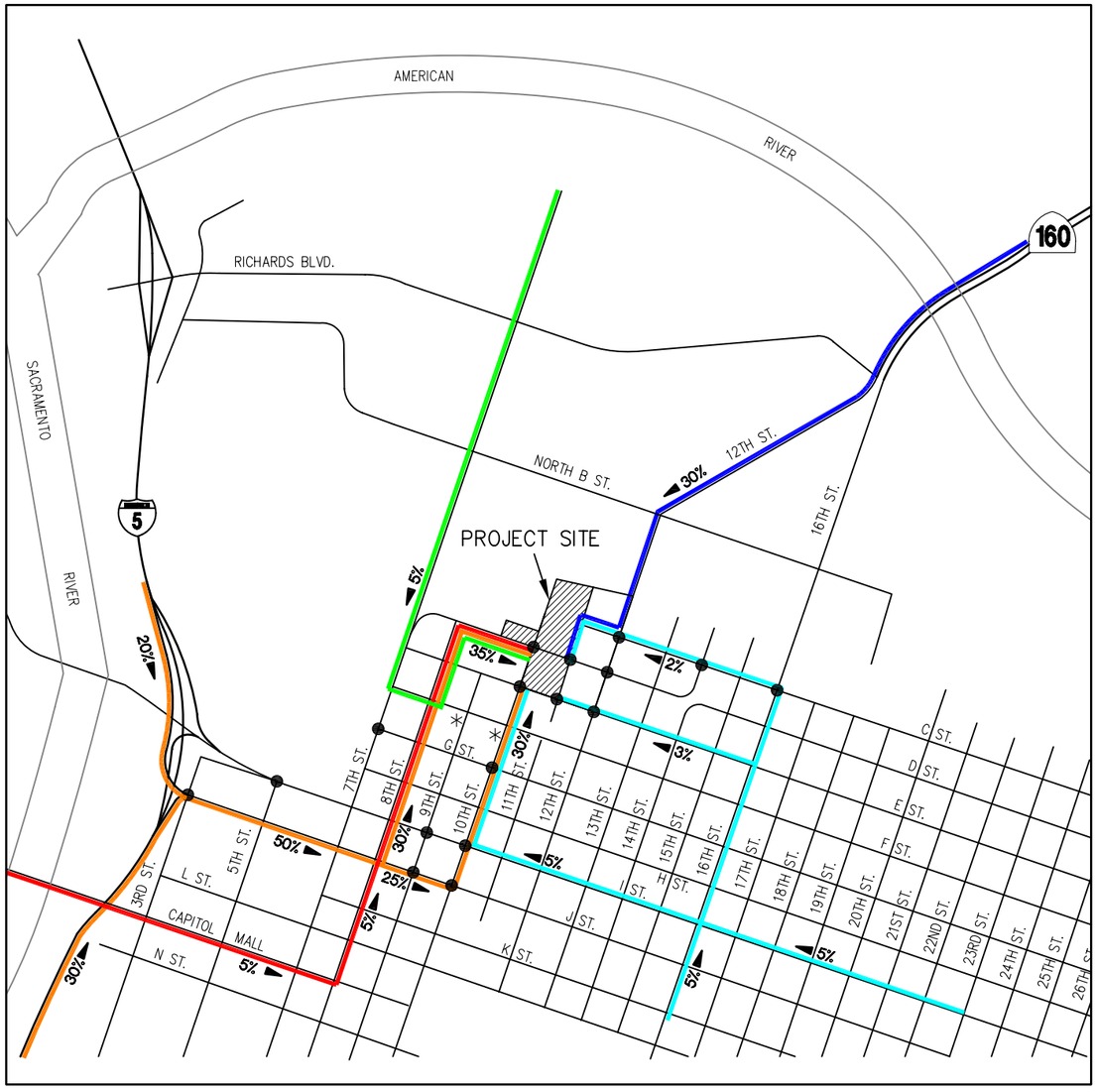
Table 2 - Trip Generation for Residential and Office Uses

ITE Land Use (Code)	Size			Total Daily Trips	AM Peak Hour					PM Peak Hour				
					Total Trips	IN		OUT		Total Trips	IN		OUT	
						%	Trips	%	Trips		%	Trips	%	Trips
Residential Condominium/ Townhome (230)	272 units			1,503	115	17%	20	83%	95	137	67%	91	33%	45
Shopping Center (820)	20.140 ksf			2,396	60	61%	37	39%	23	217	48%	104	52%	113
Office (710)	81.040 ksf			1,135	159	88%	140	12%	19	170	17%	29	83%	141
Subtotal New Trips:				***5,034***	***333***		***196***		***138***	***524***		***225***		***299***
Internal Reduction[1] (Daily, AM, PM)	13.3%	-	11.5%	-670						-60		-26		-34
Retail Pass-By Reduction[1]	20%			-479	-12		-7		-5	-43		-21		-23
Residential Transit Adjustments (Daily, AM, PM)	2.6%	3.4%	3.1%	-39	-4		-1		-3	-4		-3		-1
Retail Transit Adjustment	2.2%			-53	-1		-1		-1	-5		-2		-2
Office Transit Adjustment	11.1%			-126	-18		-15		-2	-19		-3		-16
Residential Walk, Bike & Other Non-Auto Adjustments (Daily, AM, PM)	9.6%	7.9%	8.6%	-144	-9		-2		-8	-12		-8		-4
Retail Walk, Bike & Other Non-Auto Adjustments	11.6%			-278	-7		-4		-3	-25		-12		-13
Office Walk, Bike & Other Non-Auto Adjustments	2.8%			-32	-4		-4		-1	-5		-1		-4
Existing Industrial Use[2]	8.2 Acre			-318	-61	93%	-57	7%	-4	-69	53%	-36	32%	-22
Net New External Trips:				***2,895***	***217***		***105***		***112***	***282***		***113***		***180***

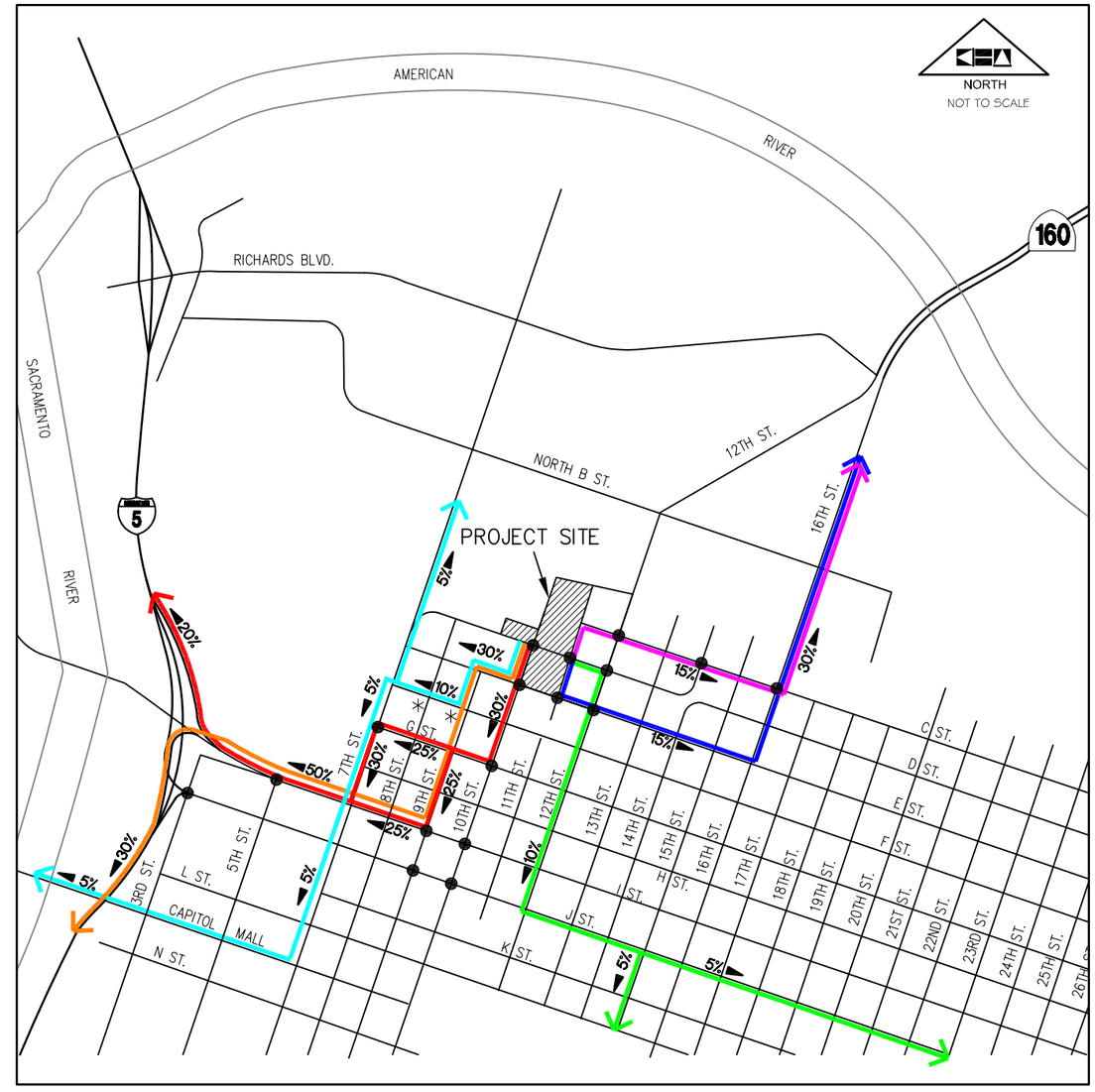
Proposed Project Trip Distribution

Project trip distribution for Baseline Plus Project conditions was based on existing traffic patterns and professional judgment. The project trip distribution percentages are illustrated in Figure 4. The resulting AM and PM peak-hour traffic volumes attributed to the proposed project at the study area intersections are illustrated in Figure 5. The distribution of project traffic for Cumulative Plus Project conditions was based on the SACOG's *SACMET Travel Demand Model* (the "model") as it has been developed by Dowling Associates to model the future effects of approved development projects.

It should be noted the trip distribution shown in Figure 4 assigns 80 percent of the site trips to I-5 and SR-160. This distribution is appropriate for office trips occupying the non-residential area of the site. This trip distribution assumption, along with the higher trip generation assumption described above, results in the highest assignment of site trips being added to intersections that are most likely to be impacted by the project. If the site builds out with a mix of retail and office uses in the non-residential areas, the project's trip generation will be directed more to areas within the Central City than is indicated in Figure 4. Given the high number of streets in the Central City, the combined uses are likely to result in a larger dispersion of site trips across the street network. This dispersion would tend to decrease the number of site trips at any specific intersection and, therefore, decrease the likelihood of potential traffic impacts to less than that studied for this project.



TRIP DISTRIBUTION IN



TRIP DISTRIBUTION OUT

LEGEND:

- ∗ ASSUMES 2-WAY CONVERSION
- ◄XX% TRIP DISTRIBUTION PERCENTAGE
- ● STUDY INTERSECTION

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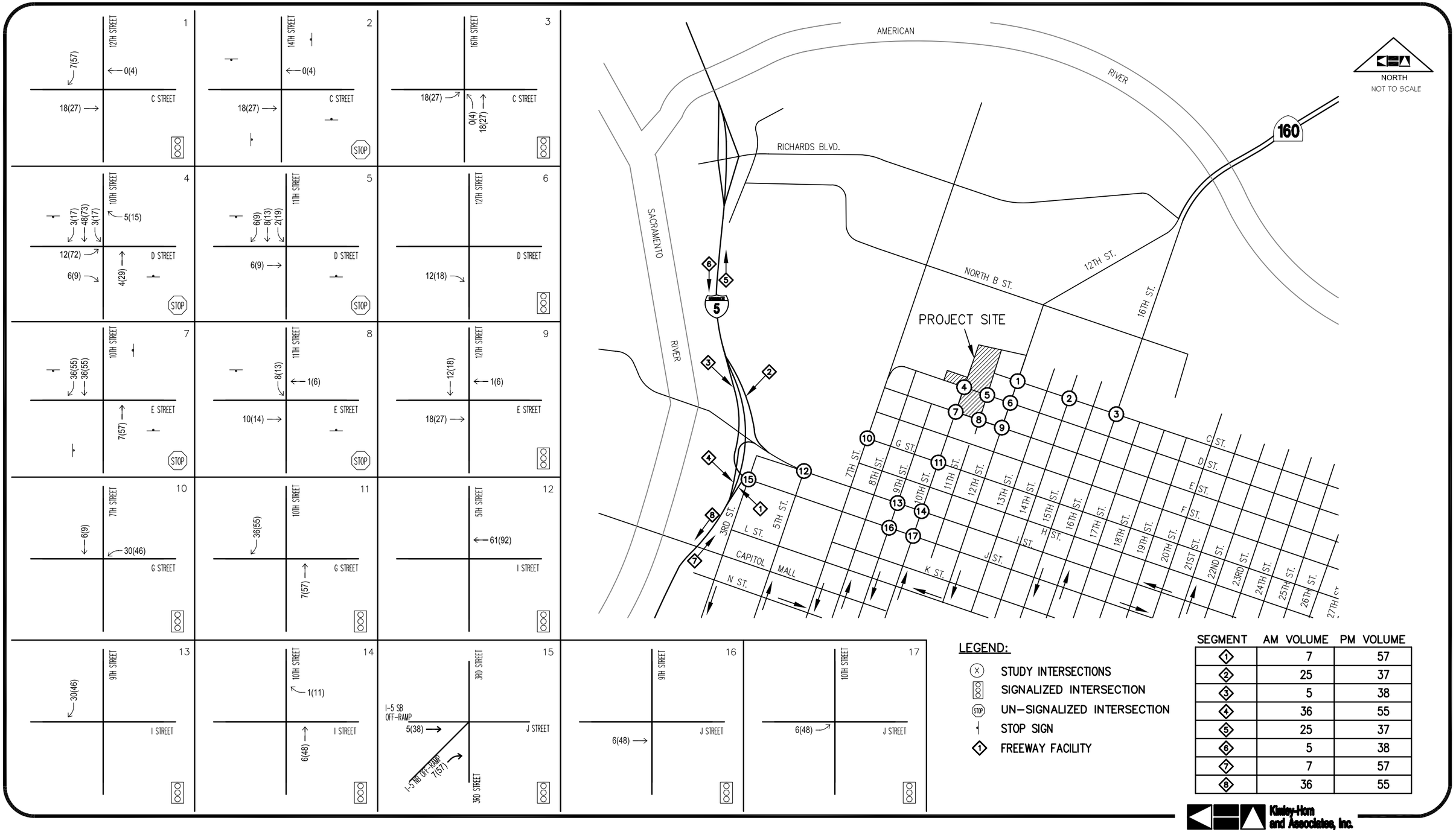
FIGURE 4

PROPOSED PROJECT TRIP DISTRIBUTION (BASELINE PLUS PROPOSED PROJECT CONDITIONS)

THE CREAMERY
SACRAMENTO, CALIFORNIA



SEGMENT	AM VOLUME	PM VOLUME
1	7	57
2	25	37
3	5	38
4	36	55
5	25	37
6	5	38
7	7	57
8	36	55

FIGURE 5

PROPOSED PROJECT TRIP ASSIGNMENT PEAK-HOUR VOLUMES (BASELINE PLUS PROPOSED PROJECT CONDITIONS)

THE CREAMERY
SACRAMENTO, CALIFORNIA

TRAFFIC IMPACT ANALYSIS METHODOLOGY

Analysis of significant environmental impacts at intersections is based on the concept of Level of Service (LOS). The LOS of an intersection is a qualitative measure used to describe operational conditions. LOS ranges from A (best), which represents minimal delay, to F (worst), which represents heavy delay and a facility that is operating at or near its functional capacity. Levels of Service for this study were determined using methods defined in the *Highway Capacity Manual, 2000* (HCM) and appropriate traffic analysis software.

Intersections

The HCM includes procedures for analyzing two-way stop controlled (TWSC), all-way stop controlled (AWSC), and signalized intersections. The TWSC procedure defines LOS as a function of average control delay for each minor street approach movement. Conversely, the AWSC and signalized intersection procedures define LOS as a function of average control delay for the intersection as a whole. *Synchro (Version 7)* traffic analysis software was used to evaluate level of service at the study intersections. Effects of the light rail trains operated by RT were factored into the *Synchro* analysis for the signalized study intersections along 12th Street. Table 3 presents signalized and unsignalized intersection LOS definitions as defined in the HCM.

Table 3 – Intersection Level of Service Criteria

Level of Service (LOS)	Un-Signalized	Signalized
	Average Control Delay* (sec/veh)	Control Delay per Vehicle (sec/veh)
A	≤ 10	≤ 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	**> 25 – 35**	**> 35 – 55**
E	**> 35 – 50**	**> 55 – 80**
F	**> 50**	**> 80**

Note: Unacceptable LOS shown in **bold** as defined by City.
Source: *Highway Capacity Manual, 2000*
* Applied to the worst lane/lane group(s) for TWSC

Freeway Mainline Segments

According to the HCM, basic freeway segments are characterized by density, speed, and volume-to-capacity ratio. While all three of these characteristics indicate how well traffic flow is being accommodated, density is the primary measure used to determine segment LOS. Table 4 presents freeway segment LOS definitions based on an assumed free flow speed of 70 mph.

Freeway Ramp Junctions

The determination of freeway ramp junction (merge and diverge) LOS is based on the density of vehicles within the corresponding merge or diverge influence area. The HCM establishes the influence area as 1,500 feet in advance of diverge points, and 1,500 feet extending past merge points. Table 5 presents freeway ramp junction LOS definitions.

Table 4 – Freeway Segment Level of Service Criteria

Level of Service (LOS)	Maximum Service Flow Rate (pc/h/ln)*	Maximum Density (pc/mi/ln)**
A	770	11
B	1,260	18
C	1,770	26
D	2,150	35
E	2,400	45
F	**> 2,400**	**> 45**

Note: Thresholds in this table are based on a Free-Flow Speed = 70 mph.
Unacceptable LOS shown in **bold** as defined by Caltrans.
* Passenger Cars per Hour per Lane, ** Passenger Cars per Mile per lane
Source: Highway Capacity Manual, 2000

Table 5 – Freeway Ramp Merge and Diverge Level of Service Criteria

Level of Service (LOS)	Density (pc/mi/ln)*
A	≤ 10
B	> 10 – 20
C	> 20 – 28
D	> 28 – 35
E	> 35
F	***Demand Exceeds Capacity***

Note: Unacceptable LOS shown in **bold** as defined by Caltrans.
* Passenger Cars per Mile per Lane
Source: Highway Capacity Manual, 2000

Freeway Ramp Segments
Freeway ramp segment operation is based on anticipated vehicle queuing at the ramp terminal intersections with the cross-street. Anticipated vehicle queues are compared against available storage lengths and a determination is made regarding the potential of adversely affecting adjacent traffic movements.

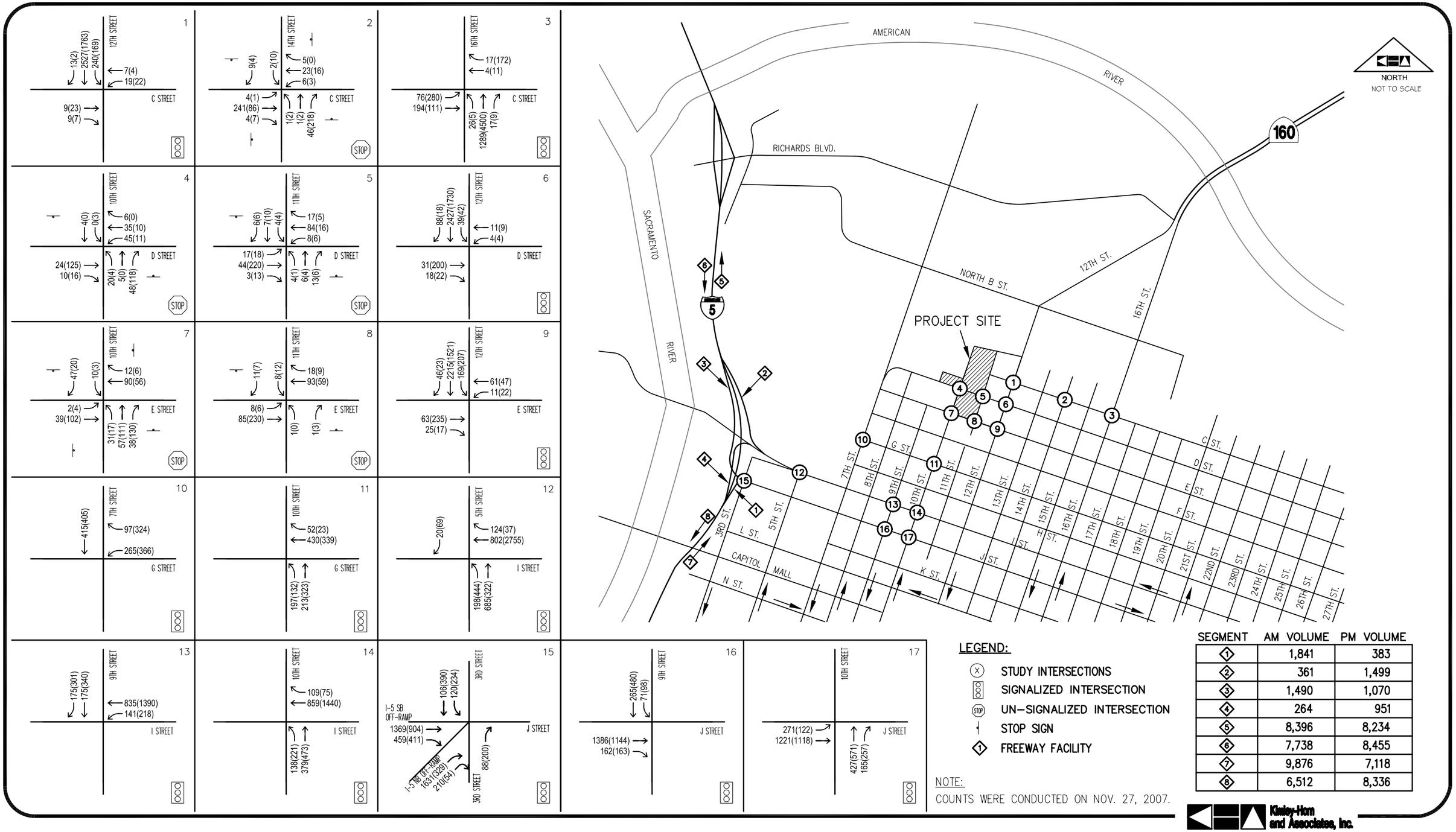
Project Analysis
The LOS analyses were conducted for the study facilities for both AM and PM peak-hours for the following scenarios:

A. Existing Conditions
B. Baseline Conditions
C. Baseline plus Proposed Project Conditions
D. Cumulative (2030) Conditions
E. Cumulative (2030) plus Proposed Project

EXISTING CONDITIONS

Turning movement counts during the AM and P M peak hours (7:00-9:00 AM and 4:00-6:00 PM) were performed on November 27, 2007, which is considered to be a typical day. Furthermore, Existing (2007) I-5 mainline and ramp traffic volumes were obtained from Caltrans[4]. Existing peak-hour traffic volumes for all study facilities are presented in Figure 6.

[4] Caltrans Office of Travel Forecasting and Modeling, January 9, 2008.



SEGMENT	AM VOLUME	PM VOLUME
1	1,841	383
2	361	1,499
3	1,490	1,070
4	264	951
5	8,396	8,234
6	7,738	8,455
7	9,876	7,118
8	6,512	8,336

FIGURE 6

EXISTING PEAK-HOUR TRAFFIC VOLUMES

THE CREAMERY
SACRAMENTO, CALIFORNIA

Intersections
Table 6 presents the existing peak-hour operating conditions for the study intersections.

Table 6 – Existing Intersection Levels of Service

#	Intersection	Traffic Control	AM Peak-Hour		PM Peak-Hour	
			Delay (seconds)	LOS	Delay (seconds)	LOS
1	C Street @ 12th Street	Signal	9.8	A	6.9	A
2	C Street @ 14th Street	AWSC	8.3	A	7.7	A
3	C Street @ 16th Street	Signal	7.9	A	66.2	E
4	D Street @ 10th Street	TWSC*	10.1 (SB)	B	11.2 (SB)	B
5	D Street @ 11th Street	TWSC*	9.7 (SB)	A	10.3 (SB)	B
6	D Street @ 12th Street	Signal	1.1	A	7.8	A
7	E Street @ 10th Street	AWSC	7.5	A	8.3	A
8	E Street @ 11th Street	TWSC*	9.3 (NB)	A	10.0 (SB)	B
9	E Street @ 12th Street	Signal	2.2	A	10.6	B
10	G Street @ 7th Street	Signal	11.1	B	16.1	B
11	G Street @ 10th Street	Signal	8.1	A	9.3	A
12	I Street @ 5th Street	Signal	15.7	B	60.3	E
13	I Street @ 9th Street	Signal	20.0	B	30.7	C
14	I Street @ 10th Street	Signal	12.4	B	21.1	C
15	J Street @ 3rd Street	Signal	101.5	F	34.5	C
16	J Street @ 9th Street	Signal	6.1	A	10.2	B
17	J Street @ 10th Street	Signal	8.4	A	19.6	B

* Average intersection control delay / worst minor approach (worst minor movement approach direction).

As indicated in Table 6, the study intersections operate from LOS A to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix B. It should be noted the delay and LOS at the D Street and 12th Street intersection accounts for the affect of the Alkalai Flat/La Valentina Light Rail Station.

Freeway Mainline Segments
Table 7 presents the existing Levels of Service for the I-5 freeway segments in the vicinity of the proposed project.

Table 7 – Existing Freeway Mainline Levels of Service

Location	AM Peak-Hour			PM Peak-Hour		
	Total Volume	Flow Rate (pc/h/ln)	LOS	Total Volume	Flow Rate (pc/h/ln)	LOS
I-5 NB, between Capitol Avenue and J Street	9,876	2,244	E	7,118	1,617	C
I-5 SB, between Capitol Avenue and J Street	6,512	1,479	C	8,336	1,894	D

As indicated in Table 7, the I-5 freeway segments operate at LOS C to LOS E during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix B.

Freeway Merge/Diverge Segments
Existing I-5 freeway ramp junction Levels of Service are presented in Table 8.

Table 8 – Existing Freeway Ramp Junction Levels of Service

Location	Junction Type	AM Peak-Hour			PM Peak-Hour		
		Total Volume	Density (pc/mi/ln)	LOS	Total Volume	Density (pc/mi/ln)	LOS
WB I St. to NB I-5	MMA	361	28.7++	D	1,499	27.9++	D
WB I St. to SB I-5	Merge	264	21.1	C	951	+	F
NB I-5 to EB J St.	MDA	1,841	+	F	383	35.5+++	E
SB I-5 to EB J St.	MDA	1,490	38.6+++	E	1,070	+	F

Note: MMA = Major Merge Area
MDA = Major Diverge Area
+ Density not computed for oversaturated flow conditions (LOS F)
++ Density computed for Major Merge Area (MMA) per page 25-9, *Highway Capacity Manual (HCM) 2000.*
+++ Density computed for Major Diverge Area (MDA) per Equation 25-12, *Highway Capacity Manual (HCM) 2000.*

As indicated in Table 8, the existing I-5 freeway ramp junctions operate from LOS C to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix B.

Freeway Ramp Segments
Vehicle queuing for the following intersection approaches was evaluated:

- J Street @ I-5 Northbound Off-ramp – Eastbound Approach
- J Street @ I-5 Southbound Off-ramp – Eastbound Approach

Results of the freeway ramp intersection queuing evaluation are presented in Table 9.

Table 9 – Existing Freeway Ramp Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
J Street @ I-5 NB Off-ramp	**EBT/R**				
	Existing	1,120	1,004	1,120	145
J Street @ I-5 SB Off-ramp	**EBT/R**				
	Existing	1,400	626	1,400	377

Source: *Highway Capacity Manual (HCM) 2000* methodology per Synchro© v7.

As presented in Table 9, queuing is not expected to exceed available storage at the J Street intersections with I-5 Northbound Ramps and I-5 Southbound Ramps during the AM and PM peak-hours.

Analysis worksheets for this scenario are provided in Appendix B.

BASELINE CONDITIONS

Baseline traffic conditions were developed to reflect conditions with the inclusion of planned and approved projects within the general study area which are anticipated to increase traffic volumes on the study facilities. The projects included in the baseline conditions are as follows:

- Globe Mills (31 DU Apartments, 112 DU Senior Adult Housing, 1,750 sf retail)
- North End Lofts (11 DU Lofts)
- Washington Park Village (52 DU Townhomes)

Land use information for the Globe Mills project was obtained from the City. Furthermore, information regarding the North End Lofts and Washington Park Village residential development projects was gathered from field observations and correspondence with respective project representatives[5,6]. Trips associated with the unoccupied portions of these three approved projects, which are all currently in varying stages of construction, were then added to the existing traffic conditions to establish Baseline conditions. Baseline peak-hour traffic volumes for all study facilities are presented in Figure 7.

In the vicinity of the proposed project, 10th Street is a one-way northbound street and 9th Street is a one-way southbound street. However, the City is moving forward to implement a one-way to two-way street conversion for the roadway segments of 9th and 10th Street between E street and G Street[7]. This roadway conversion on 9th and 10th Street, which is assumed to be in place in this analysis scenario, will impact the proposed project study intersections by creating alternative trip routes to and from the project site. Other two-way street conversions are planned for the Central Business District of Sacramento. However, they are not anticipated to affect the proposed project's study intersections.

Intersections

Table 10 presents the Baseline peak-hour operating conditions for the study intersections.

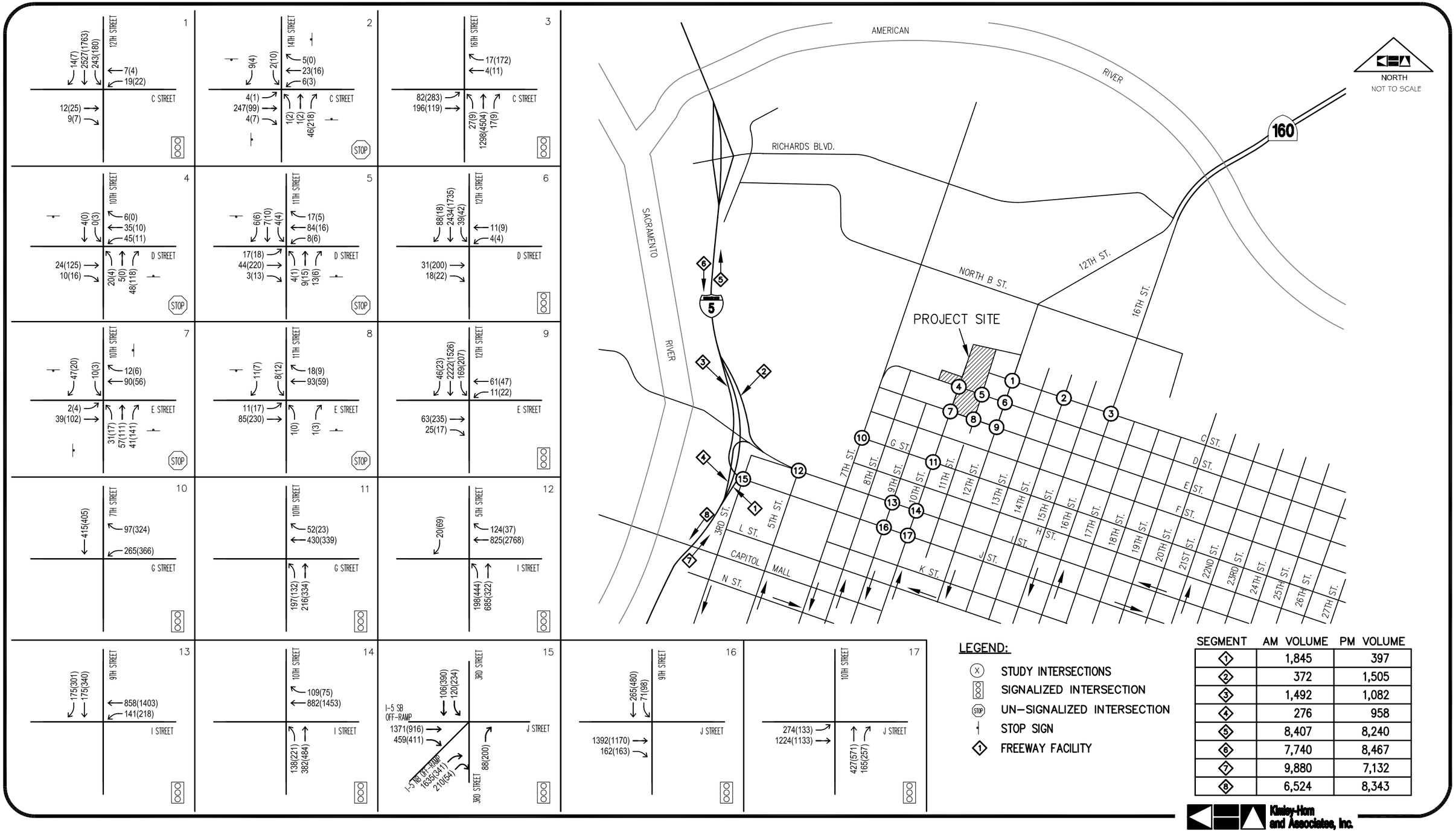
As indicated in Table 10, the study intersections operate from LOS A to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix C.

Freeway Mainline Segments

Table 11 presents the Baseline Conditions Levels of Service for the I-5 freeway segments in the vicinity of the proposed project.

As indicated in Table 11, the I-5 freeway segments operate at LOS C to LOS E during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix C.

[5] Per telephone conversation with sales representative for Ellington Properties, January 29, 2008.
[6] Per telephone conversation with sales representative for Washington Park Village, January 29, 2008.
[7] *Central City Two-Way Conversion Study*, DKS Associates, January 12, 2006.



SEGMENT	AM VOLUME	PM VOLUME
1	1,845	397
2	372	1,505
3	1,492	1,082
4	276	958
5	8,407	8,240
6	7,740	8,467
7	9,880	7,132
8	6,524	8,343

FIGURE 7

BASELINE PEAK-HOUR TRAFFIC VOLUMES

THE CREAMERY
SACRAMENTO, CALIFORNIA

Table 10 – Baseline Intersection Levels of Service

#	Intersection	Traffic Control	AM Peak-Hour		PM Peak-Hour	
			Delay (seconds)	LOS	Delay (seconds)	LOS
1	C Street @ 12th Street	Signal	9.8	A	6.9	A
2	C Street @ 14th Street	AWSC	8.4	A	7.8	A
3	C Street @ 16th Street	Signal	7.9	A	67.1	E
4	D Street @ 10th Street	TWSC*	10.1 (SB)	B	11.2 (SB)	B
5	D Street @ 11th Street	TWSC*	9.7 (SB)	A	10.7 (NB)	B
6	D Street @ 12th Street	Signal	1.5	A	7.8	A
7	E Street @ 10th Street	AWSC	7.5	A	8.4	A
8	E Street @ 11th Street	TWSC*	9.3 (SB)	A	10.2 (SB)	B
9	E Street @ 12th Street	Signal	2.2	A	10.6	B
10	G Street @ 7th Street	Signal	11.5	B	11.0	B
11	G Street @ 10th Street	Signal	12.4	B	13.0	B
12	I Street @ 5th Street	Signal	15.5	B	61.7	E
13	I Street @ 9th Street	Signal	20.1	C	30.8	C
14	I Street @ 10th Street	Signal	12.6	B	21.3	C
15	J Street @ 3rd Street	Signal	102.3	F	34.6	C
16	J Street @ 9th Street	Signal	22.7	C	8.2	A
17	J Street @ 10th Street	Signal	8.7	A	19.8	B

* Average intersection control delay / worst minor approach (worst minor movement approach direction).

Table 11 – Baseline Freeway Mainline Levels of Service

Location	AM Peak-Hour			PM Peak-Hour		
	Total Volume	Flow Rate (pc/h/ln)	LOS	Total Volume	Flow Rate (pc/h/ln)	LOS
I-5 NB, between Capitol Avenue and J Street	8,880	2,244	E	7,132	1,620	C
I-5 SB, between Capitol Avenue and J Street	6,524	1,482	C	8,343	1,895	D

Freeway Merge/Diverge Segments

Baseline I-5 freeway ramp junction Levels of Service are presented in Table 12.

As indicated in Table 12, the I-5 freeway ramp junctions operate from LOS C to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix C.

Table 12 – Baseline Freeway Ramp Junction Levels of Service

Location	Junction Type	AM Peak-Hour			PM Peak-Hour		
		Total Volume	Density (pc/mi/ln)	LOS	Total Volume	Density (pc/mi/ln)	LOS
WB I St. to NB I-5	MMA	372	28.8++	D	1,505	28.0++	D
WB I St. to SB I-5	Merge	276	21.1	C	958	+	F
NB I-5 to EB J St.	MDA	1,845	+	F	397	35.6+++	E
SB I-5 to EB J St.	MDA	1,497	38.6+++	E	1,120	+	F

Note: MMA = Major Merge Area
MDA = Major Diverge Area
+ Density not computed for oversaturated flow conditions (LOS F)
++ Density computed for Major Merge Area (MMA) per page 25-9, *Highway Capacity Manual (HCM) 2000.*
+++ Density computed for Major Diverge Area (MDA) per Equation 25-12, *Highway Capacity Manual (HCM) 2000.*

Freeway Ramp Segments
Results of the freeway ramp intersection queuing evaluation are presented in Table 13.

Table 13 – Baseline Freeway Ramp Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
J Street @ I-5 NB Off-ramp	**EBT/R**				
	Baseline	1,120	1,079	1,120	152
J Street @ I-5 SB Off-ramp	**EBT/R**				
	Baseline	1,400	611	1,400	399

Source: *Highway Capacity Manual (HCM) 2000* methodology per Synchro© v7.

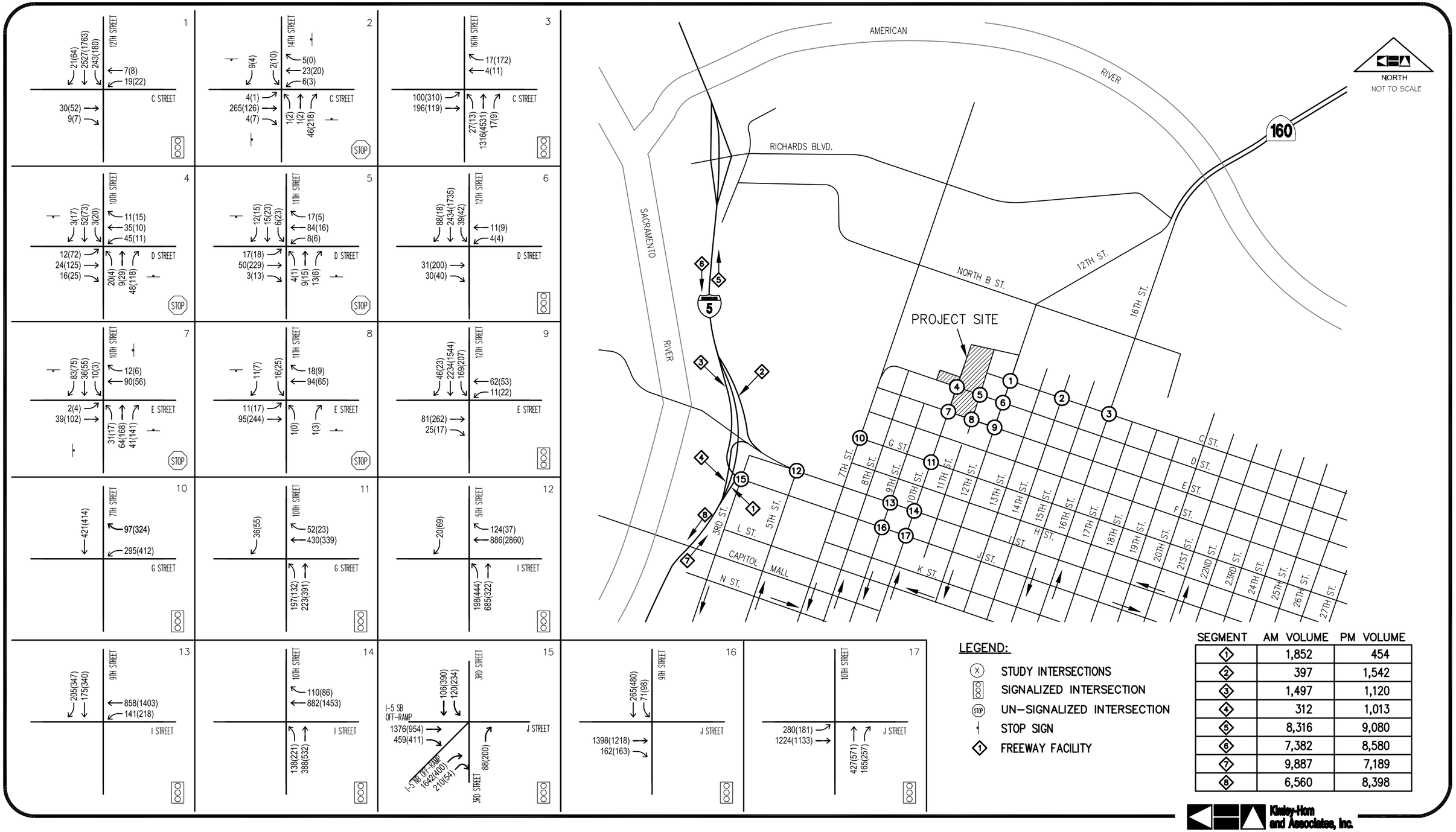
As presented in Table 13, queuing is not expected to exceed available storage at the J Street intersections with I-5 Northbound Ramps and I-5 Southbound Ramps during the AM and PM peak-hours.

Analysis worksheets for this scenario are provided in Appendix C.

BASELINE PLUS PROPOSED PROJECT CONDITIONS

Traffic associated with the proposed project was added to the Baseline traffic volumes to establish the Baseline plus Proposed Project traffic conditions. Peak-hour traffic volumes for all study facilities are presented are presented in Figure 8.

Intersections
Table 14 presents the Baseline and Baseline plus Proposed Project peak-hour operating conditions for the study intersections.



SEGMENT	AM VOLUME	PM VOLUME
1	1,852	454
2	397	1,542
3	1,497	1,120
4	312	1,013
5	8,316	9,080
6	7,382	8,580
7	9,887	7,189
8	6,560	8,398

FIGURE 8

BASELINE PLUS PROPOSED PROJECT PEAK-HOUR TRAFFIC VOLUMES

THE CREAMERY
SACRAMENTO, CALIFORNIA

Table 14 – Baseline and Baseline plus Proposed Project Intersection Levels of Service

#	Intersection	Traffic Control	Analysis Scenario	AM Peak-Hour Delay (seconds)	AM Peak-Hour LOS	PM Peak-Hour Delay (seconds)	PM Peak-Hour LOS
1	C Street @ 12th Street	Signal	Baseline	9.8	A	6.9	A
			Baseline+PP	9.9	A	7.3	A
2	C Street @ 14th Street	AWSC	Baseline	8.4	A	7.8	A
			Baseline+PP	8.5	A	8.0	A
3	C Street @ 16th Street	Signal	Baseline	7.9	A	67.1	E
			Baseline+PP	8.1	A	72.3	E
4	D Street @ 10th Street	TWSC*	Baseline	10.1 (SB)	B	11.2 (SB)	B
			Baseline+PP	10.7 (SB)	B	13.0 (SB)	B
5	D Street @ 11th Street	TWSC*	Baseline	9.7 (SB)	A	10.7 (NB)	B
			Baseline+PP	9.9 (SB)	A	10.9 (SB)	B
6	D Street @ 12th Street	Signal	Baseline	1.5	A	7.8	A
			Baseline+PP	1.2	A	8.9	A
7	E Street @ 10th Street	AWSC	Baseline	7.5	A	8.4	A
			Baseline+PP	7.8	A	9.2	A
8	E Street @ 11th Street	TWSC*	Baseline	9.3 (SB)	A	10.2 (SB)	B
			Baseline+PP	9.6 (SB)	A	10.8 (SB)	B
9	E Street @ 12th Street	Signal	Baseline	2.2	A	10.6	B
			Baseline+PP	2.5	A	13.2	B
10	G Street @ 7th Street	Signal	Baseline	11.5	B	11.0	B
			Baseline+PP	13.5	B	15.3	B
11	G Street @ 10th Street	Signal	Baseline	12.4	B	13.0	B
			Baseline+PP	23.7	C	14.5	B
12	I Street @ 5th Street	Signal	Baseline	15.5	B	61.7	E
			Baseline+PP	15.3	B	65.0	E
13	I Street @ 9th Street	Signal	Baseline	20.1	C	30.8	C
			Baseline+PP	19.8	B	30.7	C
14	I Street @ 10th Street	Signal	Baseline	12.6	B	21.3	C
			Baseline+PP	12.4	B	21.6	C
15	J Street @ 3rd Street	Signal	Baseline	102.3	F	34.6	C
			Baseline+PP	103.6	F	35.1	D
16	J Street @ 9th Street	Signal	Baseline	6.2	A	8.2	A
			Baseline+PP	6.2	A	8.6	A
17	J Street @ 10th Street	Signal	Baseline	8.7	A	19.8	B
			Baseline+PP	8.3	A	20.1	C

Note: Shaded cells indicate significant impact.
* Average intersection control delay / worst minor approach (worst minor movement approach direction).

As indicated in Table 14, the study intersections operate from LOS A to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix D.

Freeway Mainline Segments

Table 15 presents the Baseline and Baseline plus Proposed Project Conditions Levels of Service for the I-5 freeway segments in the vicinity of the proposed project.

As indicated in Table 15, the I-5 freeway segments operate from LOS C to LOS E during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix D.

Table 15 – Baseline and Baseline plus Proposed Project Freeway Mainline Levels of Service

Location	Analysis Scenario	AM Peak-Hour			PM Peak-Hour		
		Total Volume	Flow Rate (pc/h/ln)	LOS	Total Volume	Flow Rate (pc/h/ln)	LOS
I-5 NB, between Capitol Avenue and J Street	Baseline	8,880	2,244	E	7,132	1,620	C
	Baseline+PP	9,887	2,246	E	7,189	1,633	C
I-5 SB, between Capitol Avenue and J Street	Baseline	6,524	1,482	C	8,343	1,895	D
	Baseline+PP	6,560	1490	C	8,398	1,908	D

Freeway Merge/Diverge Segments
I-5 freeway ramp junction levels of service for Baseline and Baseline plus Proposed Project Conditions are presented in Table 16.

Table 16 – Baseline and Baseline plus Proposed Project Freeway Ramp Junction Levels of Service

Location	Junction Type	Analysis Scenario	AM Peak-Hour			PM Peak-Hour		
			Total Volume	Density (pc/mi/ln)	LOS	Total Volume	Density (pc/mi/ln)	LOS
WB I St. to NB I-5	MMA	Baseline	372	28.8[++]	D	1,505	28.0[++]	D
		Baseline+PP	397	28.9[++]	D	1,542	28.1[++]	D
WB I St. to SB I-5	Merge	Baseline	276	21.1	C	958	[+]	F
		Baseline+PP	312	21.2	C	1,013	[+]	F
NB I-5 to EB J St.	MDA	Baseline	1,845	[+]	F	397	35.6[+++]	E
		Baseline+PP	1,852	[+]	F	454	35.6[+++]	E
SB I-5 to EB J St.	MDA	Baseline	1,492	38.6[+++]	E	1,082	[+]	F
		Baseline+PP	1,497	38.6[+++]	E	1,120	[+]	F

Note: Significant impacts as defined by Caltrans are in shaded boxes.
MMA = Major Merge Area
MDA = Major Diverge Area
[+] Density not computed for oversaturated flow conditions (LOS F)
[++] Density computed for Major Merge Area (MMA) per page 25-9, *Highway Capacity Manual (HCM) 2000.*
[+++] Density computed for Major Diverge Area (MDA) per Equation 25-12, *Highway Capacity Manual (HCM) 2000.*

As indicated in Table 16, the I-5 freeway ramp junctions operate from LOS C to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix D.

Freeway Ramp Segments
Results of the freeway ramp intersection queuing evaluation are presented in Table 17.

As presented in Table 17, queuing is not expected to exceed available storage at the J Street intersections with I-5 Northbound Ramps and I-5 Southbound Ramps during the AM and PM peak-hours.

Analysis worksheets for this scenario are provided in Appendix D.

Table 17 – Baseline and Baseline plus Proposed Project Freeway Ramp Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour Available Storage (ft)	AM Peak-Hour 95th % Queue (ft)	PM Peak-Hour Available Storage (ft)	PM Peak-Hour 95th % Queue (ft)
J Street @ I-5 NB Off-ramp	**EBT/R**				
Baseline		1,120	1,079	1,120	152
Baseline plus Proposed Project			1,083		175
J Street @ I-5 SB Off-ramp	**EBT/R**				
Baseline		1,400	611	1,400	399
Baseline plus Proposed Project			613		415

Source: *Highway Capacity Manual (HCM) 2000* methodology per Synchro© v7.

CUMULATIVE (2030) CONDITIONS

The Cumulative analysis was performed for year 2030 conditions. Cumulative model data were obtained from the *SACMET Regional Travel Demand Model* (the "model"), which accounts for the following approved development projects:

- The Railyards
- Crocker Art Museum Expansion
- 301 Capitol Mall
- 601 Capitol Mall
- Metro Place Office/Residential
- CalPERS headquarters Expansion
- Sutter Medical Center and Trinity Cathedral
- CADA East End Gateway Residential
- Capitol West Side Projects
- Discovery Centre
- Continental Plaza
- Township 9

Existing turn movement percentages were applied to the roadway volume model outputs to establish turn movement volumes at each study intersection. Cumulative peak-hour traffic volumes for all study facilities are presented in Figure 9.

Intersections

Table 18 presents the Cumulative (2030) peak-hour operating conditions for the study intersections. For this analysis, it is assumed the transportation facilities will remain as is in the Baseline plus Project scenario.

As indicated in Table 18, the study intersections operate from LOS A to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix E.

Freeway Mainline Segments

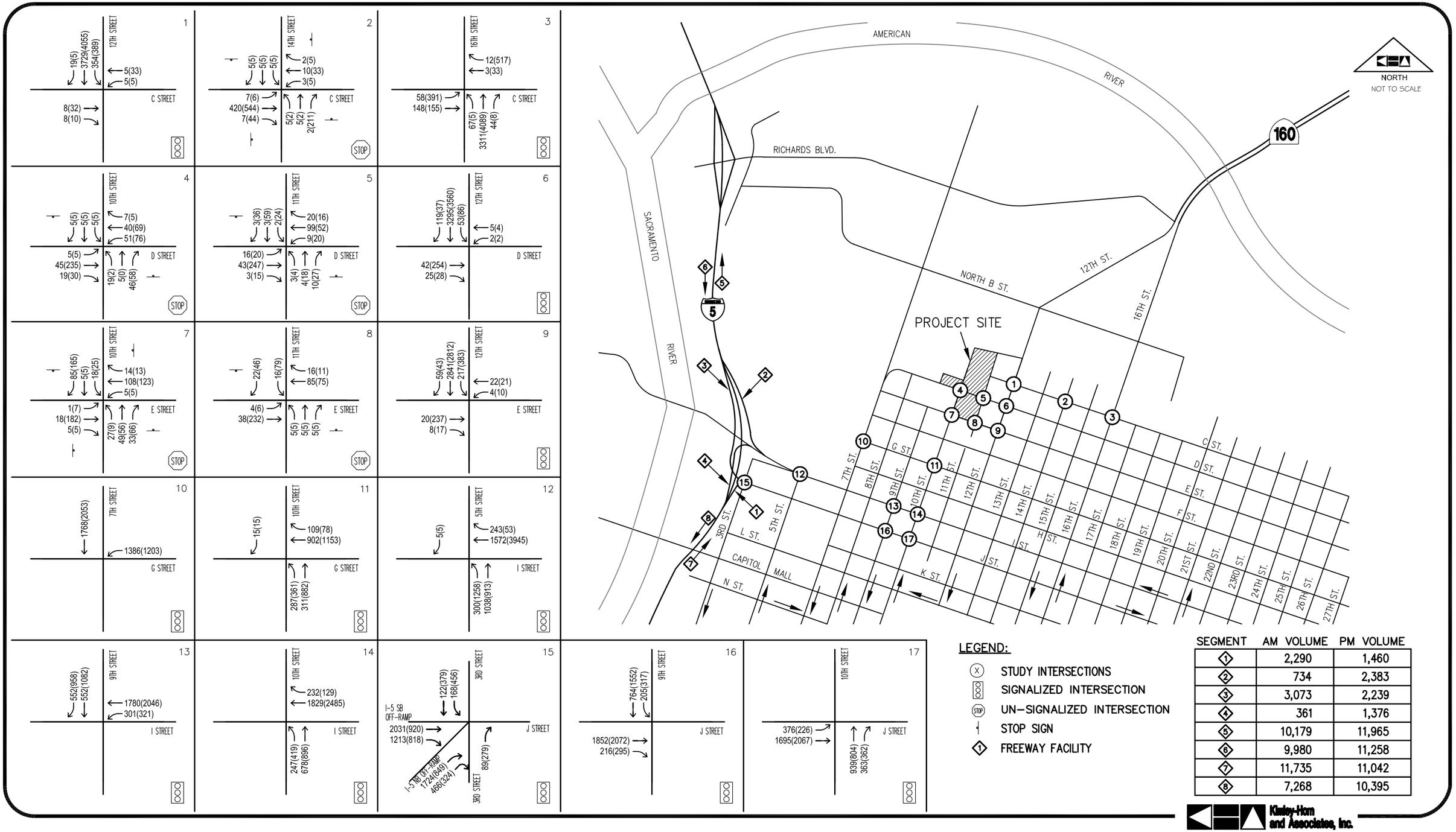
Table 19 presents the Cumulative (2030) Conditions Levels of Service for the I-5 freeway segments in the vicinity of the proposed project.

As indicated in Table 19, the I-5 freeway segments operate from LOS C to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix E.

Freeway Merge/Diverge Segments

I-5 freeway ramp junction Levels of Service for Cumulative (2030) conditions are presented in Table 20.

As indicated in Table 20, the I-5 freeway ramp junctions operate at LOS C, E and F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix E.



SEGMENT	AM VOLUME	PM VOLUME
1	2,290	1,460
2	734	2,383
3	3,073	2,239
4	361	1,376
5	10,179	11,965
6	9,980	11,258
7	11,735	11,042
8	7,268	10,395

FIGURE 9

CUMULATIVE (2030) PEAK-HOUR TRAFFIC VOLUMES

THE CREAMERY
SACRAMENTO, CALIFORNIA

Table 18 – Cumulative (2030) Intersection Levels of Service

#	Intersection	Traffic Control	AM Peak-Hour		PM Peak-Hour	
			Delay (seconds)	LOS	Delay (seconds)	LOS
1	C Street @ 12th Street	Signal	94.8	F	133.0	F
2	C Street @ 14th Street	AWSC	10.5	B	16.7	C
3	C Street @ 16th Street	Signal	17.2	B	83.9	F
4	D Street @ 10th Street	TWSC*	10.0 (SB)	A	12.1 (SB)	B
5	D Street @ 11th Street	TWSC*	9.7 (SB)	A	12.4 (SB)	B
6	D Street @ 12th Street	Signal	2.5	A	15.2	B
7	E Street @ 10th Street	AWSC	7.7	A	9.1	A
8	E Street @ 11th Street	TWSC*	9.4 (NB)	A	11.2 (SB)	B
9	E Street @ 12th Street	Signal	1.4	A	6.4	A
10	G Street @ 7th Street	Signal	16.7	B	32.5	C
11	G Street @ 10th Street	Signal	29.4	C	22.5	C
12	I Street @ 5th Street	Signal	67.4	E	189.8	F
13	I Street @ 9th Street	Signal	7.4	A	42.8	D
14	I Street @ 10th Street	Signal	44.3	D	102.6	F
15	J Street @ 3rd Street	Signal	268.0	F	81.3	F
16	J Street @ 9th Street	Signal	34.0	C	77.7	E
17	J Street @ 10th Street	Signal	16.5	B	54.5	D

* Average intersection control delay / worst minor approach (worst minor movement approach direction).

Table 19 – Cumulative (2030) Freeway Mainline Levels of Service

Location	AM Peak-Hour			PM Peak-Hour		
	Total Volume	Flow Rate (pc/h/ln)	LOS	Total Volume	Flow Rate (pc/h/ln)	LOS
I-5 NB, between Capitol Avenue and J Street	11,735	2,666	F	11,042	2,508	F
I-5 SB, between Capitol Avenue and J Street	7,268	1,651	C	10,395	2,361	E

Table 20 – Cumulative (2030) Freeway Ramp Junction Levels of Service

Location	Junction Type	AM Peak-Hour			PM Peak-Hour		
		Total Volume	Density (pc/mi/ln)	LOS	Total Volume	Density (pc/mi/ln)	LOS
WB I St. to NB I-5	MMA	734	40.9++	E	2,383	+	F
WB I St. to SB I-5	Merge	361	22.7	C	1,376	+	F
NB I-5 to EB J St.	MDA	2,290	+	F	1,460	+	F
SB I-5 to EB J St.	MDA	3,073	+	F	2,277	+	F

Note: MMA = Major Merge Area
MDA = Major Diverge Area
+ Density not computed for oversaturated flow conditions (LOS F)
++ Density computed for Major Merge Area (MMA) per page 25-9, *Highway Capacity Manual (HCM) 2000.*
+++ Density computed for Major Diverge Area (MDA) per Equation 25-12, *Highway Capacity Manual (HCM) 2000.*

Freeway Ramp Segments
Results of the freeway ramp intersection queuing evaluation are presented in Table 21.

Table 21 – Cumulative (2030) Freeway Ramp Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour		PM Peak-Hour	
		Available Storage (ft)	95th % Queue (ft)	Available Storage (ft)	95th % Queue (ft)
J Street @ I-5 NB Off-ramp	**EBT/R**				
	Cumulative	1,120	1,360	1,120	834
J Street @ I-5 SB Off-ramp	**EBT/R**				
	Cumulative	1,400	1,342	1,400	1,173

Source: *Highway Capacity Manual (HCM) 2000* methodology per Synchro© v7.

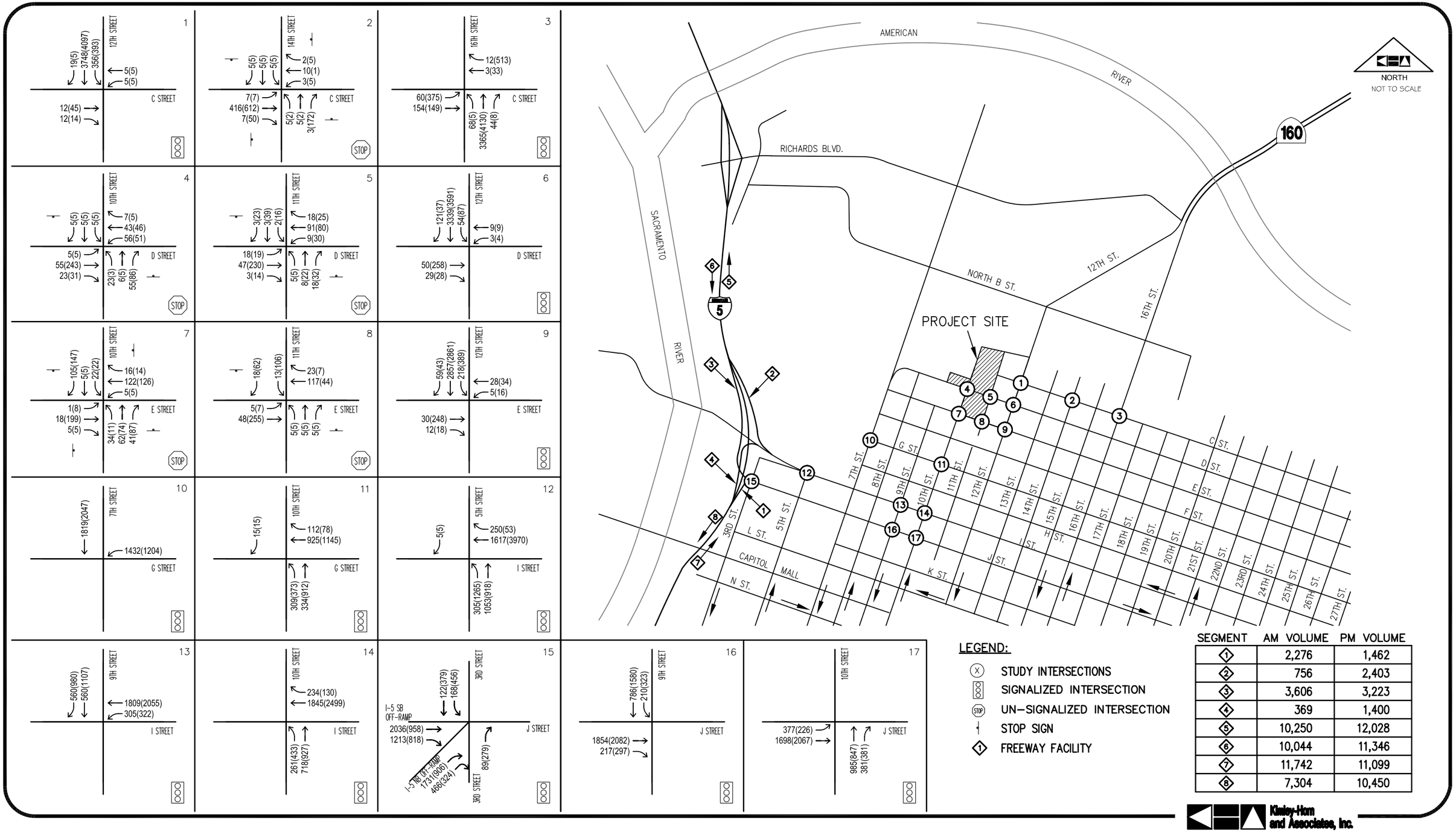
As presented in Table 21, queuing is expected to exceed available storage at the J Street intersection with the I-5 Northbound Off-Ramp during the AM peak-hour.

Analysis worksheets for this scenario are provided in Appendix E.

CUMULATIVE (2030) PLUS PROPOSED PROJECT CONDITIONS

Cumulative model data were obtained from the *SACMET Regional Travel Demand Model* (the "model"). Similar to the Cumulative (2030) Conditions, the model includes the approved development projects listed in the previous section. For this scenario, the land use data for the specific traffic analysis zone (TAZ) that includes the project site was modified to reflect the land uses of the proposed project. Existing turn movement percentages were applied to these roadway volumes to establish turn movement volumes at each study intersection. Cumulative plus Proposed Project peak-hour traffic volumes for all study facilities are presented in Figure 10.

Intersections
Table 22 presents the Cumulative (2030) and Cumulative (2030) plus Proposed Project peak-hour operating conditions for the study intersections.



SEGMENT	AM VOLUME	PM VOLUME
1	2,276	1,462
2	756	2,403
3	3,606	3,223
4	369	1,400
5	10,250	12,028
6	10,044	11,346
7	11,742	11,099
8	7,304	10,450

FIGURE 10

CUMULATIVE (2030) PLUS PROPOSED PROJECT PEAK-HOUR TRAFFIC VOLUMES

THE CREAMERY
SACRAMENTO, CALIFORNIA

Table 22 – Cumulative (2030) and Cumulative (2030) plus Proposed Project Intersection Levels of Service

#	Intersection	Traffic Control	Analysis Scenario	AM Peak-Hour		PM Peak-Hour	
				Delay (seconds)	LOS	Delay (seconds)	LOS
1	C Street @ 12th Street	Signal	Cumulative	94.8	F	133.0	F
			Cumulative+PP	97.0	F	138.5	F
2	C Street @ 14th Street	AWSC	Cumulative	10.5	B	16.7	C
			Cumulative+PP	10.4	B	20.7	C
3	C Street @ 16th Street	Signal	Cumulative	17.2	B	83.9	F
			Cumulative+PP	19.3	B	82.2	F
4	D Street @ 10th Street	TWSC*	Cumulative	10.0 (SB)	A	12.1 (SB)	B
			Cumulative+PP	10.2 (SB)	B	11.7 (SB)	B
5	D Street @ 11th Street	TWSC*	Cumulative	9.7 (SB)	A	12.4 (SB)	B
			Cumulative+PP	9.7 (SB)	A	12.4 (SB)	B
6	D Street @ 12th Street	Signal	Cumulative	2.5	A	15.2	B
			Cumulative+PP	2.7	A	17.7	B
7	E Street @ 10th Street	AWSC	Cumulative	7.7	A	9.1	A
			Cumulative+PP	7.9	A	9.3	A
8	E Street @ 11th Street	TWSC*	Cumulative	9.4 (NB)	A	11.2 (SB)	B
			Cumulative+PP	9.6 (NB)	A	11.5 (SB)	B
9	E Street @ 12th Street	Signal	Cumulative	1.4	A	6.4	A
			Cumulative+PP	1.6	A	7.1	A
10	G Street @ 7th Street	Signal	Cumulative	16.7	B	32.5	C
			Cumulative+PP	17.3	B	31.5	C
11	G Street @ 10th Street	Signal	Cumulative	29.4	C	22.5	C
			Cumulative+PP	29.2	C	30.2	C
12	I Street @ 5th Street	Signal	Cumulative	67.4	E	189.8	F
			Cumulative+PP	69.7	E	193.6	F
13	I Street @ 9th Street	Signal	Cumulative	7.4	A	42.8	D
			Cumulative+PP	6.9	A	46.9	D
14	I Street @ 10th Street	Signal	Cumulative	44.3	D	102.6	F
			Cumulative+PP	46.4	D	102.3	F
15	J Street @ 3rd Street	Signal	Cumulative	268.0	F	81.3	F
			Cumulative+PP	269.4	F	88.3	F
16	J Street @ 9th Street	Signal	Cumulative	34.0	C	77.7	E
			Cumulative+PP	34.2	C	83.7	F
17	J Street @ 10th Street	Signal	Cumulative	16.5	B	54.5	D
			Cumulative+PP	17.1	B	54.1	D

Note: Shaded cells indicate significant impact.
* Average intersection control delay / worst minor approach (worst minor movement approach direction).

As indicated in Table 22, the study intersections operate from LOS A to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix F.

Freeway Mainline Segments

Table 23 presents the Cumulative (2030) and Cumulative (2030) plus Proposed Project Levels of Service for the I-5 freeway segments in the vicinity of the proposed project.

As indicated in Table 23, the I-5 freeway segments operate from LOS C to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix F.

Table 23 – Cumulative (2030) and Cumulative (2030) plus Proposed Project Freeway Mainline Levels of Service

Location	Analysis Scenario	AM Peak-Hour			PM Peak-Hour		
		Total Volume	Flow Rate (pc/h/ln)	LOS	Total Volume	Flow Rate (pc/h/ln)	LOS
I-5 NB, between Capitol Avenue and J Street	Cumulative	11,735	2,666	F	11,042	2,508	F
	Cumulative+PP	11,742	2,667	F	11,099	2,521	F
I-5 SB, between Capitol Avenue and J Street	Cumulative	7,268	1,651	C	10,395	2,361	E
	Cumulative+PP	7,304	1,659	C	10,450	2,374	E

Freeway Merge/Diverge Segments
I-5 freeway ramp junction Levels of Service for Cumulative (2030) and Cumulative (2030) plus Proposed Project conditions are presented in Table 24.

Table 24 – Cumulative (2030) and Cumulative (2030) plus Proposed Project Freeway Ramp Junction Levels of Service

Location	Junction Type	Analysis Scenario	AM Peak-Hour			PM Peak-Hour		
			Total Volume	Density (pc/mi/ln)	LOS	Total Volume	Density (pc/mi/ln)	LOS
WB I St. to NB I-5	MMA	Cumulative	734	40.9++	E	2,383	+	F
		Cumulative+PP	756	41.6++	E	2,403	+	F
WB I St. to SB I-5	Merge	Cumulative	361	22.7	C	1,376	+	F
		Cumulative+PP	369	22.7	C	1,400	+	F
NB I-5 to EB J St.	MDA	Cumulative	2,290	+	F	1,460	+	F
		Cumulative+PP	2,276	+	F	1,462	+	F
SB I-5 to EB J St.	MDA	Cumulative	3,073	+	F	2,277	+	F
		Cumulative+PP	3,078	+	F	2,332	+	F

Note: MMA = Major Merge Area
MDA = Major Diverge Area
+ Density not computed for oversaturated flow conditions (LOS F)
++ Density computed for Major Merge Area (MMA) per page 25-9, *Highway Capacity Manual (HCM) 2000.*
+++ Density computed for Major Diverge Area (MDA) per Equation 25-12, *Highway Capacity Manual (HCM) 2000.*

As indicated in Table 24, the I-5 freeway ramp junctions operate from LOS C to LOS F during the AM and PM peak-hours. Analysis worksheets for this scenario are provided in Appendix F.

Freeway Ramp Segments
Results of the freeway ramp intersection queuing evaluation are presented in Table 25.

As presented in Table 25, queuing is expected to exceed available storage at the J Street intersection with the I-5 Northbound Off-Ramp during the AM peak-hour.

Analysis worksheets for this scenario are provided in Appendix F.

Table 25 – Cumulative (2030) and Cumulative (2030) plus Proposed Project Freeway Ramp Intersection Queuing Evaluation Results

Intersection / Analysis Scenario	Movement	AM Peak-Hour Available Storage (ft)	AM Peak-Hour 95th % Queue (ft)	PM Peak-Hour Available Storage (ft)	PM Peak-Hour 95th % Queue (ft)
J Street @ I-5 NB Off-ramp	**EBT/R**				
Cumulative		1,120	1,400	1,120	697
Cumulative plus Proposed Project			1,407		749
J Street @ I-5 SB Off-ramp	**EBT/R**				
Cumulative		1,400	1,344	1,400	468
Cumulative plus Proposed Project			1,347		482

Source: *Highway Capacity Manual (HCM) 2000* methodology per Synchro© v7.

IMPACTS AND MITIGATION

Regulatory Provisions

The City of Sacramento *General Plan* (January 1988) outlines goals and policies that coordinate the transportation and circulation system with planned land uses. The *General Plan* includes three overall transportation goals:

- Create a safe, efficient surface transportation network for the movement of people and goods.
- Provide all citizens in all communities of the City with access to a transportation network that serves both the City and region, either by personal vehicle or transit. Make a special effort to maximize alternatives to single-occupant vehicle use, such as public transit.
- Maintain a desirable quality of life, including good air quality, while supporting planned land use and population growth.

The *General Plan* (Streets and Roads, Goal D) identifies Level of Service (LOS) "C" or better as the overall traffic operational goal for the City's local and major street systems.

Project impacts were determined by comparing Baseline and Cumulative conditions without the proposed project to Baseline plus Project and Cumulative plus Project conditions, respectively. The City[8] and Caltrans[9] have defined specific thresholds for establishing significant environmental impacts. The proposed project would have a significant impact with regard to traffic and circulation if it would:

- *Intersections*
  - Cause the LOS of the intersections to degrade from LOS A, B, or C to LOS D, E, or F
  - For intersections that are already operating at LOS D, E, or F without the project, increase the average delay by 5 seconds or more at an intersection.
- *Freeway Mainline and Merge/Diverge Segments*
  According to Caltrans[9], the proposed project would have a significant impact with regard to traffic and circulation if it would:

[8] *Traffic Impact Guidelines*, City of Sacramento, February 28, 1996.
[9] *Guide for the Preparation of Traffic Impact Studies,* Caltrans, December 2002.

- Cause the LOS of the I-5 freeway mainline facility to degrade from LOS A, B, C, D, or E to LOS F, or

- Cause the LOS of a Merge/Diverge segment to decrease below that of the mainline, or

- For facilities that are already operating at LOS F without the project, result in an increase in the Measure of Effectiveness (MOE) identified for the facility type.

- *Freeway Ramp Segments*
  According to Caltrans, the proposed project would have a significant impact with regard to traffic and circulation if it would:

  - Cause the queuing at the ramp terminal intersections to exceed the available storage.

- *Bicycle Facilities*
  - Eliminate or adversely affect an existing bikeway facility in a way that discourages the bikeway use.

  - Interfere with the implementation of a proposed bikeway.

  - Result in unsafe conditions for bicyclists, including unsafe bicycle/pedestrian or bicycle/motor vehicle conflicts.

- *Pedestrian Facilities*
  - Adversely affect the existing pedestrian facility or result in unsafe conditions for pedestrians, including unsafe pedestrian/bicycle or pedestrian/motor vehicle conflicts.

- *Transit Facilities*
  - Cause the project-generated ridership, when added to the existing or future ridership, to exceed existing and/or planned system capacity. Capacity is defined as the total number of passengers the system of buses and light rail vehicles can carry during the peak hours of operation.

  - Adversely affect the transit system operations or facilities in a way that discourages ridership (e.g. removes shelter, reduces park and ride).

Baseline plus Proposed Project Conditions

Intersections

C Street at 16th Street

Impact: As shown in Table 14, the addition of traffic associated with the proposed project would cause this intersection, which operates below the City's LOS C threshold without the proposed project during the PM peak-hour, to experience an increase in delay greater than 5 seconds. ***This is a significant impact.***

Mitigation: The significant impact at this intersection during the PM peak-hour can be mitigated with the implementation of signal coordination and with optimized signal timings. Although the traffic signals located in the downtown grid are currently pre-timed, the City is planning to upgrade the controllers to allow traffic signal coordination capabilities. In addition, the applicant shall also pay toward the City of Sacramento traffic operations center for the re-timing and monitoring of the signal to improve vehicle progression along the corridor. As shown in Table

26, this mitigation measure reduces the average delay to be within 5 seconds of the average delay under Baseline Conditions. Therefore, ***this impact is less than significant***.

J Street at 3rd Street

Impact: As shown in Table 14, the addition of traffic associated with the proposed project would cause this intersection, to change from LOS C to LOS D during the PM peak-hour. ***This is a significant impact.***

Mitigation: The significant impact at this intersection during the PM peak-hour can be mitigated with the implementation of signal coordination and with optimized signal timings. Although the traffic signals located in the downtown grid are currently pre-timed, the City is planning to upgrade the controllers to allow traffic signal coordination capabilities. In addition, the applicant shall also pay a fair share to recover the costs to the City of Sacramento Traffic Operations Center for the re-timing and monitoring of the signal to improve vehicle progression along downtown. As shown in Table 26, this mitigation measure results in a LOS C. Therefore, ***this impact is less than significant***.

Table 26 - Baseline plus Proposed Project (Mitigated) Intersection Levels of Service

#	Intersection	Traffic Control	Analysis Scenario	AM Peak-Hour		PM Peak-Hour	
				Delay (seconds)	LOS	Delay (seconds)	LOS
3	C Street @ 16th Street	Signal	Baseline	7.9	A	67.1	E
			Baseline+PP	8.1	A	72.3	E
			Baseline+PP (Mitg.)	N/A		72.0	E
15	J Street @ 3rd Street	Signal	Baseline	102.3	F	34.6	C
			Baseline+PP	103.6	F	35.1	D
			Baseline+PP (Mitg.)	N/A		29.0	C

Freeway Mainline

Impact: The freeway mainline section studied for this project is not expected to operate at LOS F without the project and the project does not cause the mainline to operate at LOS F. As a result, the impacts to the freeway main line is ***less than significant***.

Mitigation: None required.

Freeway Merge/Diverge

Impact: Table 16 summarizes the operating conditions on the freeway merge and diverge areas with the addition on the proposed project. With the project, the freeway merge/diverge areas are expected to freeway main line is expected to operate at LOS C to LOS F during the AM and PM peak-hours, with and without the project. However, the project does not cause the merger or diverge areas to operate at a LOS less than the freeway mainline. As a result, this impact is ***less than significant.***

The City is participating in a multi-agency committee that is developing a regional impact fee for the I-5 corridor. The DNA light rail extension to the airport project may be included as one of the I-5 corridor improvements that would be funded under this regional impact fee. The project will be required to pay the I-5 corridor impact fee that is in effect at the time of issuance of building permits.

Mitigation: None require. However, prior to building occupancy, the applicant shall pay the I-5 corridor impact fee that is in effect at the time of the issuance of building permit.

Freeway Off-Ramp Queuing
As shown in Table 17, none of the study off-ramps experience queuing that exceeds the available storage capacity with or without the proposed project. As such, the proposed project's impacts to freeway off-ramps are considered to be ***less than significant***.

Bicycle Facilities
The proposed project is anticipated to result in the addition of residents, employees, and patrons to the site, some of whom would travel by bicycle. The proposed project will not eliminate or adversely affect existing bicycle facilities in the immediate vicinity of the proposed project site, or interfere with planned bikeways. Furthermore, the proposed project is not anticipated to results in unsafe conditions for bicyclists. As such, the proposed project's impacts to bicycle facilities are considered to be ***less than significant***.

Pedestrian Facilities
The proposed project is anticipated to result in the addition of residents, employees, and patrons to the site, some of whom would travel by walking. However, the proposed project is not anticipated to adversely affect the existing pedestrian facility or result in unsafe conditions for pedestrians. The site has numerous on-site pedestrian facilities. As such, the proposed project's impacts to pedestrian facilities are considered to be ***less than significant***.

Transit Facilities
The proposed project is anticipated to result in the addition of residents, employees, and patrons to the site, some of whom would travel by transit. More specifically, as shown in Table 1, the proposed project is anticipated to generate 7 AM peak-hour trips and 18 PM peak-hour transit trips. Of the four bus routes in the vicinity of the proposed project, the bus route with the least available capacity is Route 29, which has a current ridership of up to 39 riders per peak-hour and a capacity of 68 riders[10]. Since this bus route has the adequate available capacity to serve all of the anticipated project transit trips during both AM and PM peak-hours, the proposed project is not expected to generate transit ridership that would cause any bus route to exceed its capacity.

The RT Blue Line, which has a maximum capacity of 144 occupants per car, and operates four trains at 15 minute headways during the peak-hours, with each train having four cars. Additionally, the Gold Line, which has a maximum capacity of 199 occupants per car, also operates four trains at 15 minute headways during the peak-hours, with each train having four cars. Based on ridership data received from Sacramento Regional Transit[10], the maximum peak-hour ridership per car for the Blue and Gold Lines are 70 and 100, respectively. Therefore, both of these trains currently have excess capacity that would have the ability to serve the anticipated transit trips generated by the proposed project. As such, the proposed project's impacts to transit facilities are considered to be ***less than significant***.

Cumulative (2030) plus Proposed Project Conditions

Intersections

C Street at 12th Street
Impact: As shown in Table 22, the addition of traffic associated with the proposed project would cause this intersection, which operates below the City's LOS C threshold without the proposed projects during the PM peak-hour, to experience an increase in delay greater than 5 seconds. ***This is a significant impact.***

[10] Sacramento Regional Transit.

Mitigation: The significant impact at this intersection during the PM peak-hour can be mitigated with the implementation of signal coordination and with optimized signal timings. Although the traffic signals located in the downtown grid are currently pre-timed, the City is planning to upgrade the controllers to allow traffic signal coordination capabilities. In addition, the applicant shall also pay toward the City of Sacramento traffic operations center for the re-timing and monitoring of the signal to improve vehicle progression along the corridor. As presented in Table 27, this mitigation measure results in a LOS E, which is improved from without proposed project conditions. Therefore, ***this impact is less than significant.***

J Street at 3rd Street

Impact: As shown in Table 22, the addition of traffic associated with the proposed project would cause this intersection, which operates below the City's LOS C threshold without the proposed project during the PM peak-hour, to experience an increase in delay greater than 5 seconds. ***This is a significant impact.***

Mitigation: The significant impact at this intersection during the PM peak-hour can be mitigated with the implementation of signal coordination and with optimized signal timings. Although the traffic signals located in the downtown grid are currently pre-timed, the City is planning to upgrade the controllers to allow traffic signal coordination capabilities. In addition, the applicant shall also pay toward the City of Sacramento traffic operations center for the re-timing and monitoring of the signal to improve vehicle progression along the corridor. As shown in Table 27, this mitigation measure results in a LOS E, this is improved from without proposed project conditions. Therefore, ***this impact is less than significant***.

J Street at 9th Street

Impact: As shown in Table 22, the addition of traffic associated with the proposed project would cause this intersection, which operates below the City's LOS C threshold without the proposed project during the PM peak-hour, to experience an increase in delay greater than 5 seconds. ***This is a significant impact.***

Mitigation: The significant impact at this intersection during the PM peak-hour can be mitigated with the implementation of signal coordination and with optimized signal timings. Although the traffic signals located in the downtown grid are currently pre-timed, the City is planning to upgrade the controllers to allow traffic signal coordination capabilities. In addition, the applicant shall also pay toward the City of Sacramento traffic operations center for the re-timing and monitoring of the signal to improve vehicle progression along the corridor. As presented in Table 27, this mitigation measure results in a LOS E, which is improved from without proposed project conditions. Therefore, ***this impact is less than significant.***

Table 27 – Cumulative (2030) plus Proposed Project (Mitigated) Intersection Levels of Service

#	Intersection	Traffic Control	Analysis Scenario	AM Peak-Hour Delay (seconds)	AM Peak-Hour LOS	PM Peak-Hour Delay (seconds)	PM Peak-Hour LOS
1	C Street @ 12th Street	Signal	Cum	94.8	F	133.0	F
			Cum+PP	97.0	F	138.5	F
			Cum+PP (Mitg.)	N/A		64.0	E
13	J Street @ 9th Street	Signal	Cum	34.0	C	77.7	E
			Cum+PP	34.2	C	83.7	F
			Cum+PP (Mitg.)	N/A		55.5	E
15	J Street @ 3rd Street	Signal	Cum	268.0	F	81.3	F
			Cum+PP	269.4	F	88.3	F
			Cum+PP (Mitg.)	N/A		70.3	E

Cum = Cumulative, Cum+PP = Cum + Proposed Project, SUI = Significant and Unavoidable Impact
* Average intersection control delay / worst minor approach (worst minor movement approach direction).

Freeway Mainline

Impact: Table 23 summarizes the resultant operating conditions on the freeway mainline with the addition on the proposed project. The freeway main line is expected to operate at LOS C to LOS F during the AM and PM peak-hours, with and without the project. During peak hours, the project would add up to 36 AM and up to 57 PM peak hour vehicle trips to the freeway mainline segments. The increase in freeway trips due to the proposed project will account for approximately 0.5% of the total peak-hour trips on the freeway during the AM and PM peak-hours. This is considered to be a nominal increase in freeway volume and is not expected to result in a change in freeway operating conditions. As a result, this impact is ***less than significant.***

It should be noted that the City is participating in a multi-agency committee that is developing a regional impact fee for the I-5 corridor. The DNA light rail extension to the airport project may be included as one of the I-5 corridor improvements that would be funded under this regional impact fee. The project will be required to pay the I-5 corridor impact fee that is in effect at the time of issuance of building permits.

Mitigation: None required. However, prior to building occupancy, the applicant shall pay the I-5 corridor impact fee that is in effect at the time of the issuance of building permit.

Freeway Merge/ Diverge areas

Impact: Table 24 summarizes the operating conditions on the freeway merge and diverge areas with the addition on the proposed project. With the project, the freeway merge/diverge areas are expected to freeway main line is expected to operate at LOS C to LOS F during the AM and PM peak-hours, with and without the project. The project does not cause the merger or diverge areas to operate at a LOS less than the freeway mainline. As a result, this impact is ***less than significant.***

It should be noted that the City is participating in a multi-agency committee that is developing a regional impact fee for the I-5 corridor. The DNA light rail extension to the airport project may be included as one of the I-5 corridor improvements that would be funded under this regional impact fee. The project will be required to pay the I-5 corridor impact fee that is in effect at the time of issuance of building permits.

Mitigation: None required. However, prior to building occupancy, the applicant shall pay the I-5 corridor impact fee that is in effect at the time of the issuance of building permit.

Freeway Off-Ramp Queuing

As shown in Table 25, the proposed does not cause queuing on any study off-ramps that is not anticipated to experience queuing in excess of available storage without the project to exceed the available storage capacity. Furthermore, project results in a decrease in vehicle queues on the northbound I-5 off-ramp at J Street during the AM peak hour, which is expected to exceed the available storage length under Cumulative conditions without the project. As such, the proposed project's impacts to freeway off-ramps are considered to be ***less than significant***.

Bicycle Facilities

The proposed project is anticipated to result in the addition of residents, employees, and patrons to the site, some of whom would travel by bicycle. The proposed project will not eliminate or adversely affect existing bicycle facilities in the immediate vicinity of the proposed project site, or interfere with planned bikeways. Furthermore, the proposed project is not anticipated to results in unsafe conditions for bicyclists. As such, the proposed project's impacts to bicycle facilities are considered to be ***less than significant***.

Pedestrian Facilities

The proposed project is anticipated to result in the addition of residents, employees, and patrons to the site, some of whom would travel by walking. However, the proposed project is not anticipated to adversely affect the existing pedestrian facility or result in unsafe conditions for pedestrians. The site has numerous on-site pedestrian facilities. As such, the proposed project's impacts to pedestrian facilities are considered to be ***less than significant***.

Transit Facilities

The proposed project's impacts to transit facilities in the future is anticipated to be nominal as well, as RT is expected to increase capacity as regional population growth occurs. As such, the proposed project's impacts to transit facilities are considered to be ***less than significant***.

OTHER CONSIDERATIONS

Peak-Hour Traffic Signal Warrant Evaluation
A planning level assessment of the need for traffic signalization was performed for the following un-signalized intersections:

- C Street @ 14th Street
- D Street @ 10th Street
- D Street @ 11th Street
- E Street @ 10th Street
- E Street @ 11th Street

This evaluation was consistent with the peak-hour warrant methodologies noted in Section 4C of the *California Manual on Uniform Traffic Control Devices (CMUTCD),* September 26, 2006. None of the five unsignalized study intersections satisfy the peak-hour warrant under any of the analysis scenarios. Detailed results of this evaluation are presented in Appendix H.

Site Access and On-site Circulation Evaluation
The project site is located on two separate blocks, divided by D Street. There are driveways proposed for D Street, 10th Street, and 11th Street. The following on-site circulation evaluation is based on the site plan dated February 28, 2008, which is shown in Figure 2.

1. Proximity of driveways to adjacent intersections.

- D Street
  - Westerly driveway: This driveway appears to be at the same location of an existing driveway and is not located in close proximity to an intersection
  - Driveway at 10th Street: This driveway will form the north leg of the D Street/10th Street intersection. The location of this driveway will not interfere with traffic at the intersection. However, on-site parking spaces are proposed within the driveway at near the D Street right-of-way. Parking maneuvers at these spaces may occasionally block the driveway and cause minor delays at the intersection.
- 10th Street, south of D Street
  - There is a driveway proposed to be located south of the D Street/10th Street intersection. This driveway is one-way into the site. Location of this driveway is not expected to significantly affect intersection operations. However, if garages are located close to the 10th Street right-of-way, parking maneuvers at the garages may occasionally block the driveway.
- 11th Street
  - Southerly driveway south of D Street: This driveway is proposed to be two-way and is located in relatively close proximity to the E Street/ 11th Street intersection. Traffic volumes at this driveway are expected to be relatively low and the driveway is not expected to interfere with traffic operations at the intersection. However, if garages are located close to the 11th Street right-of-way, parking maneuvers at the garages may occasionally block the driveway.
  - Northerly driveway south of D Street: This driveway is proposed to be one-way out of the site and traffic volumes at the driveway are expected to be relatively low. As such, the driveway is not expected to affect traffic operations at the 11th Street/D Street intersection.
  - Southerly driveway north of D Street: This driveway appears to be located across 11th Street from the existing alley and is not located near an existing intersection. As such, the driveway is not expected to affect traffic operations at the intersections.
  - Northerly driveway north of D Street: This driveway will form the west leg of the C Street/11th Street intersection. As such, the driveway will function as part of the intersection.

2. *On-site conflicts between vehicles and bicycles and pedestrians.*

   The site plan features numerous pedestrian access points and pedestrian access features. In addition, there are numerous opportunities for pedestrians to access the site from surrounding streets and from other parts of the site. In general, the significant pedestrian/vehicle conflict points will be located at the site driveways. At these locations, pedestrians cross the driveways on the public sidewalk. Such crossings are within the range of driver and pedestrian expectation. As a result, significant conflicts between vehicles and pedestrians is not expected.

3. *Potential conflicts between passenger vehicle and delivery vehicle circulation and maneuvering.*

   The site plan does not indicate locations of on-site delivery areas. As such, it must be assumed delivery vehicles will park in the parking aisles on the site or will utilize on-street parking. If delivery vehicles utilize on-site parking aisles, there will be occasional conflicts between passenger vehicles and delivery vehicles, and delivery vehicles will occasionally likely block a small number of parking spaces. This condition is considered to be an inconvenience and is not expected to significantly affect traffic operations. If the delivery vehicles are expected to utilize on-street parking areas, an adequate area of delivery vehicle parking should be designated along the curb adjacent to the site, specifically in the area of the 11th Street/D Street intersection. Such designations typically include yellow curbs and appropriate signage.

CONCLUSIONS

Based upon the analysis documented in this report, the following conclusions are offered:

- The proposed project is expected to generate 4,465 new daily trips, including 145 AM peak-hour trips and 366 PM peak-hour trips.
- The proposed project does not result in any impacts that cannot be mitigated to be less than significant.
- The proposed project is not anticipated to adversely affect pedestrian, bicycle, or transit facilities in the vicinity of the project site.
- The peak-hour traffic signal warrant is not satisfied for any unsignalized study intersections under any of the analysis scenarios.
- Locations of proposed driveways are not expected to significantly affect intersection operations.

Appendix A:

Trip Generation, Distribution, and Traffic Volumes Letter

February 6, 2008 (Revised)

Mr. Jesse Gothan
City of Sacramento
Development Services Department
915 I Street, 3rd Floor
Sacramento, California 95814

Re: Trip Generation, Distribution, and Traffic Volumes
The Creamery (P07-123)
Sacramento, California

Dear Mr. Gothan:

I am writing to provide revised trip generation and distribution assumptions for the above-referenced project. This revised letter reflects your comments of January 15, 2008.

Project Trip Generation

The project is proposed to consist of a total of 272 high density residential dwelling units and 101,180 sf of retail space on 8.2 developed acres. The proposed project is generally bounded by the Union Pacific Rail Road tracks to the north, E Street to the south, 10th Street to the west, and 11th Street to the east. Access to the site is proposed to be provided via numerous driveways along 10th Street, 11th Street, D Street, and E Street. The proposed site plan is shown in Attachment A.

The number of trips anticipated to be generated by the proposed project was derived using data included in *Trip Generation, 7th Edition* and the *Trip Generation Handbook, Second Edition*, both published by the Institute of Transportation Engineers (ITE). The trip generation for the project was then adjusted to account for various factors noted below. The anticipated trip generation, with appropriate reductions, is shown in Table 1.

The trip generation was adjusted to account for internal site trips, pass-by trips, and alternate mode trips. The internal reduction factor accounts for the interaction of the proposed residential and commercial use within the project site. These trips would not be expected to use the surrounding roadway network to access other parts of the site. The percentage reduction for internal trips was calculated for daily and PM peak hour trips, in accordance with procedures outlined in *Trip Generation Handbook, Second Edition*. Calculation sheets for the internal reduction are included in Attachment B.

The pass-by reduction accounts for drivers on the network that access the site's commercial uses but are on the roadway network for some other purpose. The national average (per ITE *Trip Generation Handbook*) for this reduction is 34

percent. Since the site is not along an arterial, a more conservative pass-by rate of 20 percent is assumed.

The alternate mode reduction accounts for the proximity of transit to the site and other trips that would be expected from other "non-single occupant" vehicles. Regional Transit operates bus lines on F and 12th Streets, and the Alkalai Flat Light Rail station is located one block east of the site on 12th Street. Alternate mode trips (transit, walk, bike, and pedestrian trips) can also be expected to access the site from the surrounding neighborhood. The alternate mode adjustment percentages shown in Table 1 were derived using the methodology developed by Dowling Associates and used in The Railyards Draft EIR. The Railyards EIR references data published in the *2000 SACOG Household Travel Survey* (DKS Associates, Inc.). The survey includes travel mode choice information used primarily to aid in the development and refinement of SACOG's travel demand model[1]. The Railyards EIR assumed a 50 percent reduction of alternate mode use indicated in the survey due to light rail facilities not currently existing within the Railyards. However, we omitted that reduction since the Creamery site is one block from an existing Light Rail station. The calculations used to derive alternate mode reductions are included in Attachment B.

The site is currently developed with a manufacturing use. To avoid double counting site trips, we will remove trips for the existing uses prior to adding trips for the project. Table 1 includes an adjustment of project trips to account for the existing use and traffic already on the network.

Traffic Volumes to be Analyzed

Existing Conditions
Traffic counts were conducted for this project on November 27-29, 2007, (the week after Thanksgiving) for all seventeen (17) study intersections. These traffic counts were conducted from 7-9 am and 4-6 pm. Current traffic volumes for all pertinent freeway facilities will be obtained from the Caltrans website.

Baseline Conditions
Traffic from previously approved projects will be added to existing volumes to establish Baseline conditions. Observations made during previous field visits suggests that there are three projects in the vicinity of the proposed project, including Globe Mills (112 DU senior housing, 33 DU apartment, 1.75 ksf retail), North End Lofts (11 DU loft/townhome), and Washington Park Village (52 DU townhome). These projects are in various stages of construction and occupancy. We will add trips estimated for the unoccupied portions of these projects to the existing traffic volumes to establish Baseline traffic volumes.

[1] *Pre-Census Travel Behavior Report: Analysis of the 2000 SACOG Household Travel Survey*, DKS Associates, July 25, 2001.

Table 1 – Trip Generation – Proposed Uses

ITE Land Use (Code)	Size			Total Daily Trips	AM Peak Hour					PM Peak Hour				
					Total Trips	IN		OUT		Total Trips	IN		OUT	
						%	Trips	%	Trips		%	Trips	%	Trips
Residential Condominium/ Townhome (230)	272 units			1,503	115	17%	20	83%	95	137	67%	91	33%	45
Shopping Center (820)	101.2 ksf			6,843	158	61%	96	39%	61	631	48%	303	52%	328
Subtotal New Trips:				***8,346***	***273***		***116***		***157***	***767***		***394***		***373***
Internal Reduction[1] (Daily, AM, PM)	13%	-	14%	-1,085						-107		-55		-52
Retail Pass-By Reduction[1]	20%			-1,369	-32		-19		-12	-126		-61		-66
Residential Transit Adjustments (Daily, AM, PM)	2.6%	3.4%	3.1%	-39	-4		-1		-3	-4		-3		-1
Retail Transit Adjustments	2.2%			-151	-3		-2		-1	-14		-7		-7
Residential Walk, Bike & Other Non-Auto Adjustments (Daily, AM, PM)	9.6%	7.9%	8.6%	-144	-9		-2		-8	-12		-8		-4
Retail Walk, Bike & Other Non-Auto Adjustments	11.6%			-794	-18		-11		-7	-73		-35		-38
Existing Industrial Use[2]	8.2 Acre			-318	-61	93%	-57	7%	-4	-69	53%	-36	32%	-22
Net New External Trips:				***4,446***	***145***		***24***		***121***	***362***		***190***		***183***

Source: *Trip Generation, 7th Edition*, ITE.
[1] *Trip Generation Handbook, Second Edition*, ITE.
[2] Assumes Manufacturing Land use, ITE code 140.

We will also include the effects of the *Central City Two-Way Conversion* project starting with the Baseline Conditions. The conversion project will convert several streets in the project area from one-way to two-way operation.

Cumulative Year Conditions
Cumulative (2027) traffic volumes will be derived from SACMET Regional Travel Demand Forecasting model output, to be provided by Dowling Associates, Inc. We will use model output that includes Year 2030 with the Initial Phase of the Railyards Project. We will use the model output, along with traffic counts collected in November 2007 to establish an annual traffic growth rate. That growth rate will then be used to calculate year 2027 traffic volumes. The model output includes trips from the site assuming it is developed with industrial uses, consistent with the site's General Plan designation. As such, the Year 2027 volumes will constitute Cumulative year, no project conditions. We will remove trips for the industrial uses at the site from the network, and replace those with project trips obtain Cumulative year plus project conditions.

Project Trip Distribution

The distribution of project traffic was developed based on project area roadway volumes, general knowledge of project area traffic patterns, and engineering judgment. Project distribution percentages are illustrated in Attachment C.

Your concurrence on the above is appreciated. Please contact me at (916) 797-3811 if you have any questions or require additional information.

Very truly yours,

KIMLEY-HORN AND ASSOCIATES, INC.

Stephen M. Pyburn, C.E., T.E.
Senior Project Manager
PE No. C49598 & TR1904

Enclosures: Attachment A - Project Site Plan
Attachment B - Trip Reduction Calculation Sheets
Attachment C - Trip Distribution

Appendix B:

Worksheets for Existing Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	9	19	7	0	0	0	0	240	2527	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1563			1617						5738	
Flt Permitted		1.00			0.86						1.00	
Satd. Flow (perm)		1563			1442						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	9	9	19	7	0	0	0	0	240	2527	13
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	16	0	0	26	0	0	0	0	0	2779	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		359			332						3385	
v/s Ratio Prot		0.01									c0.48	
v/s Ratio Perm					c0.02							
v/c Ratio		0.04			0.08						0.82	
Uniform Delay, d1		15.0			15.1						8.1	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.2			0.5						2.4	
Delay (s)		15.2			15.6						10.5	
Level of Service		B			B						B	
Approach Delay (s)		15.2			15.6			0.0			10.5	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	241	4	6	23	5	1	1	46	2	0	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	241	4	6	23	5	1	1	46	2	0	9

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	249	34	48	11
Volume Left (vph)	4	6	1	2
Volume Right (vph)	4	5	46	9
Hadj (s)	0.03	-0.02	-0.54	-0.42
Departure Headway (s)	4.1	4.2	4.0	4.1
Degree Utilization, x	0.28	0.04	0.05	0.01
Capacity (veh/h)	865	823	837	797
Control Delay (s)	8.7	7.4	7.2	7.2
Approach Delay (s)	8.7	7.4	7.2	7.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.3		
HCM Level of Service	A		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	194	0	0	4	17	26	1289	17	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5750				
Flt Permitted	0.76	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1266	1676			1676	1425		5750				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	76	194	0	0	4	17	26	1289	17	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	13	0	3	0	0	0	0
Lane Group Flow (vph)	76	194	0	0	4	4	0	1329	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	11.0	11.0			11.0	11.0		31.0				
Effective Green, g (s)	11.0	11.0			11.0	11.0		31.0				
Actuated g/C Ratio	0.22	0.22			0.22	0.22		0.62				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	279	369			369	314		3565				
v/s Ratio Prot		c0.12			0.00							
v/s Ratio Perm	0.06					0.00		0.23				
v/c Ratio	0.27	0.53			0.01	0.01		0.37				
Uniform Delay, d1	16.2	17.2			15.2	15.2		4.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.4	5.3			0.1	0.1		0.3				
Delay (s)	18.6	22.5			15.3	15.3		5.0				
Level of Service	B	C			B	B		A				
Approach Delay (s)		21.4			15.3			5.0			0.0	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	24	10	45	35	6	20	5	48	0	4	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	24	10	45	35	6	20	5	48	0	4	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)					792							
pX, platoon unblocked												
vC, conflicting volume	41			34			159	160	29	208	162	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	41			34			159	160	29	208	162	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			97	99	95	100	99	100
cM capacity (veh/h)	1568			1578			786	711	1046	696	710	1034

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	86	73	4
Volume Left	0	45	20	0
Volume Right	10	6	48	0
cSH	1568	1578	931	710
Volume to Capacity	0.00	0.03	0.08	0.01
Queue Length 95th (ft)	0	2	6	0
Control Delay (s)	0.0	3.9	9.2	10.1
Lane LOS		A	A	B
Approach Delay (s)	0.0	3.9	9.2	10.1
Approach LOS			A	B

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	44	3	8	84	17	4	6	13	4	7	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	44	3	8	84	17	4	6	13	4	7	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	101			47			198	196	46	204	190	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	101			47			198	196	46	204	190	92
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	99	99	99	99
cM capacity (veh/h)	1491			1560			741	688	1024	730	694	965

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	64	109	23	17
Volume Left	17	8	4	4
Volume Right	3	17	13	6
cSH	1491	1560	858	780
Volume to Capacity	0.01	0.01	0.03	0.02
Queue Length 95th (ft)	1	0	2	2
Control Delay (s)	2.0	0.6	9.3	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	2.0	0.6	9.3	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay		2.7		
Intersection Capacity Utilization		18.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	31	18	4	11	0	0	0	0	39	2427	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1593			1654						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1593			1599						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	31	18	4	11	0	0	0	0	39	2427	88
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	45	0	0	15	0	0	0	0	0	2544	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		366			368						3612	
v/s Ratio Prot		c0.03									c0.44	
v/s Ratio Perm					0.01							
v/c Ratio		0.12			0.04						0.70	
Uniform Delay, d1		15.3			15.0						6.2	
Progression Factor		1.00			1.00						0.00	
Incremental Delay, d2		0.7			0.2						0.7	
Delay (s)		15.9			15.2						0.7	
Level of Service		B			B						A	
Approach Delay (s)		15.9			15.2			0.0			0.7	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay		1.0	HCM Level of Service	A
HCM Volume to Capacity ratio		0.55		
Actuated Cycle Length (s)		50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization		56.4%	ICU Level of Service	B
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	39	0	0	90	12	31	57	38	10	0	47
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	39	0	0	90	12	31	57	38	10	0	47

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	41	102	31	95	57
Volume Left (vph)	2	0	31	0	10
Volume Right (vph)	0	12	0	38	47
Hadj (s)	0.04	-0.04	0.53	-0.25	-0.43
Departure Headway (s)	4.5	4.3	5.4	4.6	4.1
Degree Utilization, x	0.05	0.12	0.05	0.12	0.06
Capacity (veh/h)	766	797	642	749	851
Control Delay (s)	7.7	7.9	7.5	7.1	7.3
Approach Delay (s)	7.7	7.9	7.2		7.3
Approach LOS	A	A	A		A

Intersection Summary			
Delay		7.5	
HCM Level of Service		A	
Intersection Capacity Utilization		23.2%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	8	85	0	0	93	18	1	0	1	8	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	85	0	0	93	18	1	0	1	8	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	111			85			214	212	85	204	203	102
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	111			85			214	212	85	204	203	102
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	100	99
cM capacity (veh/h)	1479			1512			731	682	974	750	690	953

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	93	111	2	19
Volume Left	8	0	1	8
Volume Right	0	18	1	11
cSH	1479	1700	835	856
Volume to Capacity	0.01	0.07	0.00	0.02
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.7	0.0	9.3	9.3
Lane LOS	A		A	A
Approach Delay (s)	0.7	0.0	9.3	9.3
Approach LOS			A	A

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization		22.1%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	63	25	11	61	0	0	0	0	169	2215	46
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.70	1.00						1.00	
Satd. Flow (perm)		1612		1173	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	63	25	11	61	0	0	0	0	169	2215	46
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	81	0	11	61	0	0	0	0	0	2425	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		371		270	385						3611	
v/s Ratio Prot		c0.05			0.04							
v/s Ratio Perm				0.01							0.42	
v/c Ratio		0.22		0.04	0.16						0.67	
Uniform Delay, d1		15.6		15.0	15.4						5.9	
Progression Factor		1.00		1.00	1.00						0.01	
Incremental Delay, d2		1.4		0.3	0.9						0.7	
Delay (s)		17.0		15.2	16.3						0.8	
Level of Service		B		B	B						A	
Approach Delay (s)		17.0			16.1			0.0			0.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	1.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	265	97	0	0	0	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5				3.5
Lane Util. Factor	0.97	1.00				1.00
Frt	1.00	0.85				1.00
Flt Protected	0.95	1.00				1.00
Satd. Flow (prot)	3090	1425				1676
Flt Permitted	0.95	1.00				1.00
Satd. Flow (perm)	3090	1425				1676
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	265	97	0	0	0	415
RTOR Reduction (vph)	151	55	0	0	0	0
Lane Group Flow (vph)	114	42	0	0	0	415
Turn Type		Prot				
Protected Phases	2	2				1
Permitted Phases						
Actuated Green, G (s)	21.5	21.5				21.5
Effective Green, g (s)	21.5	21.5				21.5
Actuated g/C Ratio	0.43	0.43				0.43
Clearance Time (s)	3.5	3.5				3.5
Lane Grp Cap (vph)	1329	613				721
v/s Ratio Prot	c0.04	0.03				c0.25
v/s Ratio Perm						
v/c Ratio	0.09	0.07				0.58
Uniform Delay, d1	8.4	8.4				10.8
Progression Factor	1.00	0.54				1.00
Incremental Delay, d2	0.1	0.2				3.3
Delay (s)	8.6	4.8				14.1
Level of Service	A	A				B
Approach Delay (s)	7.5		0.0			14.1
Approach LOS	A		A			B

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	430	52	197	213	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4503			4469				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4503			4469				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	430	52	197	213	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	30	0	0	104	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	452	0	0	306	0	0	0	0
Turn Type							Perm					
Protected Phases					2			1				
Permitted Phases							1					
Actuated Green, G (s)					19.5			23.5				
Effective Green, g (s)					19.5			23.5				
Actuated g/C Ratio					0.39			0.47				
Clearance Time (s)					3.5			3.5				
Lane Grp Cap (vph)					1756			2100				
v/s Ratio Prot					c0.10							
v/s Ratio Perm								0.07				
v/c Ratio					0.26			0.15				
Uniform Delay, d1					10.3			7.5				
Progression Factor					1.00			0.64				
Incremental Delay, d2					0.4			0.1				
Delay (s)					10.7			5.0				
Level of Service					B			A				
Approach Delay (s)		0.0			10.7			5.0			0.0	
Approach LOS		A			B			A			A	

Intersection Summary				
HCM Average Control Delay	8.1	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.20			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	31.7%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	802	124	198	685	0	0	0	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					0.86		0.97	0.95				0.88
Frt					0.98		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5651		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5651		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	802	124	198	685	0	0	0	20
RTOR Reduction (vph)	0	0	0	0	56	0	150	0	0	0	0	18
Lane Group Flow (vph)	0	0	0	0	870	0	48	685	0	0	0	2
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					21.0		12.0	12.0				5.0
Effective Green, g (s)					21.0		12.0	12.0				5.0
Actuated g/C Ratio					0.42		0.24	0.24				0.10
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2373		742	764				251
v/s Ratio Prot					c0.15		0.02	c0.22				c0.00
v/s Ratio Perm												
v/c Ratio					0.37		0.06	0.90				0.01
Uniform Delay, d1					9.9		14.7	18.4				20.3
Progression Factor					0.20		1.00	1.00				1.00
Incremental Delay, d2					0.4		0.2	15.4				0.1
Delay (s)					2.4		14.8	33.8				20.3
Level of Service					A		B	C				C
Approach Delay (s)		0.0			2.4			29.5			20.3	
Approach LOS		A			A			C			C	

Intersection Summary				
HCM Average Control Delay	15.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	141	835	0	0	0	0	0	175	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.92	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4234	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4234	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	141	835	0	0	0	0	0	175	175
RTOR Reduction (vph)	0	0	0	80	0	0	0	0	0	0	47	0
Lane Group Flow (vph)	0	0	0	61	835	0	0	0	0	0	303	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				21.5	21.5						21.5	
Effective Green, g (s)				21.5	21.5						21.5	
Actuated g/C Ratio				0.43	0.43						0.43	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				685	1968						1821	
v/s Ratio Prot					c0.18						c0.07	
v/s Ratio Perm				0.04								
v/c Ratio				0.09	0.42						0.17	
Uniform Delay, d1				8.4	9.9						8.7	
Progression Factor				6.05	1.88						1.00	
Incremental Delay, d2				0.2	0.6						0.2	
Delay (s)				51.3	19.3						8.9	
Level of Service				D	B						A	
Approach Delay (s)		0.0			23.9			0.0			8.9	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	859	109	138	379	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4499			4516				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4499			4516				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	859	109	138	379	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	32	0	0	40	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	936	0	0	477	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					21.0			21.5				
Effective Green, g (s)					21.0			21.5				
Actuated g/C Ratio					0.42			0.43				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					1890			1942				
v/s Ratio Prot					c0.21							
v/s Ratio Perm								0.11				
v/c Ratio					0.50			0.25				
Uniform Delay, d1					10.6			9.1				
Progression Factor					1.00			1.50				
Incremental Delay, d2					0.9			0.3				
Delay (s)					11.5			13.9				
Level of Service					B			B				
Approach Delay (s)		0.0			11.5			13.9			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	39.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
15: J St. & 3rd St.

Existing
AM Peak

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	1369	459	88	120	106	1631	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.96		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5550		2508	1449	3005	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5550		2508	1449	3005	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1369	459	88	120	106	1631	210
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1828	0	88	73	153	1841	0
Turn Type			custom	Perm		custom	
Protected Phases	6		2		2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	31.0		11.0	11.0	11.0	46.0	
Effective Green, g (s)	31.0		11.0	11.0	11.0	46.0	
Actuated g/C Ratio	0.31		0.11	0.11	0.11	0.46	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	1721		276	159	331	1495	
v/s Ratio Prot	c0.33		0.04			c0.57	
v/s Ratio Perm				0.05	0.05		
v/c Ratio	1.06		0.32	0.46	0.46	1.23	
Uniform Delay, d1	34.5		41.0	41.7	41.7	27.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	40.4		3.0	9.3	4.6	110.2	
Delay (s)	74.9		44.1	51.0	46.3	137.2	
Level of Service	E		D	D	D	F	
Approach Delay (s)	74.9				47.8		
Approach LOS	E				D		

Intersection Summary			
HCM Average Control Delay	101.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
16: J St. & 9th St.

Existing AM
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1386	162	0	0	0	0	0	0	71	265	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4505									4529	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4505									4529	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1386	162	0	0	0	0	0	0	71	265	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1534	0	0	0	0	0	0	0	0	326	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		46.5									46.5	
Effective Green, g (s)		46.5									46.5	
Actuated g/C Ratio		0.46									0.46	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		2095									2106	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.07	
v/c Ratio		0.73									0.15	
Uniform Delay, d1		21.7									15.4	
Progression Factor		0.16									1.11	
Incremental Delay, d2		0.2									0.2	
Delay (s)		3.7									17.3	
Level of Service		A									B	
Approach Delay (s)		3.7			0.0			0.0			17.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	6.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Existing AM
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	271	1221	0	0	0	0	0	427	165	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4536						3034	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4536						3034	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	271	1221	0	0	0	0	0	427	165	0	0	0
RTOR Reduction (vph)	0	35	0	0	0	0	0	3	17	0	0	0
Lane Group Flow (vph)	0	1457	0	0	0	0	0	441	131	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		46.5						46.5	46.5			
Effective Green, g (s)		46.5						46.5	46.5			
Actuated g/C Ratio		0.46						0.46	0.46			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		2109						1411	603			
v/s Ratio Prot								c0.15				
v/s Ratio Perm		0.32							0.10			
v/c Ratio		0.69						0.31	0.22			
Uniform Delay, d1		21.1						16.7	15.9			
Progression Factor		0.17						1.00	1.00			
Incremental Delay, d2		1.3						0.6	0.8			
Delay (s)		4.9						17.3	16.8			
Level of Service		A						B	B			
Approach Delay (s)		4.9			0.0			17.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	8.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Existing (w/ LRT)
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	9	9	19	7	0	0	0	0	240	2527	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1563			1617						5738	
Flt Permitted		1.00			0.82						1.00	
Satd. Flow (perm)		1563			1371						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	9	9	19	7	0	0	0	0	240	2527	13
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	10	0	0	26	0	0	0	0	0	2780	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		135			119						4854	
v/s Ratio Prot		0.01									c0.48	
v/s Ratio Perm					c0.02							
v/c Ratio		0.07			0.22						0.57	
Uniform Delay, d1		55.8			56.6						3.1	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		1.0			4.2						0.5	
Delay (s)		56.9			60.7						3.6	
Level of Service		E			E						A	
Approach Delay (s)		56.9			60.7			0.0			3.6	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	4.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	31	18	4	11	0	0	0	0	39	2427	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1593			1654						5733	
Flt Permitted		1.00			0.94						1.00	
Satd. Flow (perm)		1593			1581						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	31	18	4	11	0	0	0	0	39	2427	88
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	33	0	0	15	0	0	0	0	0	2550	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		138			137						4936	
v/s Ratio Prot		c0.02									c0.44	
v/s Ratio Perm					0.01							
v/c Ratio		0.24			0.11						0.52	
Uniform Delay, d1		56.7			56.0						2.3	
Progression Factor		1.00			1.00						0.00	
Incremental Delay, d2		4.1			1.6						0.3	
Delay (s)		60.8			57.6						0.3	
Level of Service		E			E						A	
Approach Delay (s)		60.8			57.6			0.0			0.3	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	1.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	63	25	11	61	0	0	0	0	169	2215	46
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.53	1.00						1.00	
Satd. Flow (perm)		1612		893	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	63	25	11	61	0	0	0	0	169	2215	46
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	77	0	11	61	0	0	0	0	0	2428	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		139		77	145						4934	
v/s Ratio Prot		c0.05			0.04							
v/s Ratio Perm				0.01							0.42	
v/c Ratio		0.55		0.14	0.42						0.49	
Uniform Delay, d1		58.3		56.2	57.6						2.2	
Progression Factor		1.00		1.00	1.00						0.01	
Incremental Delay, d2		15.0		3.9	8.7						0.3	
Delay (s)		73.3		60.0	66.3						0.3	
Level of Service		E		E	E						A	
Approach Delay (s)		73.3			65.4			0.0			0.3	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	4.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Existing
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	23	7	22	4	0	0	0	0	169	1763	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1624			1608						5741	
Flt Permitted		1.00			0.83						1.00	
Satd. Flow (perm)		1624			1395						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	23	7	22	4	0	0	0	0	169	1763	2
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	25	0	0	26	0	0	0	0	0	1934	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		374			321						3387	
v/s Ratio Prot		0.02									c0.34	
v/s Ratio Perm					c0.02							
v/c Ratio		0.07			0.08						0.57	
Uniform Delay, d1		15.1			15.1						6.3	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.3			0.5						0.7	
Delay (s)		15.4			15.6						7.0	
Level of Service		B			B						A	
Approach Delay (s)		15.4			15.6			0.0			7.0	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
2: C St. & 14th St.

Existing
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	86	7	3	16	0	2	2	218	10	0	4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	86	7	3	16	0	2	2	218	10	0	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	94	19	222	14
Volume Left (vph)	1	3	2	10
Volume Right (vph)	7	0	218	4
Hadj (s)	-0.01	0.07	-0.55	0.01
Departure Headway (s)	4.4	4.5	3.6	4.4
Degree Utilization, x	0.11	0.02	0.22	0.02
Capacity (veh/h)	780	738	960	780
Control Delay (s)	7.9	7.6	7.7	7.4
Approach Delay (s)	7.9	7.6	7.7	7.4
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.7		
HCM Level of Service	A		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	111	0	0	11	172	5	4500	9	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5765				
Flt Permitted	0.75	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1258	1676			1676	1425		5765				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	280	111	0	0	11	172	5	4500	9	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	280	111	0	0	11	172	0	4514	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	21.0	21.0			21.0	21.0		71.0				
Effective Green, g (s)	21.0	21.0			21.0	21.0		71.0				
Actuated g/C Ratio	0.21	0.21			0.21	0.21		0.71				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	264	352			352	299		4093				
v/s Ratio Prot		0.07			0.01							
v/s Ratio Perm	c0.22					0.12		0.78				
v/c Ratio	1.06	0.32			0.03	0.58		1.10				
Uniform Delay, d1	39.5	33.4			31.4	35.5		14.5				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	72.3	2.3			0.2	7.8		50.6				
Delay (s)	111.8	35.8			31.6	43.3		65.1				
Level of Service	F	D			C	D		E				
Approach Delay (s)		90.2			42.6			65.1			0.0	
Approach LOS		F			D			E			A	

Intersection Summary			
HCM Average Control Delay	66.2	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	111.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	125	16	11	10	0	4	0	118	3	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	125	16	11	10	0	4	0	118	3	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)					792							
pX, platoon unblocked												
vC, conflicting volume	10			141			165	165	133	283	173	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			141			165	165	133	283	173	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	87	99	100	100
cM capacity (veh/h)	1610			1442			795	722	916	580	715	1071

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	141	21	122	3
Volume Left	0	11	4	3
Volume Right	16	0	118	0
cSH	1610	1442	912	580
Volume to Capacity	0.00	0.01	0.13	0.01
Queue Length 95th (ft)	0	1	12	0
Control Delay (s)	0.0	4.0	9.6	11.2
Lane LOS		A	A	B
Approach Delay (s)	0.0	4.0	9.6	11.2
Approach LOS			A	B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	26.4%	ICU Level of Service	A
Analysis Period (min)	15		

The Creamery
5: D St. & 11th St.

Existing
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	220	13	6	16	5	1	4	6	4	10	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	220	13	6	16	5	1	4	6	4	10	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	21			233			304	296	226	301	300	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	21			233			304	296	226	301	300	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	99	99	98	99
cM capacity (veh/h)	1595			1335			629	606	813	636	603	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	251	27	11	20
Volume Left	18	6	1	4
Volume Right	13	5	6	6
cSH	1595	1335	706	701
Volume to Capacity	0.01	0.00	0.02	0.03
Queue Length 95th (ft)	1	0	1	2
Control Delay (s)	0.6	1.7	10.2	10.3
Lane LOS	A	A	B	B
Approach Delay (s)	0.6	1.7	10.2	10.3
Approach LOS			B	B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

The Creamery
6: D St. & 12th St.

Existing
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	200	22	4	9	0	0	0	0	42	1730	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1651						5752	
Flt Permitted		1.00			0.92						1.00	
Satd. Flow (perm)		1654			1542						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	200	22	4	9	0	0	0	0	42	1730	18
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	214	0	0	13	0	0	0	0	0	1787	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		380			355						3624	
v/s Ratio Prot		c0.13									c0.31	
v/s Ratio Perm					0.01							
v/c Ratio		0.56			0.04						0.49	
Uniform Delay, d1		17.0			14.9						5.0	
Progression Factor		1.00			1.00						0.09	
Incremental Delay, d2		5.9			0.2						0.4	
Delay (s)		23.0			15.1						0.9	
Level of Service		C			B						A	
Approach Delay (s)		23.0			15.1			0.0			0.9	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	102	0	0	56	6	17	111	130	3	0	20
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	102	0	0	56	6	17	111	130	3	0	20

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	106	62	17	241	23
Volume Left (vph)	4	0	17	0	3
Volume Right (vph)	0	6	0	130	20
Hadj (s)	0.04	-0.02	0.53	-0.34	-0.46
Departure Headway (s)	4.7	4.7	5.5	4.6	4.2
Degree Utilization, x	0.14	0.08	0.03	0.31	0.03
Capacity (veh/h)	718	717	637	759	792
Control Delay (s)	8.4	8.1	7.4	8.4	7.4
Approach Delay (s)	8.4	8.1	8.3		7.4
Approach LOS	A	A	A		A

Intersection Summary				
Delay		8.3		
HCM Level of Service		A		
Intersection Capacity Utilization		31.6%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	230	0	0	59	9	0	0	3	12	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	230	0	0	59	9	0	0	3	12	0	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	68			230			312	310	230	308	306	64
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			230			312	310	230	308	306	64
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	98	100	99
cM capacity (veh/h)	1533			1338			634	602	809	640	606	1001

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	236	68	3	19
Volume Left	6	0	0	12
Volume Right	0	9	3	7
cSH	1533	1700	809	738
Volume to Capacity	0.00	0.04	0.00	0.03
Queue Length 95th (ft)	0	0	0	2
Control Delay (s)	0.2	0.0	9.5	10.0
Lane LOS	A		A	B
Approach Delay (s)	0.2	0.0	9.5	10.0
Approach LOS			A	B

Intersection Summary				
Average Delay		0.8		
Intersection Capacity Utilization		33.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	235	17	22	47	0	0	0	0	207	1521	23
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.46	1.00						0.99	
Satd. Flow (perm)		1661		768	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	235	17	22	47	0	0	0	0	207	1521	23
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	247	0	22	47	0	0	0	0	0	1748	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		382		177	385						3605	
v/s Ratio Prot		c0.15			0.03							
v/s Ratio Perm				0.03							0.31	
v/c Ratio		0.65		0.12	0.12						0.48	
Uniform Delay, d1		17.4		15.3	15.3						4.9	
Progression Factor		1.00		1.00	1.00						0.05	
Incremental Delay, d2		8.2		1.4	0.6						0.4	
Delay (s)		25.6		16.7	15.9						0.7	
Level of Service		C		B	B						A	
Approach Delay (s)		25.6			16.2			0.0			0.7	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	4.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	366	324	0	0	0	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5				3.5
Lane Util. Factor	0.97	1.00				1.00
Frt	1.00	0.85				1.00
Flt Protected	0.95	1.00				1.00
Satd. Flow (prot)	3090	1425				1676
Flt Permitted	0.95	1.00				1.00
Satd. Flow (perm)	3090	1425				1676
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	366	324	0	0	0	405
RTOR Reduction (vph)	209	185	0	0	0	0
Lane Group Flow (vph)	157	139	0	0	0	405
Turn Type		Prot				
Protected Phases	2	2				1
Permitted Phases						
Actuated Green, G (s)	21.5	21.5				21.5
Effective Green, g (s)	21.5	21.5				21.5
Actuated g/C Ratio	0.43	0.43				0.43
Clearance Time (s)	3.5	3.5				3.5
Lane Grp Cap (vph)	1329	613				721
v/s Ratio Prot	0.05	c0.10				c0.24
v/s Ratio Perm						
v/c Ratio	0.12	0.23				0.56
Uniform Delay, d1	8.6	9.0				10.7
Progression Factor	1.00	2.93				1.00
Incremental Delay, d2	0.2	0.9				3.1
Delay (s)	8.7	27.2				13.9
Level of Service	A	C				B
Approach Delay (s)	17.4		0.0			13.9
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	339	23	132	323	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					3.5			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4533			4511				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4533			4511				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	339	23	132	323	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	14	0	0	70	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	348	0	0	385	0	0	0	0
Turn Type							Perm					
Protected Phases					2			1				
Permitted Phases							1					
Actuated Green, G (s)					19.5			23.5				
Effective Green, g (s)					19.5			23.5				
Actuated g/C Ratio					0.39			0.47				
Clearance Time (s)					3.5			3.5				
Lane Grp Cap (vph)					1768			2120				
v/s Ratio Prot					c0.08							
v/s Ratio Perm								0.09				
v/c Ratio					0.20			0.18				
Uniform Delay, d1					10.1			7.7				
Progression Factor					1.00			1.07				
Incremental Delay, d2					0.2			0.2				
Delay (s)					10.3			8.4				
Level of Service					B			A				
Approach Delay (s)		0.0			10.3			8.4			0.0	
Approach LOS		A			B			A			A	

Intersection Summary			
HCM Average Control Delay	9.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	2755	37	444	322	0	0	0	69
Ideal Flow (vphpl)	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					0.86		0.97	0.95				0.88
Frt					1.00		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5756		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5756		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2755	37	444	322	0	0	0	69
RTOR Reduction (vph)	0	0	0	0	2	0	189	0	0	0	0	59
Lane Group Flow (vph)	0	0	0	0	2790	0	255	322	0	0	0	10
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					46.0		28.0	28.0				14.0
Effective Green, g (s)					46.0		28.0	28.0				14.0
Actuated g/C Ratio					0.46		0.28	0.28				0.14
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2648		865	892				351
v/s Ratio Prot					c0.48		0.08	c0.10				c0.00
v/s Ratio Perm												
v/c Ratio					1.05		0.29	0.36				0.03
Uniform Delay, d1					27.0		28.2	28.8				37.1
Progression Factor					1.33		1.00	1.00				1.00
Incremental Delay, d2					33.4		0.9	1.1				0.1
Delay (s)					69.3		29.1	30.0				37.3
Level of Service					E		C	C				D
Approach Delay (s)		0.0			69.3			29.5			37.3	
Approach LOS		A			E			C			D	

Intersection Summary			
HCM Average Control Delay	60.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	218	1390	0	0	0	0	0	340	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.93	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4254	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4254	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	218	1390	0	0	0	0	0	340	301
RTOR Reduction (vph)	0	0	0	65	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	153	1390	0	0	0	0	0	631	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.5	46.5						46.5	
Effective Green, g (s)				46.5	46.5						46.5	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				741	2128						1978	
v/s Ratio Prot					c0.30						c0.15	
v/s Ratio Perm				0.10								
v/c Ratio				0.21	0.65						0.32	
Uniform Delay, d1				15.8	20.6						16.8	
Progression Factor				2.67	1.65						1.00	
Incremental Delay, d2				0.5	1.2						0.4	
Delay (s)				42.7	35.0						17.2	
Level of Service				D	C						B	
Approach Delay (s)		0.0			36.0			0.0			17.2	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM Average Control Delay	30.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1440	75	221	473	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4543			4505				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4543			4505				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1440	75	221	473	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1510	0	0	686	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					46.0			46.5				
Effective Green, g (s)					46.0			46.5				
Actuated g/C Ratio					0.46			0.46				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					2090			2095				
v/s Ratio Prot					c0.33							
v/s Ratio Perm								0.15				
v/c Ratio					0.72			0.33				
Uniform Delay, d1					21.8			16.9				
Progression Factor					1.00			0.86				
Incremental Delay, d2					2.2			0.4				
Delay (s)					24.0			14.8				
Level of Service					C			B				
Approach Delay (s)		0.0			24.0			14.8			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
15: J St. & 3rd St.

Existing
PM Peak

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	904	411	200	234	390	329	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.95		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	5497		2508	1449	3039	3249	
Flt Permitted	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	5497		2508	1449	3039	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	904	411	200	234	390	329	54
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1315	0	200	201	423	383	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	30.0		25.0	25.0	25.0	33.0	
Effective Green, g (s)	30.0		25.0	25.0	25.0	33.0	
Actuated g/C Ratio	0.30		0.25	0.25	0.25	0.33	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	1649		627	362	760	1072	
v/s Ratio Prot	c0.24					c0.12	
v/s Ratio Perm			0.08	0.14	0.14		
v/c Ratio	0.94dr		0.32	0.56	0.56	0.36	
Uniform Delay, d1	32.2		30.6	32.7	32.7	25.4	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.1		1.3	6.0	2.9	0.9	
Delay (s)	36.3		31.9	38.7	35.6	26.4	
Level of Service	D		C	D	D	C	
Approach Delay (s)	36.3				36.6		
Approach LOS	D				D		

Intersection Summary			
HCM Average Control Delay	34.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

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

The Creamery
16: J St. & 9th St.

Existing
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1144	163	0	0	0	0	0	0	98	480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4491									4538	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4491									4538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1144	163	0	0	0	0	0	0	98	480	0
RTOR Reduction (vph)	0	37	0	0	0	0	0	0	0	0	17	0
Lane Group Flow (vph)	0	1270	0	0	0	0	0	0	0	0	561	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		21.5									21.5	
Effective Green, g (s)		21.5									21.5	
Actuated g/C Ratio		0.43									0.43	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		1931									1951	
v/s Ratio Prot		c0.28										
v/s Ratio Perm											0.12	
v/c Ratio		0.66									0.29	
Uniform Delay, d1		11.3									9.3	
Progression Factor		1.02									0.45	
Incremental Delay, d2		1.1									0.4	
Delay (s)		12.6									4.5	
Level of Service		B									A	
Approach Delay (s)		12.6			0.0			0.0			4.5	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Existing
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	122	1118	0	0	0	0	0	571	257	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		4554						3031	1297			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		4554						3031	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	122	1118	0	0	0	0	0	571	257	0	0	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	6	19	0	0	0
Lane Group Flow (vph)	0	1214	0	0	0	0	0	591	212	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		21.5						21.5	21.5			
Effective Green, g (s)		21.5						21.5	21.5			
Actuated g/C Ratio		0.43						0.43	0.43			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		1958						1303	558			
v/s Ratio Prot								c0.19				
v/s Ratio Perm		0.27							0.16			
v/c Ratio		0.62						0.45	0.38			
Uniform Delay, d1		11.1						10.1	9.7			
Progression Factor		2.16						1.00	1.00			
Incremental Delay, d2		1.1						1.1	2.0			
Delay (s)		25.0						11.2	11.7			
Level of Service		C						B	B			
Approach Delay (s)		25.0			0.0			11.4			0.0	
Approach LOS		C			A			B			A	

Intersection Summary				
HCM Average Control Delay	19.6	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.54			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	54.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Existing (w/ LRT)
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	23	7	22	4	0	0	0	0	169	1763	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1624			1608						5741	
Flt Permitted		1.00			0.78						1.00	
Satd. Flow (perm)		1624			1310						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	23	7	22	4	0	0	0	0	169	1763	2
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	24	0	0	26	0	0	0	0	0	1934	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		140			113						4856	
v/s Ratio Prot		0.01									c0.34	
v/s Ratio Perm					c0.02							
v/c Ratio		0.17			0.23						0.40	
Uniform Delay, d1		56.3			56.6						2.4	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		2.6			4.7						0.2	
Delay (s)		58.9			61.3						2.6	
Level of Service		E			E						A	
Approach Delay (s)		58.9			61.3			0.0			2.6	
Approach LOS		E			E			A			A	

Intersection Summary				
HCM Average Control Delay	4.2	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0	
Intersection Capacity Utilization	47.5%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	200	22	4	9	0	0	0	0	42	1730	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1651						5752	
Flt Permitted		1.00			0.47						1.00	
Satd. Flow (perm)		1654			785						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	200	22	4	9	0	0	0	0	42	1730	18
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	219	0	0	13	0	0	0	0	0	1789	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		143			68						4952	
v/s Ratio Prot		c0.13									c0.31	
v/s Ratio Perm					0.02							
v/c Ratio		1.53			0.19						0.36	
Uniform Delay, d1		60.8			56.4						1.9	
Progression Factor		1.00			1.00						0.13	
Incremental Delay, d2		271.9			6.2						0.2	
Delay (s)		332.7			62.6						0.4	
Level of Service		F			E						A	
Approach Delay (s)		332.7			62.6			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	37.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		

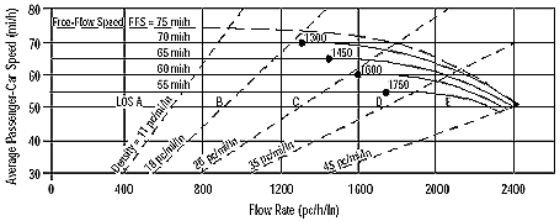
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	235	17	22	47	0	0	0	0	207	1521	23
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.35	1.00						0.99	
Satd. Flow (perm)		1661		583	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	235	17	22	47	0	0	0	0	207	1521	23
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	250	0	22	47	0	0	0	0	0	1750	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		144		50	145						4926	
v/s Ratio Prot		c0.15			0.03							
v/s Ratio Perm				0.04							0.31	
v/c Ratio		1.74		0.44	0.32						0.36	
Uniform Delay, d1		60.8		57.7	57.1						1.9	
Progression Factor		1.00		1.00	1.00						0.13	
Incremental Delay, d2		359.0		25.7	5.8						0.2	
Delay (s)		419.8		83.4	62.9						0.4	
Level of Service		F		F	E						A	
Approach Delay (s)		419.8			69.5			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	53.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Existing*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*9876*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2244*	pc/h/ln	Design LOS
S	*58.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*38.2*	pc/mi/ln	S
LOS	*E*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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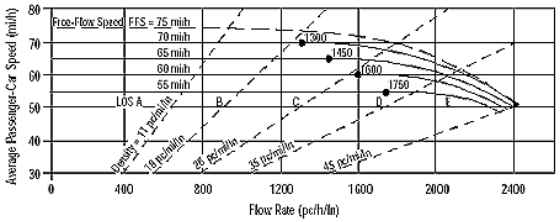

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Existing*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*7118*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1617*	pc/h/ln	Design LOS
S	*69.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*23.3*	pc/mi/ln	S
LOS	*C*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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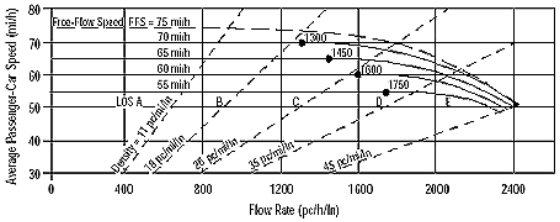

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Existing*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*6512*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1479*	pc/h/ln	Design LOS v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
S	*69.9*	mi/h	S
D = v_p / S	*21.2*	pc/mi/ln	D = v_p / S
LOS	*C*		Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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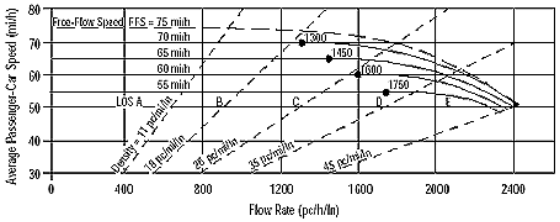

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Existing*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*8336*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1894*	pc/h/ln	Design LOS
S	*66.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*28.4*	pc/mi/ln	S
LOS	*D*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8035	0.92	Level	10	0	0.952	1.00	9170
Ramp	361	0.92	Level	10	0	0.952	1.00	412
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 1917 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9582	See Exhibit 25-7	Yes
V_{R12}	2329	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -607.6 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.684 (Exibit 25-19)

S_R= 218.7 mph (Exhibit 25-19)

S_0= 50.5 mph(Exhibit 25-19)

S= 62.1 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6735	0.92	Level	10	0	0.952	1.00	7687
Ramp	1499	0.92	Level	10	0	0.952	1.00	1711
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 1607 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9398	See Exhibit 25-7	No
V_{R12}	3318	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -600.5 (pc/ m/ln)

LOS = A (Exhibit 25-4)

Speed Estimation

M_S = -6.617 (Exibit 25-19)

S_R= 217.2 mph (Exhibit 25-19)

S_0= 54.0 mph(Exhibit 25-19)

S= 73.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6248	0.92	Level	10	0	0.952	1.00	7131
Ramp	264	0.92	Level	10	0	0.952	1.00	301
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.276 using Equation (Exhibit 25-5)

V_{12}= 1966 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7432	See Exhibit 25-7	No
V_{R12}	2267	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 21.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.338 (Exibit 25-19)

S_R= 57.2 mph (Exhibit 25-19)

S_0= 56.8 mph(Exhibit 25-19)

S= 56.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7385	0.92	Level	10	0	0.952	1.00	8429
Ramp	951	0.92	Level	10	0	0.952	1.00	1085
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.178 using Equation (Exhibit 25-5)

V_{12}= 1498 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9514	See Exhibit 25-7	Yes
V_{R12}	2583	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 23.2 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.352 (Exibit 25-19)

S_R= 56.9 mph (Exhibit 25-19)

S_0= 51.5 mph(Exhibit 25-19)

S= 52.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9876	0.92	Level	10	0	0.952	1.00	11272
Ramp	1841	0.92	Level	10	0	0.952	1.00	2101
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4485 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11272	9400	Yes
V_{12}	4485	4400:All	Yes
$V_{FO} = V_F - V_R$	9171	9400	No
V_R	2101	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 35.4 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.617 (Exhibit 25-19)

S_R= 50.8 mph (Exhibit 25-19)

S_0= 62.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 57.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7118	0.92	Level	10	0	0.952	1.00	8124
Ramp	383	0.92	Level	10	0	0.952	1.00	437
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2436 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	8124	9400	No
V_{12}	2436	4400:All	No
$V_{FO} = V_F - V_R$	7687	9400	No
V_R	437	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 17.7 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.467 (Exhibit 25-19)

S_R= 54.3 mph (Exhibit 25-19)

S_0= 64.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 60.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7738	0.92	Level	10	0	0.952	1.00	8831
Ramp	1490	0.92	Level	10	0	0.952	1.00	1701
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3555 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	8831	9400	No
V_{12}	3555	4400:All	No
$V_{FO} = V_F - V_R$	7130	9400	No
V_R	1701	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -17.4 (pc/ mi /ln)

LOS= A (Exhibit 25-4)

Speed Estimation

D_s = 0.581 (Exhibit 25-19)

S_R= 51.6 mph (Exhibit 25-19)

S_0= 64.9 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 58.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Existing

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8455	0.92	Level	10	0	0.952	1.00	9650
Ramp	1070	0.92	Level	10	0	0.952	1.00	1221
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3413 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	9650	9400	Yes
V_{12}	3413	4400:All	No
$V_{FO} = V_F - V_R$	8429	9400	No
V_R	1221	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -18.6 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.538 (Exhibit 25-19)

S_R= 52.6 mph (Exhibit 25-19)

S_0= 63.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) | S = 58.9 mph (Exhibit 25-15)

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Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	2078	92	85	178	1878
v/c Ratio	1.70	0.21	0.26	0.26	2.63
Control Delay	347.4	36.8	34.0	32.7	755.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	347.4	36.8	34.0	32.7	755.8
Queue Length 50th (ft)	~569	28	49	51	~889
Queue Length 95th (ft)	#626	54	91	79	#1004
Internal Link Dist (ft)	1459			132	
Turn Bay Length (ft)					
Base Capacity (vph)	1221	439	333	691	715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.70	0.21	0.26	0.26	2.63

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1385	267	240	503	518
v/c Ratio	1.36dr	0.61	0.72	0.72	0.72
Control Delay	112.2	44.7	49.3	42.3	42.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	112.2	44.7	49.3	42.3	42.9
Queue Length 50th (ft)	~302	90	156	163	135
Queue Length 95th (ft)	#377	111	231	206	145
Internal Link Dist (ft)	1544			132	
Turn Bay Length (ft)					
Base Capacity (vph)	1209	439	333	699	715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.15	0.61	0.72	0.72	0.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Appendix C:

Worksheets for Baseline Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	12	9	19	7	0	0	0	0	243	2527	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.94			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1579			1617						5738	
Flt Permitted		1.00			0.86						1.00	
Satd. Flow (perm)		1579			1440						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	12	9	19	7	0	0	0	0	243	2527	14
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	19	0	0	26	0	0	0	0	0	2783	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		363			331						3385	
v/s Ratio Prot		0.01									c0.49	
v/s Ratio Perm					c0.02							
v/c Ratio		0.05			0.08						0.82	
Uniform Delay, d1		15.0			15.1						8.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.3			0.5						2.4	
Delay (s)		15.3			15.6						10.5	
Level of Service		B			B						B	
Approach Delay (s)		15.3			15.6			0.0			10.5	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	247	4	6	23	5	1	1	46	2	0	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	247	4	6	23	5	1	1	46	2	0	9

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	255	34	48	11
Volume Left (vph)	4	6	1	2
Volume Right (vph)	4	5	46	9
Hadj (s)	0.03	-0.02	-0.54	-0.42
Departure Headway (s)	4.1	4.3	4.0	4.2
Degree Utilization, x	0.29	0.04	0.05	0.01
Capacity (veh/h)	865	822	834	793
Control Delay (s)	8.7	7.4	7.2	7.2
Approach Delay (s)	8.7	7.4	7.2	7.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.4		
HCM Level of Service	A		
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	196	0	0	4	17	27	1298	17	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5750				
Flt Permitted	0.76	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1266	1676			1676	1425		5750				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	82	196	0	0	4	17	27	1298	17	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	13	0	3	0	0	0	0
Lane Group Flow (vph)	82	196	0	0	4	4	0	1339	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	11.0	11.0			11.0	11.0		31.0				
Effective Green, g (s)	11.0	11.0			11.0	11.0		31.0				
Actuated g/C Ratio	0.22	0.22			0.22	0.22		0.62				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	279	369			369	314		3565				
v/s Ratio Prot		c0.12			0.00							
v/s Ratio Perm	0.06					0.00		0.23				
v/c Ratio	0.29	0.53			0.01	0.01		0.38				
Uniform Delay, d1	16.3	17.2			15.2	15.2		4.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	2.7	5.4			0.1	0.1		0.3				
Delay (s)	18.9	22.6			15.3	15.3		5.0				
Level of Service	B	C			B	B		A				
Approach Delay (s)		21.5			15.3			5.0			0.0	
Approach LOS		C			B			A			A	

Intersection Summary				
HCM Average Control Delay	7.9	HCM Level of Service	A	
HCM Volume to Capacity ratio	0.42			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	48.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	24	10	45	35	6	20	5	48	0	4	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	24	10	45	35	6	20	5	48	0	4	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)					792							
pX, platoon unblocked												
vC, conflicting volume	41			34			159	160	29	208	162	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	41			34			159	160	29	208	162	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			97	99	95	100	99	100
cM capacity (veh/h)	1568			1578			786	711	1046	696	710	1034

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	34	86	73	4
Volume Left	0	45	20	0
Volume Right	10	6	48	0
cSH	1568	1578	931	710
Volume to Capacity	0.00	0.03	0.08	0.01
Queue Length 95th (ft)	0	2	6	0
Control Delay (s)	0.0	3.9	9.2	10.1
Lane LOS		A	A	B
Approach Delay (s)	0.0	3.9	9.2	10.1
Approach LOS			A	B

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	44	3	8	84	17	4	9	13	4	7	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	44	3	8	84	17	4	9	13	4	7	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	101			47			198	196	46	206	190	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	101			47			198	196	46	206	190	92
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	99	99	99	99
cM capacity (veh/h)	1491			1560			741	688	1024	726	694	965

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	64	109	26	17
Volume Left	17	8	4	4
Volume Right	3	17	13	6
cSH	1491	1560	834	779
Volume to Capacity	0.01	0.01	0.03	0.02
Queue Length 95th (ft)	1	0	2	2
Control Delay (s)	2.0	0.6	9.5	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	2.0	0.6	9.5	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay		2.8		
Intersection Capacity Utilization		18.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	31	18	4	11	0	0	0	0	39	2434	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1593			1654						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1593			1599						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	31	18	4	11	0	0	0	0	39	2434	88
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	45	0	0	15	0	0	0	0	0	2551	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		366			368						3612	
v/s Ratio Prot		c0.03									c0.45	
v/s Ratio Perm					0.01							
v/c Ratio		0.12			0.04						0.71	
Uniform Delay, d1		15.3			15.0						6.2	
Progression Factor		1.00			1.00						0.06	
Incremental Delay, d2		0.7			0.2						0.7	
Delay (s)		15.9			15.2						1.1	
Level of Service		B			B						A	
Approach Delay (s)		15.9			15.2			0.0			1.1	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay		1.4	HCM Level of Service	A
HCM Volume to Capacity ratio		0.55		
Actuated Cycle Length (s)		50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization		56.5%	ICU Level of Service	B
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	39	0	0	90	12	31	57	41	10	0	47
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	39	0	0	90	12	31	57	41	10	0	47

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	41	102	31	98	57
Volume Left (vph)	2	0	31	0	10
Volume Right (vph)	0	12	0	41	47
Hadj (s)	0.04	-0.04	0.53	-0.26	-0.43
Departure Headway (s)	4.5	4.3	5.4	4.6	4.1
Degree Utilization, x	0.05	0.12	0.05	0.13	0.06
Capacity (veh/h)	764	796	642	751	850
Control Delay (s)	7.7	7.9	7.5	7.1	7.3
Approach Delay (s)	7.7	7.9	7.2		7.3
Approach LOS	A	A	A		A

Intersection Summary				
Delay			7.5	
HCM Level of Service			A	
Intersection Capacity Utilization			23.2%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	85	0	0	93	18	1	0	1	8	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	85	0	0	93	18	1	0	1	8	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	111			85			220	218	85	210	209	102
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	111			85			220	218	85	210	209	102
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	99	100	99
cM capacity (veh/h)	1479			1512			723	675	974	742	683	953

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	96	111	2	19
Volume Left	11	0	1	8
Volume Right	0	18	1	11
cSH	1479	1700	830	851
Volume to Capacity	0.01	0.07	0.00	0.02
Queue Length 95th (ft)	1	0	0	2
Control Delay (s)	0.9	0.0	9.3	9.3
Lane LOS	A		A	A
Approach Delay (s)	0.9	0.0	9.3	9.3
Approach LOS			A	A

Intersection Summary				
Average Delay			1.2	
Intersection Capacity Utilization			22.3%	ICU Level of Service A
Analysis Period (min)			15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	63	25	11	61	0	0	0	0	169	2222	46
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.70	1.00						1.00	
Satd. Flow (perm)		1612		1173	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	63	25	11	61	0	0	0	0	169	2222	46
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	82	0	11	61	0	0	0	0	0	2432	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		371		270	385						3611	
v/s Ratio Prot		c0.05			0.04							
v/s Ratio Perm				0.01							0.42	
v/c Ratio		0.22		0.04	0.16						0.67	
Uniform Delay, d1		15.6		15.0	15.4						5.9	
Progression Factor		1.00		1.00	1.00						0.02	
Incremental Delay, d2		1.4		0.3	0.9						0.7	
Delay (s)		17.0		15.2	16.3						0.8	
Level of Service		B		B	B						A	
Approach Delay (s)		17.0			16.1			0.0			0.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	1.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	265	97	0	0	0	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5				3.5
Lane Util. Factor	0.97	1.00				1.00
Frt	1.00	0.85				1.00
Flt Protected	0.95	1.00				1.00
Satd. Flow (prot)	3090	1425				1676
Flt Permitted	0.95	1.00				1.00
Satd. Flow (perm)	3090	1425				1676
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	265	97	0	0	0	415
RTOR Reduction (vph)	151	55	0	0	0	0
Lane Group Flow (vph)	114	42	0	0	0	415
Turn Type		Prot				
Protected Phases	2	2				1
Permitted Phases						
Actuated Green, G (s)	21.5	21.5				21.5
Effective Green, g (s)	21.5	21.5				21.5
Actuated g/C Ratio	0.43	0.43				0.43
Clearance Time (s)	3.5	3.5				3.5
Lane Grp Cap (vph)	1329	613				721
v/s Ratio Prot	c0.04	0.03				c0.25
v/s Ratio Perm						
v/c Ratio	0.09	0.07				0.58
Uniform Delay, d1	8.4	8.4				10.8
Progression Factor	1.00	1.00				1.00
Incremental Delay, d2	0.1	0.2				3.3
Delay (s)	8.6	8.6				14.1
Level of Service	A	A				B
Approach Delay (s)	8.6		0.0			14.1
Approach LOS	A		A			B

Intersection Summary			
HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	430	52	197	216	0	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				
Lane Util. Factor					0.91		1.00	0.95				
Frt					0.98		1.00	1.00				
Flt Protected					1.00		0.95	1.00				
Satd. Flow (prot)					4503		1593	3185				
Flt Permitted					1.00		0.95	1.00				
Satd. Flow (perm)					4503		1593	3185				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	430	52	197	216	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	21	0	100	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	461	0	97	216	0	0	0	0
Turn Type							Perm					
Protected Phases					2			1				
Permitted Phases							1					
Actuated Green, G (s)					29.5		35.5	35.5				
Effective Green, g (s)					29.5		35.5	35.5				
Actuated g/C Ratio					0.41		0.49	0.49				
Clearance Time (s)					3.5		3.5	3.5				
Lane Grp Cap (vph)					1845		785	1570				
v/s Ratio Prot					c0.10			c0.07				
v/s Ratio Perm							0.06					
v/c Ratio					0.25		0.12	0.14				
Uniform Delay, d1					14.0		9.9	9.9				
Progression Factor					1.00		1.00	1.00				
Incremental Delay, d2					0.3		0.3	0.2				
Delay (s)					14.3		10.2	10.1				
Level of Service					B		B	B				
Approach Delay (s)		0.0			14.3			10.1			0.0	
Approach LOS		A			B			B			A	

Intersection Summary				
HCM Average Control Delay	12.4	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.19			
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	31.7%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	825	124	198	685	0	0	0	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					0.86		0.97	0.95				0.88
Frt					0.98		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5654		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5654		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	825	124	198	685	0	0	0	20
RTOR Reduction (vph)	0	0	0	0	54	0	150	0	0	0	0	18
Lane Group Flow (vph)	0	0	0	0	895	0	48	685	0	0	0	2
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					21.0		12.0	12.0				5.0
Effective Green, g (s)					21.0		12.0	12.0				5.0
Actuated g/C Ratio					0.42		0.24	0.24				0.10
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2375		742	764				251
v/s Ratio Prot					c0.16		0.02	c0.22				c0.00
v/s Ratio Perm												
v/c Ratio					0.38		0.06	0.90				0.01
Uniform Delay, d1					10.0		14.7	18.4				20.3
Progression Factor					0.20		1.00	1.00				1.00
Incremental Delay, d2					0.4		0.2	15.4				0.1
Delay (s)					2.4		14.8	33.8				20.3
Level of Service					A		B	C				C
Approach Delay (s)		0.0			2.4			29.5			20.3	
Approach LOS		A			A			C			C	

Intersection Summary				
HCM Average Control Delay	15.5	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.49			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	43.3%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	141	858	0	0	0	0	0	175	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.92	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4234	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4234	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	141	858	0	0	0	0	0	175	175
RTOR Reduction (vph)	0	0	0	80	0	0	0	0	0	0	44	0
Lane Group Flow (vph)	0	0	0	61	858	0	0	0	0	0	306	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				21.5	21.5						21.5	
Effective Green, g (s)				21.5	21.5						21.5	
Actuated g/C Ratio				0.43	0.43						0.43	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				685	1968						1821	
v/s Ratio Prot					c0.19						c0.07	
v/s Ratio Perm				0.04								
v/c Ratio				0.09	0.44						0.17	
Uniform Delay, d1				8.4	10.0						8.8	
Progression Factor				6.05	1.88						1.00	
Incremental Delay, d2				0.2	0.6						0.2	
Delay (s)				51.3	19.5						9.0	
Level of Service				D	B						A	
Approach Delay (s)		0.0			24.0			0.0			9.0	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	882	109	138	382	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4501			4517				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4501			4517				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	882	109	138	382	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	31	0	0	38	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	960	0	0	482	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					21.0			21.5				
Effective Green, g (s)					21.0			21.5				
Actuated g/C Ratio					0.42			0.43				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					1890			1942				
v/s Ratio Prot					c0.21							
v/s Ratio Perm								0.11				
v/c Ratio					0.51			0.25				
Uniform Delay, d1					10.7			9.1				
Progression Factor					1.00			1.56				
Incremental Delay, d2					1.0			0.3				
Delay (s)					11.7			14.4				
Level of Service					B			B				
Approach Delay (s)		0.0			11.7			14.4			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
15: J St. & 3rd St.

Baseline
AM Peak

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	1371	459	88	120	106	1635	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.97	1.00	0.76	
Frt	0.96		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	5550		2508	3090	1676	3249	
Flt Permitted	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	5550		2508	3090	1676	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1371	459	88	120	106	1635	210
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1830	0	88	120	106	1845	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	31.0		11.0	11.0	11.0	46.0	
Effective Green, g (s)	31.0		11.0	11.0	11.0	46.0	
Actuated g/C Ratio	0.31		0.11	0.11	0.11	0.46	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	1721		276	340	184	1495	
v/s Ratio Prot	c0.33				c0.06	c0.57	
v/s Ratio Perm			0.04	0.04			
v/c Ratio	1.06		0.32	0.35	0.58	1.23	
Uniform Delay, d1	34.5		41.0	41.2	42.3	27.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	40.8		3.0	2.9	12.5	111.4	
Delay (s)	75.3		44.1	44.1	54.8	138.4	
Level of Service	E		D	D	D	F	
Approach Delay (s)	75.3				49.1		
Approach LOS	E				D		

Intersection Summary			
HCM Average Control Delay	102.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
16: J St. & 9th St.

Baseline
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1392	162	0	0	0	0	0	0	71	265	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4505									4529	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4505									4529	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1392	162	0	0	0	0	0	0	71	265	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1540	0	0	0	0	0	0	0	0	326	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		46.5									46.5	
Effective Green, g (s)		46.5									46.5	
Actuated g/C Ratio		0.46									0.46	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		2095									2106	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.07	
v/c Ratio		0.73									0.15	
Uniform Delay, d1		21.7									15.4	
Progression Factor		0.16									1.14	
Incremental Delay, d2		0.2									0.2	
Delay (s)		3.7									17.7	
Level of Service		A									B	
Approach Delay (s)		3.7			0.0			0.0			17.7	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	274	1224	0	0	0	0	0	427	165	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4535						3034	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4535						3034	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	274	1224	0	0	0	0	0	427	165	0	0	0
RTOR Reduction (vph)	0	36	0	0	0	0	0	3	17	0	0	0
Lane Group Flow (vph)	0	1462	0	0	0	0	0	441	131	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		46.5						46.5	46.5			
Effective Green, g (s)		46.5						46.5	46.5			
Actuated g/C Ratio		0.46						0.46	0.46			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		2109						1411	603			
v/s Ratio Prot								c0.15				
v/s Ratio Perm		0.32							0.10			
v/c Ratio		0.69						0.31	0.22			
Uniform Delay, d1		21.1						16.7	15.9			
Progression Factor		0.19						1.00	1.00			
Incremental Delay, d2		1.4						0.6	0.8			
Delay (s)		5.4						17.3	16.8			
Level of Service		A						B	B			
Approach Delay (s)		5.4			0.0			17.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	8.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	12	9	19	7	0	0	0	0	243	2527	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.94			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1579			1617						5738	
Flt Permitted		1.00			0.82						1.00	
Satd. Flow (perm)		1579			1369						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	12	9	19	7	0	0	0	0	243	2527	14
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	13	0	0	26	0	0	0	0	0	2784	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		137			118						4854	
v/s Ratio Prot		0.01									c0.49	
v/s Ratio Perm					c0.02							
v/c Ratio		0.09			0.22						0.57	
Uniform Delay, d1		55.9			56.6						3.1	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		1.3			4.3						0.5	
Delay (s)		57.3			60.8						3.6	
Level of Service		E			E						A	
Approach Delay (s)		57.3			60.8			0.0			3.6	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	4.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	31	18	4	11	0	0	0	0	39	2434	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1593			1654						5733	
Flt Permitted		1.00			0.94						1.00	
Satd. Flow (perm)		1593			1581						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	31	18	4	11	0	0	0	0	39	2434	88
RTOR Reduction (vph)	0	16	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	33	0	0	15	0	0	0	0	0	2557	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		138			137						4936	
v/s Ratio Prot		c0.02									c0.45	
v/s Ratio Perm					0.01							
v/c Ratio		0.24			0.11						0.52	
Uniform Delay, d1		56.7			56.0						2.3	
Progression Factor		1.00			1.00						0.06	
Incremental Delay, d2		4.1			1.6						0.3	
Delay (s)		60.8			57.6						0.5	
Level of Service		E			E						A	
Approach Delay (s)		60.8			57.6			0.0			0.5	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	1.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	63	25	11	61	0	0	0	0	169	2222	46
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.53	1.00						1.00	
Satd. Flow (perm)		1612		893	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	63	25	11	61	0	0	0	0	169	2222	46
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	77	0	11	61	0	0	0	0	0	2435	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		139		77	145						4934	
v/s Ratio Prot		c0.05			0.04							
v/s Ratio Perm				0.01							0.42	
v/c Ratio		0.55		0.14	0.42						0.49	
Uniform Delay, d1		58.3		56.2	57.6						2.2	
Progression Factor		1.00		1.00	1.00						0.02	
Incremental Delay, d2		15.0		3.9	8.7						0.3	
Delay (s)		73.3		60.0	66.3						0.3	
Level of Service		E		E	E						A	
Approach Delay (s)		73.3			65.4			0.0			0.3	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	4.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	25	7	22	4	0	0	0	0	180	1763	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1627			1608						5737	
Flt Permitted		1.00			0.83						1.00	
Satd. Flow (perm)		1627			1394						5737	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	25	7	22	4	0	0	0	0	180	1763	7
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	27	0	0	26	0	0	0	0	0	1949	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		374			321						3385	
v/s Ratio Prot		0.02									c0.34	
v/s Ratio Perm					c0.02							
v/c Ratio		0.07			0.08						0.58	
Uniform Delay, d1		15.1			15.1						6.4	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.4			0.5						0.7	
Delay (s)		15.4			15.6						7.1	
Level of Service		B			B						A	
Approach Delay (s)		15.4			15.6			0.0			7.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	99	7	3	16	0	2	2	218	10	0	4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	99	7	3	16	0	2	2	218	10	0	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	107	19	222	14
Volume Left (vph)	1	3	2	10
Volume Right (vph)	7	0	218	4
Hadj (s)	0.00	0.07	-0.55	0.01
Departure Headway (s)	4.4	4.6	3.7	4.4
Degree Utilization, x	0.13	0.02	0.23	0.02
Capacity (veh/h)	779	735	950	772
Control Delay (s)	8.0	7.7	7.7	7.5
Approach Delay (s)	8.0	7.7	7.7	7.5
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.8		
HCM Level of Service	A		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	283	119	0	0	11	172	9	4504	9	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5765				
Flt Permitted	0.75	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1258	1676			1676	1425		5765				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	283	119	0	0	11	172	9	4504	9	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	283	119	0	0	11	172	0	4522	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	21.0	21.0			21.0	21.0		71.0				
Effective Green, g (s)	21.0	21.0			21.0	21.0		71.0				
Actuated g/C Ratio	0.21	0.21			0.21	0.21		0.71				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	264	352			352	299		4093				
v/s Ratio Prot		0.07			0.01							
v/s Ratio Perm	c0.22					0.12		0.78				
v/c Ratio	1.07	0.34			0.03	0.58		1.10				
Uniform Delay, d1	39.5	33.6			31.4	35.5		14.5				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	75.8	2.6			0.2	7.8		51.4				
Delay (s)	115.3	36.2			31.6	43.3		65.9				
Level of Service	F	D			C	D		E				
Approach Delay (s)		91.9			42.6			65.9			0.0	
Approach LOS		F			D			E			A	

Intersection Summary			
HCM Average Control Delay	67.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	112.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	125	16	11	10	0	4	0	118	3	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	125	16	11	10	0	4	0	118	3	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)					792							
pX, platoon unblocked												
vC, conflicting volume	10			141			165	165	133	283	173	10
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	10			141			165	165	133	283	173	10
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	87	99	100	100
cM capacity (veh/h)	1610			1442			795	722	916	580	715	1071

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	141	21	122	3
Volume Left	0	11	4	3
Volume Right	16	0	118	0
cSH	1610	1442	912	580
Volume to Capacity	0.00	0.01	0.13	0.01
Queue Length 95th (ft)	0	1	12	0
Control Delay (s)	0.0	4.0	9.6	11.2
Lane LOS		A	A	B
Approach Delay (s)	0.0	4.0	9.6	11.2
Approach LOS			A	B

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	26.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	220	13	6	16	5	1	15	6	4	10	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	220	13	6	16	5	1	15	6	4	10	6
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	21			233			304	296	226	306	300	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	21			233			304	296	226	306	300	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	98	99	99	98	99
cM capacity (veh/h)	1595			1335			629	606	813	621	603	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	251	27	22	20
Volume Left	18	6	1	4
Volume Right	13	5	6	6
cSH	1595	1335	653	697
Volume to Capacity	0.01	0.00	0.03	0.03
Queue Length 95th (ft)	1	0	3	2
Control Delay (s)	0.6	1.7	10.7	10.3
Lane LOS	A	A	B	B
Approach Delay (s)	0.6	1.7	10.7	10.3
Approach LOS			B	B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	26.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	200	22	4	9	0	0	0	0	42	1735	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1651						5752	
Flt Permitted		1.00			0.92						1.00	
Satd. Flow (perm)		1654			1542						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	200	22	4	9	0	0	0	0	42	1735	18
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	214	0	0	13	0	0	0	0	0	1792	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		380			355						3624	
v/s Ratio Prot		c0.13									c0.31	
v/s Ratio Perm					0.01							
v/c Ratio		0.56			0.04						0.49	
Uniform Delay, d1		17.0			14.9						5.0	
Progression Factor		1.00			1.00						0.09	
Incremental Delay, d2		5.9			0.2						0.4	
Delay (s)		23.0			15.1						0.9	
Level of Service		C			B						A	
Approach Delay (s)		23.0			15.1			0.0			0.9	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	102	0	0	56	6	17	111	141	3	0	20
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	102	0	0	56	6	17	111	141	3	0	20

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	106	62	17	252	23
Volume Left (vph)	4	0	17	0	3
Volume Right (vph)	0	6	0	141	20
Hadj (s)	0.04	-0.02	0.53	-0.36	-0.46
Departure Headway (s)	4.7	4.7	5.5	4.6	4.3
Degree Utilization, x	0.14	0.08	0.03	0.32	0.03
Capacity (veh/h)	714	712	637	762	789
Control Delay (s)	8.5	8.1	7.4	8.5	7.4
Approach Delay (s)	8.5	8.1	8.4		7.4
Approach LOS	A	A	A		A

Intersection Summary				
Delay		8.4		
HCM Level of Service		A		
Intersection Capacity Utilization		32.3%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	230	0	0	59	9	0	0	3	12	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	230	0	0	59	9	0	0	3	12	0	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	68			230			334	332	230	330	328	64
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			230			334	332	230	330	328	64
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	98	100	99
cM capacity (veh/h)	1533			1338			610	581	809	615	585	1001

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	68	3	19
Volume Left	17	0	0	12
Volume Right	0	9	3	7
cSH	1533	1700	809	717
Volume to Capacity	0.01	0.04	0.00	0.03
Queue Length 95th (ft)	1	0	0	2
Control Delay (s)	0.6	0.0	9.5	10.2
Lane LOS	A		A	B
Approach Delay (s)	0.6	0.0	9.5	10.2
Approach LOS			A	B

Intersection Summary				
Average Delay		1.1		
Intersection Capacity Utilization		35.7%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	235	17	22	47	0	0	0	0	207	1526	23
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.46	1.00						0.99	
Satd. Flow (perm)		1661		768	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	235	17	22	47	0	0	0	0	207	1526	23
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	247	0	22	47	0	0	0	0	0	1753	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		382		177	385						3605	
v/s Ratio Prot		c0.15			0.03							
v/s Ratio Perm				0.03							0.31	
v/c Ratio		0.65		0.12	0.12						0.49	
Uniform Delay, d1		17.4		15.3	15.3						4.9	
Progression Factor		1.00		1.00	1.00						0.05	
Incremental Delay, d2		8.2		1.4	0.6						0.4	
Delay (s)		25.6		16.7	15.9						0.7	
Level of Service		C		B	B						A	
Approach Delay (s)		25.6			16.2			0.0			0.7	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	4.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	366	324	0	0	0	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5				3.5
Lane Util. Factor	0.97	1.00				1.00
Frt	1.00	0.85				1.00
Flt Protected	0.95	1.00				1.00
Satd. Flow (prot)	3090	1425				1676
Flt Permitted	0.95	1.00				1.00
Satd. Flow (perm)	3090	1425				1676
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	366	324	0	0	0	405
RTOR Reduction (vph)	209	185	0	0	0	0
Lane Group Flow (vph)	157	139	0	0	0	405
Turn Type		Prot				
Protected Phases	2	2				1
Permitted Phases						
Actuated Green, G (s)	21.5	21.5				21.5
Effective Green, g (s)	21.5	21.5				21.5
Actuated g/C Ratio	0.43	0.43				0.43
Clearance Time (s)	3.5	3.5				3.5
Lane Grp Cap (vph)	1329	613				721
v/s Ratio Prot	0.05	c0.10				c0.24
v/s Ratio Perm						
v/c Ratio	0.12	0.23				0.56
Uniform Delay, d1	8.6	9.0				10.7
Progression Factor	1.00	1.00				1.00
Incremental Delay, d2	0.2	0.9				3.1
Delay (s)	8.7	9.9				13.9
Level of Service	A	A				B
Approach Delay (s)	9.3		0.0			13.9
Approach LOS	A		A			B

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	339	23	132	334	0	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				
Lane Util. Factor					0.91		1.00	0.95				
Frt					0.99		1.00	1.00				
Flt Protected					1.00		0.95	1.00				
Satd. Flow (prot)					4533		1593	3185				
Flt Permitted					1.00		0.95	1.00				
Satd. Flow (perm)					4533		1593	3185				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	339	23	132	334	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	67	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	353	0	65	334	0	0	0	0
Turn Type							Perm					
Protected Phases					2			1				
Permitted Phases							1					
Actuated Green, G (s)					33.5		39.5	39.5				
Effective Green, g (s)					33.5		39.5	39.5				
Actuated g/C Ratio					0.42		0.49	0.49				
Clearance Time (s)					3.5		3.5	3.5				
Lane Grp Cap (vph)					1898		787	1573				
v/s Ratio Prot					c0.08			c0.10				
v/s Ratio Perm							0.04					
v/c Ratio					0.19		0.08	0.21				
Uniform Delay, d1					14.7		10.7	11.5				
Progression Factor					1.00		1.00	1.00				
Incremental Delay, d2					0.2		0.2	0.3				
Delay (s)					14.9		10.9	11.8				
Level of Service					B		B	B				
Approach Delay (s)		0.0			14.9			11.5			0.0	
Approach LOS		A			B			B			A	

Intersection Summary				
HCM Average Control Delay	13.0	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.20			
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.0	
Intersection Capacity Utilization	31.7%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	2768	37	444	322	0	0	0	69
Ideal Flow (vphpl)	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					0.86		0.97	0.95				0.88
Frt					1.00		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5756		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5756		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2768	37	444	322	0	0	0	69
RTOR Reduction (vph)	0	0	0	0	2	0	189	0	0	0	0	59
Lane Group Flow (vph)	0	0	0	0	2803	0	255	322	0	0	0	10
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					46.0		28.0	28.0				14.0
Effective Green, g (s)					46.0		28.0	28.0				14.0
Actuated g/C Ratio					0.46		0.28	0.28				0.14
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2648		865	892				351
v/s Ratio Prot					c0.49		0.08	c0.10				c0.00
v/s Ratio Perm												
v/c Ratio					1.06		0.29	0.36				0.03
Uniform Delay, d1					27.0		28.2	28.8				37.1
Progression Factor					1.33		1.00	1.00				1.00
Incremental Delay, d2					35.1		0.9	1.1				0.1
Delay (s)					71.1		29.1	30.0				37.3
Level of Service					E		C	C				D
Approach Delay (s)		0.0			71.1			29.5			37.3	
Approach LOS		A			E			C			D	

Intersection Summary				
HCM Average Control Delay	61.7	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	72.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	218	1403	0	0	0	0	0	340	301
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.93	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4254	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4254	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	218	1403	0	0	0	0	0	340	301
RTOR Reduction (vph)	0	0	0	64	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	154	1403	0	0	0	0	0	631	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.5	46.5						46.5	
Effective Green, g (s)				46.5	46.5						46.5	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				741	2128						1978	
v/s Ratio Prot					c0.31						c0.15	
v/s Ratio Perm				0.10								
v/c Ratio				0.21	0.66						0.32	
Uniform Delay, d1				15.8	20.6						16.8	
Progression Factor				2.67	1.65						1.00	
Incremental Delay, d2				0.5	1.2						0.4	
Delay (s)				42.7	35.2						17.2	
Level of Service				D	D						B	
Approach Delay (s)		0.0			36.2			0.0			17.2	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1453	75	221	484	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4543			4506				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4543			4506				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1453	75	221	484	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1523	0	0	697	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					46.0			46.5				
Effective Green, g (s)					46.0			46.5				
Actuated g/C Ratio					0.46			0.46				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					2090			2095				
v/s Ratio Prot					c0.34							
v/s Ratio Perm								0.15				
v/c Ratio					0.73			0.33				
Uniform Delay, d1					21.9			16.9				
Progression Factor					1.00			0.87				
Incremental Delay, d2					2.3			0.4				
Delay (s)					24.2			15.1				
Level of Service					C			B				
Approach Delay (s)		0.0			24.2			15.1			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	21.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
15: J St. & 3rd St.

Baseline
PM Peak

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	916	411	200	234	390	343	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.95		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	5499		2508	1449	3039	3249	
Flt Permitted	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	5499		2508	1449	3039	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	916	411	200	234	390	343	54
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1327	0	200	201	423	397	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	30.0		25.0	25.0	25.0	33.0	
Effective Green, g (s)	30.0		25.0	25.0	25.0	33.0	
Actuated g/C Ratio	0.30		0.25	0.25	0.25	0.33	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	1650		627	362	760	1072	
v/s Ratio Prot	c0.24					c0.12	
v/s Ratio Perm			0.08	0.14	0.14		
v/c Ratio	0.94dr		0.32	0.56	0.56	0.37	
Uniform Delay, d1	32.3		30.6	32.7	32.7	25.6	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.3		1.3	6.0	2.9	1.0	
Delay (s)	36.6		31.9	38.7	35.6	26.6	
Level of Service	D		C	D	D	C	
Approach Delay (s)	36.6				36.6		
Approach LOS	D				D		

Intersection Summary			
HCM Average Control Delay	34.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.8%	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

The Creamery
16: J St. & 9th St.

Baseline
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1170	163	0	0	0	0	0	0	98	480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4493									4538	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4493									4538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1170	163	0	0	0	0	0	0	98	480	0
RTOR Reduction (vph)	0	36	0	0	0	0	0	0	0	0	15	0
Lane Group Flow (vph)	0	1297	0	0	0	0	0	0	0	0	563	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		21.5									21.5	
Effective Green, g (s)		21.5									21.5	
Actuated g/C Ratio		0.43									0.43	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		1932									1951	
v/s Ratio Prot		c0.29										
v/s Ratio Perm											0.12	
v/c Ratio		0.67									0.29	
Uniform Delay, d1		11.4									9.3	
Progression Factor		0.75									0.45	
Incremental Delay, d2		1.2									0.4	
Delay (s)		9.8									4.5	
Level of Service		A									A	
Approach Delay (s)		9.8			0.0			0.0			4.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Baseline
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	1133	0	0	0	0	0	571	257	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4553						3031	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4553						3031	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	133	1133	0	0	0	0	0	571	257	0	0	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	6	18	0	0	0
Lane Group Flow (vph)	0	1237	0	0	0	0	0	591	213	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		21.5						21.5	21.5			
Effective Green, g (s)		21.5						21.5	21.5			
Actuated g/C Ratio		0.43						0.43	0.43			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		1958						1303	558			
v/s Ratio Prot								c0.19				
v/s Ratio Perm		0.27							0.16			
v/c Ratio		0.63						0.45	0.38			
Uniform Delay, d1		11.2						10.1	9.7			
Progression Factor		2.16						1.00	1.00			
Incremental Delay, d2		1.2						1.1	2.0			
Delay (s)		25.3						11.2	11.7			
Level of Service		C						B	B			
Approach Delay (s)		25.3			0.0			11.4			0.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Baseline (w/ LRT)
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	25	7	22	4	0	0	0	0	180	1763	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1627			1608						5737	
Flt Permitted		1.00			0.78						1.00	
Satd. Flow (perm)		1627			1308						5737	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	25	7	22	4	0	0	0	0	180	1763	7
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	26	0	0	26	0	0	0	0	0	1950	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		141			113						4853	
v/s Ratio Prot		0.02									c0.34	
v/s Ratio Perm					c0.02							
v/c Ratio		0.18			0.23						0.40	
Uniform Delay, d1		56.4			56.6						2.4	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		2.8			4.7						0.2	
Delay (s)		59.2			61.3						2.6	
Level of Service		E			E						A	
Approach Delay (s)		59.2			61.3			0.0			2.6	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	4.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	200	22	4	9	0	0	0	0	42	1735	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1651						5752	
Flt Permitted		1.00			0.47						1.00	
Satd. Flow (perm)		1654			785						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	200	22	4	9	0	0	0	0	42	1735	18
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	219	0	0	13	0	0	0	0	0	1794	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		143			68						4952	
v/s Ratio Prot		c0.13									c0.31	
v/s Ratio Perm					0.02							
v/c Ratio		1.53			0.19						0.36	
Uniform Delay, d1		60.8			56.4						1.9	
Progression Factor		1.00			1.00						0.13	
Incremental Delay, d2		271.9			6.2						0.2	
Delay (s)		332.7			62.6						0.4	
Level of Service		F			E						A	
Approach Delay (s)		332.7			62.6			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	37.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

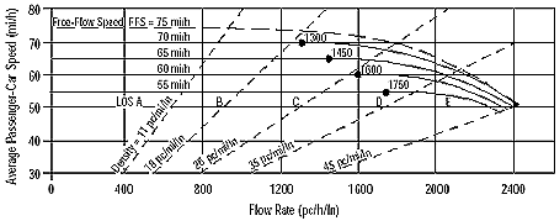
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	235	17	22	47	0	0	0	0	207	1526	23
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.35	1.00						0.99	
Satd. Flow (perm)		1661		583	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	235	17	22	47	0	0	0	0	207	1526	23
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	250	0	22	47	0	0	0	0	0	1755	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		144		50	145						4926	
v/s Ratio Prot		c0.15			0.03							
v/s Ratio Perm				0.04							0.31	
v/c Ratio		1.74		0.44	0.32						0.36	
Uniform Delay, d1		60.8		57.7	57.1						1.9	
Progression Factor		1.00		1.00	1.00						0.13	
Incremental Delay, d2		359.0		25.7	5.8						0.2	
Delay (s)		419.8		83.4	62.9						0.4	
Level of Service		F		F	E						A	
Approach Delay (s)		419.8			69.5			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	53.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Baseline*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*9880*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2244*	pc/h/ln	Design LOS
S	*58.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*38.2*	pc/mi/ln	S
LOS	*E*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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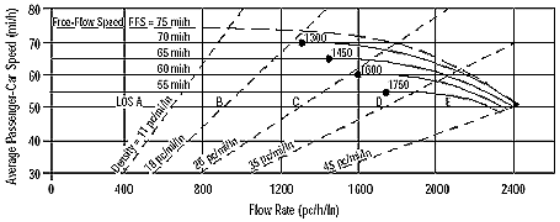
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Baseline*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*7132*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1620*	pc/h/ln	Design LOS v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
S	*69.3*	mi/h	S
D = v_p / S	*23.4*	pc/mi/ln	D = v_p / S
LOS	*C*		Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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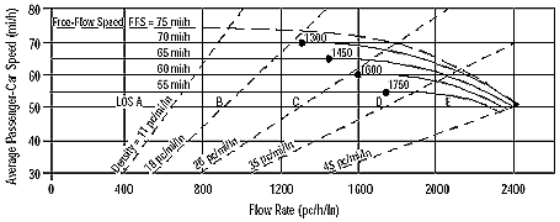
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Baseline*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*6524*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			Calc Speed Adj and FFS	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			Design (N)
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1482*	pc/h/ln	Design LOS
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*21.2*	pc/mi/ln	S
LOS	*C*		D = v_p / S
			Required Number of Lanes, N

Glossary		Factor Location
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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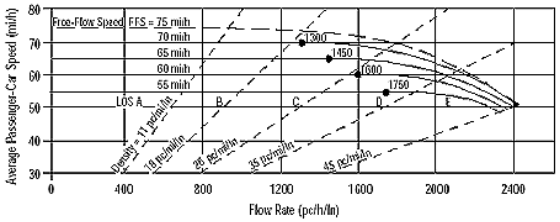
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Baseline*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*8343*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1895*	pc/h/ln	Design LOS
S	*66.6*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*28.4*	pc/mi/ln	S
LOS	*D*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8035	0.92	Level	10	0	0.952	1.00	9170
Ramp	372	0.92	Level	10	0	0.952	1.00	425
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 1917 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9595	See Exhibit 25-7	Yes
V_{R12}	2342	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -607.5 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.684 (Exibit 25-19)

S_R= 218.7 mph (Exhibit 25-19)

S_0= 50.5 mph(Exhibit 25-19)

S= 62.2 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6735	0.92	Level	10	0	0.952	1.00	7687
Ramp	1505	0.92	Level	10	0	0.952	1.00	1718
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 1607 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9405	See Exhibit 25-7	Yes
V_{R12}	3325	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -600.5 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.616 (Exibit 25-19)

S_R= 217.2 mph (Exhibit 25-19)

S_0= 54.0 mph(Exhibit 25-19)

S= 73.6 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6248	0.92	Level	10	0	0.952	1.00	7131
Ramp	276	0.92	Level	10	0	0.952	1.00	315
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.274 using Equation (Exhibit 25-5)

V_{12}= 1954 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7446	See Exhibit 25-7	No
V_{R12}	2269	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 21.1 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.338 (Exibit 25-19)

S_R= 57.2 mph (Exhibit 25-19)

S_0= 56.7 mph(Exhibit 25-19)

S= 56.9 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7385	0.92	Level	10	0	0.952	1.00	8429
Ramp	958	0.92	Level	10	0	0.952	1.00	1093
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.177 using Equation (Exhibit 25-5)

V_{12}= 1490 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9522	See Exhibit 25-7	Yes
V_{R12}	2583	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 23.2 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.352 (Exibit 25-19)

S_R= 56.9 mph (Exhibit 25-19)

S_0= 51.5 mph(Exhibit 25-19)

S= 52.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9880	0.92	Level	10	0	0.952	1.00	11276
Ramp	1845	0.92	Level	10	0	0.952	1.00	2106
UpStream								
DownStream								

Estimation of v_{12} — Merge Areas

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Estimation of v_{12} — Diverge Areas

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4490 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11276	9400	Yes
V_{12}	4490	4400:All	Yes
$V_{FO} = V_F - V_R$	9170	9400	No
V_R	2106	3800	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 35.4 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Speed Estimation

D_s = 0.618 (Exhibit 25-19)

S_R= 50.8 mph (Exhibit 25-19)

S_0= 62.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 57.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7132	0.92	Level	10	0	0.952	1.00	8140
Ramp	397	0.92	Level	10	0	0.952	1.00	453
UpStream								
DownStream								

Estimation of v_{12} — Merge Areas

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Estimation of v_{12} — Diverge Areas

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2452 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	8140	9400	No
V_{12}	2452	4400:All	No
$V_{FO} = V_F - V_R$	7687	9400	No
V_R	453	3800	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 17.9 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Speed Estimation

D_s = 0.469 (Exhibit 25-19)

S_R= 54.2 mph (Exhibit 25-19)

S_0= 64.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) | S = 60.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7740	0.92	Level	10	0	0.952	1.00	8834
Ramp	1497	0.92	Level	10	0	0.952	1.00	1709
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3561 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	8834	9400	No
V_{12}	3561	4400:All	No
$V_{FO} = V_F - V_R$	7125	9400	No
V_R	1709	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -17.3 (pc/ mi /ln)

LOS= A (Exhibit 25-4)

Speed Estimation

D_s = 0.582 (Exhibit 25-19)

S_R= 51.6 mph (Exhibit 25-19)

S_0= 64.9 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 58.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8467	0.92	Level	10	0	0.952	1.00	9663
Ramp	1082	0.92	Level	10	0	0.952	1.00	1235
UpStream								
DownStream								

Estimation of v_{12}

Merge Areas

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Diverge Areas

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3426 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	9663	9400	Yes
V_{12}	3426	4400:All	No
$V_{FO} = V_F - V_R$	8428	9400	No
V_R	1235	3800	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -18.5 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

D_s = 0.539 (Exhibit 25-19)

S_R= 52.6 mph (Exhibit 25-19)

S_0= 63.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 58.9 mph (Exhibit 25-15)

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Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1989	96	79	166	2005
v/c Ratio	1.63	0.22	0.24	0.24	2.80
Control Delay	315.7	36.9	33.7	32.5	834.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	315.7	36.9	33.7	32.5	834.5
Queue Length 50th (ft)	~534	30	45	47	~964
Queue Length 95th (ft)	#611	56	90	78	#1079
Internal Link Dist (ft)	967			189	
Turn Bay Length (ft)					
Base Capacity (vph)	1221	439	333	691	715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.63	0.22	0.24	0.24	2.80

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1443	217	218	460	432
v/c Ratio	1.40dr	0.49	0.65	0.66	0.60
Control Delay	130.6	41.7	45.5	40.2	39.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	130.6	41.7	45.5	40.2	39.2
Queue Length 50th (ft)	~325	71	139	146	109
Queue Length 95th (ft)	#399	113	229	204	152
Internal Link Dist (ft)	1230			272	
Turn Bay Length (ft)					
Base Capacity (vph)	1210	439	333	699	715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.19	0.49	0.65	0.66	0.60

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Appendix D:

Worksheets for
Baseline plus Proposed Project Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	30	9	19	7	0	0	0	0	243	2527	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1624			1617						5736	
Flt Permitted		1.00			0.85						1.00	
Satd. Flow (perm)		1624			1428						5736	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	30	9	19	7	0	0	0	0	243	2527	21
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	37	0	0	26	0	0	0	0	0	2789	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		374			328						3384	
v/s Ratio Prot		c0.02									c0.49	
v/s Ratio Perm					0.02							
v/c Ratio		0.10			0.08						0.82	
Uniform Delay, d1		15.2			15.1						8.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.5			0.5						2.4	
Delay (s)		15.7			15.6						10.6	
Level of Service		B			B						B	
Approach Delay (s)		15.7			15.6			0.0			10.6	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	265	4	6	23	5	1	1	46	2	0	9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	265	4	6	23	5	1	1	46	2	0	9

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	273	34	48	11
Volume Left (vph)	4	6	1	2
Volume Right (vph)	4	5	46	9
Hadj (s)	0.03	-0.02	-0.54	-0.42
Departure Headway (s)	4.1	4.3	4.0	4.2
Degree Utilization, x	0.31	0.04	0.05	0.01
Capacity (veh/h)	865	807	823	783
Control Delay (s)	8.9	7.5	7.3	7.3
Approach Delay (s)	8.9	7.5	7.3	7.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.5		
HCM Level of Service	A		
Intersection Capacity Utilization	26.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	196	0	0	4	17	27	1316	17	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5751				
Flt Permitted	0.76	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1266	1676			1676	1425		5751				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	100	196	0	0	4	17	27	1316	17	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	13	0	3	0	0	0	0
Lane Group Flow (vph)	100	196	0	0	4	4	0	1357	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	11.0	11.0			11.0	11.0		31.0				
Effective Green, g (s)	11.0	11.0			11.0	11.0		31.0				
Actuated g/C Ratio	0.22	0.22			0.22	0.22		0.62				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	279	369			369	314		3566				
v/s Ratio Prot		c0.12			0.00							
v/s Ratio Perm	0.08					0.00		0.24				
v/c Ratio	0.36	0.53			0.01	0.01		0.38				
Uniform Delay, d1	16.5	17.2			15.2	15.2		4.7				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	3.6	5.4			0.1	0.1		0.3				
Delay (s)	20.1	22.6			15.3	15.3		5.0				
Level of Service	C	C			B	B		A				
Approach Delay (s)		21.8			15.3			5.0			0.0	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	12	24	16	45	35	11	20	9	48	3	52	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	12	24	16	45	35	11	20	9	48	3	52	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					792							
pX, platoon unblocked												
vC, conflicting volume	46			40			216	192	32	239	194	40
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	46			40			216	192	32	239	194	40
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			97	99	95	100	92	100
cM capacity (veh/h)	1562			1570			676	678	1042	657	675	1031

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	52	91	77	58
Volume Left	12	45	20	3
Volume Right	16	11	48	3
cSH	1562	1570	866	687
Volume to Capacity	0.01	0.03	0.09	0.08
Queue Length 95th (ft)	1	2	7	7
Control Delay (s)	1.7	3.7	9.6	10.7
Lane LOS	A	A	A	B
Approach Delay (s)	1.7	3.7	9.6	10.7
Approach LOS			A	B

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	50	3	8	84	17	4	9	13	6	15	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	50	3	8	84	17	4	9	13	6	15	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	101			53			214	202	52	212	196	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	101			53			214	202	52	212	196	92
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	99	99	98	99
cM capacity (veh/h)	1491			1553			713	682	1016	719	688	965

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	70	109	26	33
Volume Left	17	8	4	6
Volume Right	3	17	13	12
cSH	1491	1553	823	775
Volume to Capacity	0.01	0.01	0.03	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	1.9	0.6	9.5	9.9
Lane LOS	A	A	A	A
Approach Delay (s)	1.9	0.6	9.5	9.9
Approach LOS			A	A

Intersection Summary				
Average Delay		3.2		
Intersection Capacity Utilization		19.1%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	31	30	4	11	0	0	0	0	39	2434	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1565			1654						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1565			1596						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	31	30	4	11	0	0	0	0	39	2434	88
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	57	0	0	15	0	0	0	0	0	2551	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		360			367						3612	
v/s Ratio Prot		c0.04									c0.45	
v/s Ratio Perm					0.01							
v/c Ratio		0.16			0.04						0.71	
Uniform Delay, d1		15.4			15.0						6.2	
Progression Factor		1.00			1.00						0.00	
Incremental Delay, d2		0.9			0.2						0.7	
Delay (s)		16.3			15.2						0.7	
Level of Service		B			B						A	
Approach Delay (s)		16.3			15.2			0.0			0.7	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay		1.1	HCM Level of Service	A
HCM Volume to Capacity ratio		0.56		
Actuated Cycle Length (s)		50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization		56.5%	ICU Level of Service	B
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	39	0	0	90	12	31	64	41	10	36	83
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	2	39	0	0	90	12	31	64	41	10	36	83

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	41	102	31	105	129
Volume Left (vph)	2	0	31	0	10
Volume Right (vph)	0	12	0	41	83
Hadj (s)	0.04	-0.04	0.53	-0.24	-0.34
Departure Headway (s)	4.7	4.5	5.5	4.7	4.2
Degree Utilization, x	0.05	0.13	0.05	0.14	0.15
Capacity (veh/h)	714	745	632	734	821
Control Delay (s)	7.9	8.2	7.6	7.3	7.9
Approach Delay (s)	7.9	8.2	7.3		7.9
Approach LOS	A	A	A		A

Intersection Summary			
Delay		7.8	
HCM Level of Service		A	
Intersection Capacity Utilization		27.8%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	11	95	0	0	94	18	1	0	1	16	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	11	95	0	0	94	18	1	0	1	16	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	112			95			231	229	95	221	220	103
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	112			95			231	229	95	221	220	103
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	98	100	99
cM capacity (veh/h)	1478			1499			711	666	962	730	673	952

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	106	112	2	27
Volume Left	11	0	1	16
Volume Right	0	18	1	11
cSH	1478	1700	818	807
Volume to Capacity	0.01	0.07	0.00	0.03
Queue Length 95th (ft)	1	0	0	3
Control Delay (s)	0.8	0.0	9.4	9.6
Lane LOS	A		A	A
Approach Delay (s)	0.8	0.0	9.4	9.6
Approach LOS			A	A

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		22.9%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	81	25	11	62	0	0	0	0	169	2234	46
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.97		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1623		1593	1676						5731	
Flt Permitted		1.00		0.69	1.00						1.00	
Satd. Flow (perm)		1623		1154	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	81	25	11	62	0	0	0	0	169	2234	46
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	100	0	11	62	0	0	0	0	0	2444	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		373		265	385						3611	
v/s Ratio Prot		c0.06			0.04							
v/s Ratio Perm				0.01							0.43	
v/c Ratio		0.27		0.04	0.16						0.68	
Uniform Delay, d1		15.8		15.0	15.4						6.0	
Progression Factor		1.00		1.00	1.00						0.02	
Incremental Delay, d2		1.8		0.3	0.9						0.7	
Delay (s)		17.5		15.3	16.3						0.9	
Level of Service		B		B	B						A	
Approach Delay (s)		17.5			16.1			0.0			0.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	2.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	295	97	0	0	0	421
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0				3.5
Lane Util. Factor	0.97	1.00				1.00
Frt	1.00	0.85				1.00
Flt Protected	0.95	1.00				1.00
Satd. Flow (prot)	3090	1425				1676
Flt Permitted	0.95	1.00				1.00
Satd. Flow (perm)	3090	1425				1676
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	295	97	0	0	0	421
RTOR Reduction (vph)	168	97	0	0	0	0
Lane Group Flow (vph)	127	0	0	0	0	421
Turn Type		NA				
Protected Phases	2					1
Permitted Phases						
Actuated Green, G (s)	21.5	0.0				21.5
Effective Green, g (s)	21.5	0.0				21.5
Actuated g/C Ratio	0.43	0.00				0.43
Clearance Time (s)	3.5					3.5
Lane Grp Cap (vph)	1329	0				721
v/s Ratio Prot	c0.04					c0.25
v/s Ratio Perm						
v/c Ratio	0.10	0.00				0.58
Uniform Delay, d1	8.5	25.0				10.8
Progression Factor	1.00	1.00				1.00
Incremental Delay, d2	0.1	0.0				3.4
Delay (s)	8.6	25.0				14.3
Level of Service	A	C				B
Approach Delay (s)	12.7		0.0			14.3
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	430	52	197	223	0	0	0	36
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				4.0
Lane Util. Factor					0.91		1.00	0.95				1.00
Frt					0.98		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					4503		1593	3185				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					4503		1593	3185				1450
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	430	52	197	223	0	0	0	36
RTOR Reduction (vph)	0	0	0	0	15	0	127	0	0	0	0	27
Lane Group Flow (vph)	0	0	0	0	467	0	70	223	0	0	0	9
Turn Type							Perm					custom
Protected Phases					2			1				3
Permitted Phases							1					
Actuated Green, G (s)					29.5		35.5	35.5				24.0
Effective Green, g (s)					29.5		35.5	35.5				24.0
Actuated g/C Ratio					0.30		0.36	0.36				0.24
Clearance Time (s)					3.5		3.5	3.5				4.0
Lane Grp Cap (vph)					1328		566	1131				348
v/s Ratio Prot					c0.10			c0.07				c0.01
v/s Ratio Perm							0.04					
v/c Ratio					0.35		0.12	0.20				0.02
Uniform Delay, d1					27.7		21.8	22.4				29.1
Progression Factor					1.00		0.91	0.69				1.00
Incremental Delay, d2					0.7		0.4	0.4				0.1
Delay (s)					28.5		20.2	15.8				29.2
Level of Service					C		C	B				C
Approach Delay (s)		0.0			28.5			17.9			29.2	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	886	124	198	685	0	0	0	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					0.86		0.97	0.95				0.88
Frt					0.98		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5661		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5661		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	886	124	198	685	0	0	0	20
RTOR Reduction (vph)	0	0	0	0	50	0	150	0	0	0	0	18
Lane Group Flow (vph)	0	0	0	0	960	0	48	685	0	0	0	2
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					21.0		12.0	12.0				5.0
Effective Green, g (s)					21.0		12.0	12.0				5.0
Actuated g/C Ratio					0.42		0.24	0.24				0.10
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2378		742	764				251
v/s Ratio Prot					c0.17		0.02	c0.22				c0.00
v/s Ratio Perm												
v/c Ratio					0.40		0.06	0.90				0.01
Uniform Delay, d1					10.1		14.7	18.4				20.3
Progression Factor					0.23		1.00	1.00				1.00
Incremental Delay, d2					0.5		0.2	15.4				0.1
Delay (s)					2.9		14.8	33.8				20.3
Level of Service					A		B	C				C
Approach Delay (s)		0.0			2.9			29.5			20.3	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	141	858	0	0	0	0	0	175	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.92	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4206	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4206	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	141	858	0	0	0	0	0	175	205
RTOR Reduction (vph)	0	0	0	80	0	0	0	0	0	0	44	0
Lane Group Flow (vph)	0	0	0	61	858	0	0	0	0	0	336	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				21.5	21.5						21.5	
Effective Green, g (s)				21.5	21.5						21.5	
Actuated g/C Ratio				0.43	0.43						0.43	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				685	1968						1809	
v/s Ratio Prot					c0.19						c0.08	
v/s Ratio Perm				0.04								
v/c Ratio				0.09	0.44						0.19	
Uniform Delay, d1				8.4	10.0						8.8	
Progression Factor				6.04	1.88						1.00	
Incremental Delay, d2				0.2	0.6						0.2	
Delay (s)				51.2	19.4						9.1	
Level of Service				D	B						A	
Approach Delay (s)		0.0			23.9			0.0			9.1	
Approach LOS		A			C			A			A	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	882	110	138	388	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4501			4518				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4501			4518				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	882	110	138	388	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	31	0	0	38	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	961	0	0	488	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					21.0			21.5				
Effective Green, g (s)					21.0			21.5				
Actuated g/C Ratio					0.42			0.43				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					1890			1943				
v/s Ratio Prot					c0.21							
v/s Ratio Perm								0.11				
v/c Ratio					0.51			0.25				
Uniform Delay, d1					10.7			9.1				
Progression Factor					1.00			1.49				
Incremental Delay, d2					1.0			0.3				
Delay (s)					11.7			13.8				
Level of Service					B			B				
Approach Delay (s)		0.0			11.7			13.8			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	1376	459	88	120	106	1642	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.96		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5551		2508	1449	3005	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5551		2508	1449	3005	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1376	459	88	120	106	1642	210
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1835	0	88	73	153	1852	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	31.0		11.0	11.0	11.0	46.0	
Effective Green, g (s)	31.0		11.0	11.0	11.0	46.0	
Actuated g/C Ratio	0.31		0.11	0.11	0.11	0.46	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	1721		276	159	331	1495	
v/s Ratio Prot	c0.33					c0.57	
v/s Ratio Perm			0.04	0.05	0.05		
v/c Ratio	1.07		0.32	0.46	0.46	1.24	
Uniform Delay, d1	34.5		41.0	41.7	41.7	27.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	41.8		3.0	9.3	4.6	113.4	
Delay (s)	76.3		44.1	51.0	46.3	140.4	
Level of Service	E		D	D	D	F	
Approach Delay (s)	76.3				47.8		
Approach LOS	E				D		

Intersection Summary			
HCM Average Control Delay	103.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1398	162	0	0	0	0	0	0	71	265	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4505									4529	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4505									4529	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1398	162	0	0	0	0	0	0	71	265	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	1546	0	0	0	0	0	0	0	0	326	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		46.5									46.5	
Effective Green, g (s)		46.5									46.5	
Actuated g/C Ratio		0.46									0.46	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		2095									2106	
v/s Ratio Prot		c0.34										
v/s Ratio Perm											0.07	
v/c Ratio		0.74									0.15	
Uniform Delay, d1		21.8									15.4	
Progression Factor		0.16									1.14	
Incremental Delay, d2		0.2									0.2	
Delay (s)		3.7									17.7	
Level of Service		A									B	
Approach Delay (s)		3.7			0.0			0.0			17.7	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	6.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Baseline plus Proposed Project
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	1224	0	0	0	0	0	427	165	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4535						3034	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4535						3034	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	280	1224	0	0	0	0	0	427	165	0	0	0
RTOR Reduction (vph)	0	37	0	0	0	0	0	3	17	0	0	0
Lane Group Flow (vph)	0	1467	0	0	0	0	0	441	131	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		46.5						46.5	46.5			
Effective Green, g (s)		46.5						46.5	46.5			
Actuated g/C Ratio		0.46						0.46	0.46			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		2109						1411	603			
v/s Ratio Prot								c0.15				
v/s Ratio Perm		0.32							0.10			
v/c Ratio		0.70						0.31	0.22			
Uniform Delay, d1		21.2						16.7	15.9			
Progression Factor		0.17						1.00	1.00			
Incremental Delay, d2		1.4						0.6	0.8			
Delay (s)		4.9						17.3	16.8			
Level of Service		A						B	B			
Approach Delay (s)		4.9			0.0			17.2			0.0	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM Average Control Delay	8.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Baseline plus Proposed Project (w/ LRT)
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	30	9	19	7	0	0	0	0	243	2527	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1624			1617						5736	
Flt Permitted		1.00			0.81						1.00	
Satd. Flow (perm)		1624			1353						5736	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	30	9	19	7	0	0	0	0	243	2527	21
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	31	0	0	26	0	0	0	0	0	2790	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		140			117						4852	
v/s Ratio Prot		0.02									c0.49	
v/s Ratio Perm					c0.02							
v/c Ratio		0.22			0.22						0.58	
Uniform Delay, d1		56.6			56.6						3.1	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		3.6			4.3						0.5	
Delay (s)		60.2			60.9						3.6	
Level of Service		E			E						A	
Approach Delay (s)		60.2			60.9			0.0			3.6	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	31	30	4	11	0	0	0	0	39	2434	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1565			1654						5733	
Flt Permitted		1.00			0.94						1.00	
Satd. Flow (perm)		1565			1578						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	31	30	4	11	0	0	0	0	39	2434	88
RTOR Reduction (vph)	0	21	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	40	0	0	15	0	0	0	0	0	2557	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		135			136						4936	
v/s Ratio Prot		c0.03									c0.45	
v/s Ratio Perm					0.01							
v/c Ratio		0.30			0.11						0.52	
Uniform Delay, d1		57.0			56.0						2.3	
Progression Factor		1.00			1.00						0.00	
Incremental Delay, d2		5.5			1.6						0.3	
Delay (s)		62.5			57.7						0.3	
Level of Service		E			E						A	
Approach Delay (s)		62.5			57.7			0.0			0.3	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	2.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	81	25	11	62	0	0	0	0	169	2234	46
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.97		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1623		1593	1676						5731	
Flt Permitted		1.00		0.44	1.00						1.00	
Satd. Flow (perm)		1623		743	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	81	25	11	62	0	0	0	0	169	2234	46
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	98	0	11	62	0	0	0	0	0	2447	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		140		64	145						4934	
v/s Ratio Prot		c0.06			0.04							
v/s Ratio Perm				0.01							0.43	
v/c Ratio		0.70		0.17	0.43						0.50	
Uniform Delay, d1		59.1		56.3	57.6						2.2	
Progression Factor		1.00		1.00	1.00						0.04	
Incremental Delay, d2		25.1		5.7	9.0						0.3	
Delay (s)		84.2		62.1	66.6						0.4	
Level of Service		F		E	E						A	
Approach Delay (s)		84.2			65.9			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	5.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	52	7	22	8	0	0	0	0	180	1763	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1650			1617						5714	
Flt Permitted		1.00			0.84						1.00	
Satd. Flow (perm)		1650			1404						5714	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	52	7	22	8	0	0	0	0	180	1763	64
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	9	0
Lane Group Flow (vph)	0	54	0	0	30	0	0	0	0	0	1998	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		380			323						3371	
v/s Ratio Prot		c0.03									c0.35	
v/s Ratio Perm					0.02							
v/c Ratio		0.14			0.09						0.59	
Uniform Delay, d1		15.3			15.1						6.5	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.8			0.6						0.8	
Delay (s)		16.1			15.7						7.2	
Level of Service		B			B						A	
Approach Delay (s)		16.1			15.7			0.0			7.2	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	126	7	3	20	0	2	2	218	10	0	4
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	126	7	3	20	0	2	2	218	10	0	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	134	23	222	14
Volume Left (vph)	1	3	2	10
Volume Right (vph)	7	0	218	4
Hadj (s)	0.00	0.06	-0.55	0.01
Departure Headway (s)	4.4	4.6	3.7	4.5
Degree Utilization, x	0.16	0.03	0.23	0.02
Capacity (veh/h)	777	729	926	752
Control Delay (s)	8.3	7.7	7.8	7.6
Approach Delay (s)	8.3	7.7	7.8	7.6
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.0		
HCM Level of Service	A		
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	310	119	0	0	11	172	13	4531	9	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5765				
Flt Permitted	0.75	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1258	1676			1676	1425		5765				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	310	119	0	0	11	172	13	4531	9	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	310	119	0	0	11	172	0	4553	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	21.0	21.0			21.0	21.0		71.0				
Effective Green, g (s)	21.0	21.0			21.0	21.0		71.0				
Actuated g/C Ratio	0.21	0.21			0.21	0.21		0.71				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	264	352			352	299		4093				
v/s Ratio Prot		0.07			0.01							
v/s Ratio Perm	c0.25					0.12		0.79				
v/c Ratio	1.17	0.34			0.03	0.58		1.11				
Uniform Delay, d1	39.5	33.6			31.4	35.5		14.5				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	110.9	2.6			0.2	7.8		54.6				
Delay (s)	150.4	36.2			31.6	43.3		69.1				
Level of Service	F	D			C	D		E				
Approach Delay (s)		118.7			42.6			69.1			0.0	
Approach LOS		F			D			E			A	

Intersection Summary			
HCM Average Control Delay	72.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	114.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	72	125	25	11	10	15	4	29	118	20	73	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	72	125	25	11	10	15	4	29	118	20	73	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					792							
pX, platoon unblocked												
vC, conflicting volume	25			150			374	328	138	454	334	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	25			150			374	328	138	454	334	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			99			99	95	87	95	87	98
cM capacity (veh/h)	1589			1431			495	559	911	415	556	1061

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	222	36	151	110
Volume Left	72	11	4	20
Volume Right	25	15	118	17
cSH	1589	1431	797	562
Volume to Capacity	0.05	0.01	0.19	0.20
Queue Length 95th (ft)	4	1	17	18
Control Delay (s)	2.6	2.3	10.6	13.0
Lane LOS	A	A	B	B
Approach Delay (s)	2.6	2.3	10.6	13.0
Approach LOS			B	B

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	229	13	6	16	5	1	15	6	23	23	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	229	13	6	16	5	1	15	6	23	23	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	21			242			328	304	236	316	308	18
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	21			242			328	304	236	316	308	18
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	99	96	96	99
cM capacity (veh/h)	1595			1324			591	599	804	613	596	1060

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	260	27	22	61
Volume Left	18	6	1	23
Volume Right	13	5	6	15
cSH	1595	1324	643	676
Volume to Capacity	0.01	0.00	0.03	0.09
Queue Length 95th (ft)	1	0	3	7
Control Delay (s)	0.6	1.7	10.8	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.6	1.7	10.8	10.9
Approach LOS			B	B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	200	40	4	9	0	0	0	0	42	1735	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1639			1651						5752	
Flt Permitted		1.00			0.92						1.00	
Satd. Flow (perm)		1639			1537						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	200	40	4	9	0	0	0	0	42	1735	18
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	225	0	0	13	0	0	0	0	0	1792	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		377			354						3624	
v/s Ratio Prot		c0.14									c0.31	
v/s Ratio Perm					0.01							
v/c Ratio		0.60			0.04						0.49	
Uniform Delay, d1		17.2			14.9						5.0	
Progression Factor		1.00			1.00						0.04	
Incremental Delay, d2		6.8			0.2						0.4	
Delay (s)		24.0			15.1						0.6	
Level of Service		C			B						A	
Approach Delay (s)		24.0			15.1			0.0			0.6	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	3.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	4	102	0	0	56	6	17	168	141	3	55	75
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	102	0	0	56	6	17	168	141	3	55	75

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	106	62	17	309	133
Volume Left (vph)	4	0	17	0	3
Volume Right (vph)	0	6	0	141	75
Hadj (s)	0.04	-0.02	0.53	-0.29	-0.30
Departure Headway (s)	5.1	5.1	5.6	4.8	4.5
Degree Utilization, x	0.15	0.09	0.03	0.41	0.17
Capacity (veh/h)	641	632	620	729	747
Control Delay (s)	9.0	8.6	7.6	9.9	8.5
Approach Delay (s)	9.0	8.6	9.7		8.5
Approach LOS	A	A	A		A

Intersection Summary			
Delay		9.2	
HCM Level of Service		A	
Intersection Capacity Utilization		35.6%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	17	244	0	0	65	9	0	0	3	25	0	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	17	244	0	0	65	9	0	0	3	25	0	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	74			244			354	352	244	350	348	70
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74			244			354	352	244	350	348	70
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	99
cM capacity (veh/h)	1526			1322			591	566	795	597	570	993

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	261	74	3	32
Volume Left	17	0	0	25
Volume Right	0	9	3	7
cSH	1526	1700	795	654
Volume to Capacity	0.01	0.04	0.00	0.05
Queue Length 95th (ft)	1	0	0	4
Control Delay (s)	0.6	0.0	9.5	10.8
Lane LOS	A		A	B
Approach Delay (s)	0.6	0.0	9.5	10.8
Approach LOS			A	B

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization		37.3%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	262	17	22	53	0	0	0	0	207	1544	23
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1663		1593	1676						5722	
Flt Permitted		1.00		0.41	1.00						0.99	
Satd. Flow (perm)		1663		681	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	262	17	22	53	0	0	0	0	207	1544	23
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	274	0	22	53	0	0	0	0	0	1771	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		382		157	385						3605	
v/s Ratio Prot		c0.17			0.03							
v/s Ratio Perm				0.03							0.31	
v/c Ratio		0.72		0.14	0.14						0.49	
Uniform Delay, d1		17.8		15.3	15.3						5.0	
Progression Factor		1.00		1.00	1.00						0.04	
Incremental Delay, d2		11.1		1.9	0.7						0.4	
Delay (s)		28.8		17.2	16.1						0.6	
Level of Service		C		B	B						A	
Approach Delay (s)		28.8			16.4			0.0			0.6	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	4.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	412	324	0	0	0	414
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	4.0				3.5
Lane Util. Factor	0.97	1.00				1.00
Frt	1.00	0.85				1.00
Flt Protected	0.95	1.00				1.00
Satd. Flow (prot)	3090	1425				1676
Flt Permitted	0.95	1.00				1.00
Satd. Flow (perm)	3090	1425				1676
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	412	324	0	0	0	414
RTOR Reduction (vph)	235	324	0	0	0	0
Lane Group Flow (vph)	177	0	0	0	0	414
Turn Type		NA				
Protected Phases	2					1
Permitted Phases						
Actuated Green, G (s)	21.5	0.0				21.5
Effective Green, g (s)	21.5	0.0				21.5
Actuated g/C Ratio	0.43	0.00				0.43
Clearance Time (s)	3.5					3.5
Lane Grp Cap (vph)	1329	0				721
v/s Ratio Prot	c0.06					c0.25
v/s Ratio Perm						
v/c Ratio	0.13	0.00				0.57
Uniform Delay, d1	8.6	25.0				10.8
Progression Factor	1.00	1.00				1.00
Incremental Delay, d2	0.2	0.0				3.3
Delay (s)	8.8	25.0				14.1
Level of Service	A	C				B
Approach Delay (s)	15.9		0.0			14.1
Approach LOS	B		A			B

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	339	23	132	391	0	0	0	55
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				4.0
Lane Util. Factor					0.91		1.00	0.95				1.00
Frt					0.99		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					4533		1593	3185				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					4533		1593	3185				1450
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	339	23	132	391	0	0	0	55
RTOR Reduction (vph)	0	0	0	0	7	0	80	0	0	0	0	46
Lane Group Flow (vph)	0	0	0	0	355	0	52	391	0	0	0	9
Turn Type							Perm					custom
Protected Phases					2			1				3
Permitted Phases							1					3
Actuated Green, G (s)					33.5		39.5	39.5				16.0
Effective Green, g (s)					33.5		39.5	39.5				16.0
Actuated g/C Ratio					0.34		0.40	0.40				0.16
Clearance Time (s)					3.5		3.5	3.5				4.0
Lane Grp Cap (vph)					1519		629	1258				232
v/s Ratio Prot					c0.08			c0.12				c0.01
v/s Ratio Perm							0.03					
v/c Ratio					0.23		0.08	0.31				0.04
Uniform Delay, d1					24.0		18.9	20.9				35.5
Progression Factor					1.00		0.00	0.31				1.00
Incremental Delay, d2					0.4		0.2	0.6				0.3
Delay (s)					24.3		0.2	7.1				35.8
Level of Service					C		A	A				D
Approach Delay (s)		0.0			24.3			5.4			35.8	
Approach LOS		A			C			A			D	

Intersection Summary				
HCM Average Control Delay	14.5	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.23			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	38.8%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	2860	37	444	322	0	0	0	69
Ideal Flow (vphpl)	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					0.86		0.97	0.95				0.88
Frt					1.00		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5756		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5756		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2860	37	444	322	0	0	0	69
RTOR Reduction (vph)	0	0	0	0	2	0	189	0	0	0	0	59
Lane Group Flow (vph)	0	0	0	0	2895	0	255	322	0	0	0	10
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					47.0		27.0	27.0				14.0
Effective Green, g (s)					47.0		27.0	27.0				14.0
Actuated g/C Ratio					0.47		0.27	0.27				0.14
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2705		834	860				351
v/s Ratio Prot					c0.50		0.08	c0.10				c0.00
v/s Ratio Perm												
v/c Ratio					1.07		0.31	0.37				0.03
Uniform Delay, d1					26.5		29.0	29.6				37.1
Progression Factor					1.34		1.00	1.00				1.00
Incremental Delay, d2					39.4		0.9	1.2				0.1
Delay (s)					74.8		30.0	30.9				37.3
Level of Service					E		C	C				D
Approach Delay (s)		0.0			74.8			30.4			37.3	
Approach LOS		A			E			C			D	

Intersection Summary				
HCM Average Control Delay	65.0	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.69			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	74.1%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	218	1403	0	0	0	0	0	340	347
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.92	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4230	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4230	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	218	1403	0	0	0	0	0	340	347
RTOR Reduction (vph)	0	0	0	64	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	154	1403	0	0	0	0	0	677	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.5	46.5						46.5	
Effective Green, g (s)				46.5	46.5						46.5	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				741	2128						1967	
v/s Ratio Prot					c0.31						c0.16	
v/s Ratio Perm				0.10								
v/c Ratio				0.21	0.66						0.34	
Uniform Delay, d1				15.8	20.6						17.0	
Progression Factor				2.67	1.65						1.00	
Incremental Delay, d2				0.5	1.2						0.5	
Delay (s)				42.7	35.2						17.5	
Level of Service				D	D						B	
Approach Delay (s)		0.0			36.2			0.0			17.5	
Approach LOS		A			D			A			B	

Intersection Summary			
HCM Average Control Delay	30.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1453	86	221	532	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4538			4511				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4538			4511				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1453	86	221	532	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	6	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1533	0	0	745	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					46.0			46.5				
Effective Green, g (s)					46.0			46.5				
Actuated g/C Ratio					0.46			0.46				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					2087			2098				
v/s Ratio Prot					c0.34							
v/s Ratio Perm								0.17				
v/c Ratio					0.73			0.36				
Uniform Delay, d1					22.0			17.1				
Progression Factor					1.00			0.91				
Incremental Delay, d2					2.3			0.4				
Delay (s)					24.4			16.0				
Level of Service					C			B				
Approach Delay (s)		0.0			24.4			16.0			0.0	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	954	411	200	234	390	400	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		3.5	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.95		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	5507		2508	1449	3039	3249	
Flt Permitted	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	5507		2508	1449	3039	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	954	411	200	234	390	400	54
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1365	0	200	201	423	454	0
Turn Type			custom	Split		custom	
Protected Phases	6		1!	2!	2	3	
Permitted Phases							
Actuated Green, G (s)	30.0		25.5	25.0	25.0	33.0	
Effective Green, g (s)	30.0		25.5	25.0	25.0	33.0	
Actuated g/C Ratio	0.30		0.26	0.25	0.25	0.33	
Clearance Time (s)	4.0		3.5	4.0	4.0	4.0	
Lane Grp Cap (vph)	1652		640	362	760	1072	
v/s Ratio Prot	c0.25		0.08	0.14	c0.14	c0.14	
v/s Ratio Perm							
v/c Ratio	0.94dr		0.31	0.56	0.56	0.42	
Uniform Delay, d1	32.6		30.2	32.7	32.7	26.1	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.9		1.3	6.0	2.9	1.2	
Delay (s)	37.5		31.4	38.7	35.6	27.3	
Level of Service	D		C	D	D	C	
Approach Delay (s)	37.5				36.6		
Approach LOS	D				D		

Intersection Summary			
HCM Average Control Delay	35.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1218	163	0	0	0	0	0	0	98	480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4496									4538	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4496									4538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1218	163	0	0	0	0	0	0	98	480	0
RTOR Reduction (vph)	0	34	0	0	0	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	1347	0	0	0	0	0	0	0	0	565	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		21.5									21.5	
Effective Green, g (s)		21.5									21.5	
Actuated g/C Ratio		0.43									0.43	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		1933									1951	
v/s Ratio Prot		c0.30										
v/s Ratio Perm											0.12	
v/c Ratio		0.70									0.29	
Uniform Delay, d1		11.6									9.3	
Progression Factor		0.78									0.45	
Incremental Delay, d2		1.2									0.4	
Delay (s)		10.3									4.6	
Level of Service		B									A	
Approach Delay (s)		10.3			0.0			0.0			4.6	
Approach LOS		B			A			A			A	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Baseline plus Proposed Project
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	181	1133	0	0	0	0	0	571	257	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4545						3031	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4545						3031	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	181	1133	0	0	0	0	0	571	257	0	0	0
RTOR Reduction (vph)	0	43	0	0	0	0	0	6	18	0	0	0
Lane Group Flow (vph)	0	1271	0	0	0	0	0	591	213	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		21.5						21.5	21.5			
Effective Green, g (s)		21.5						21.5	21.5			
Actuated g/C Ratio		0.43						0.43	0.43			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		1954						1303	558			
v/s Ratio Prot								c0.19				
v/s Ratio Perm		0.28							0.16			
v/c Ratio		0.65						0.45	0.38			
Uniform Delay, d1		11.3						10.1	9.7			
Progression Factor		2.16						1.00	1.00			
Incremental Delay, d2		1.2						1.1	2.0			
Delay (s)		25.6						11.2	11.7			
Level of Service		C						B	B			
Approach Delay (s)		25.6			0.0			11.4			0.0	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM Average Control Delay	20.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Baseline plus Proposed Project (w/ LRT)
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	52	7	22	8	0	0	0	0	180	1763	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.96						1.00	
Satd. Flow (prot)		1650			1617						5714	
Flt Permitted		1.00			0.79						1.00	
Satd. Flow (perm)		1650			1321						5714	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	52	7	22	8	0	0	0	0	180	1763	64
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	55	0	0	30	0	0	0	0	0	2004	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		143			114						4833	
v/s Ratio Prot		c0.03									c0.35	
v/s Ratio Perm					0.02							
v/c Ratio		0.39			0.26						0.41	
Uniform Delay, d1		57.4			56.8						2.4	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		7.7			5.5						0.3	
Delay (s)		65.1			62.3						2.7	
Level of Service		E			E						A	
Approach Delay (s)		65.1			62.3			0.0			2.7	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	5.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	200	40	4	9	0	0	0	0	42	1735	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1639			1651						5752	
Flt Permitted		1.00			0.47						1.00	
Satd. Flow (perm)		1639			785						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	200	40	4	9	0	0	0	0	42	1735	18
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	235	0	0	13	0	0	0	0	0	1794	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		142			68						4952	
v/s Ratio Prot		c0.14									c0.31	
v/s Ratio Perm					0.02							
v/c Ratio		1.65			0.19						0.36	
Uniform Delay, d1		60.8			56.4						1.9	
Progression Factor		1.00			1.00						0.10	
Incremental Delay, d2		322.4			6.2						0.2	
Delay (s)		383.2			62.6						0.4	
Level of Service		F			E						A	
Approach Delay (s)		383.2			62.6			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	45.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

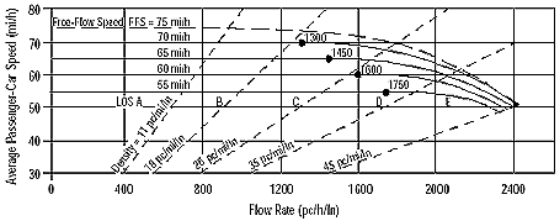
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	262	17	22	53	0	0	0	0	207	1544	23
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1663		1593	1676						5722	
Flt Permitted		1.00		0.35	1.00						0.99	
Satd. Flow (perm)		1663		583	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	262	17	22	53	0	0	0	0	207	1544	23
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	277	0	22	53	0	0	0	0	0	1773	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		144		50	145						4926	
v/s Ratio Prot		c0.17			0.03							
v/s Ratio Perm				0.04							0.31	
v/c Ratio		1.92		0.44	0.37						0.36	
Uniform Delay, d1		60.8		57.7	57.3						1.9	
Progression Factor		1.00		1.00	1.00						0.10	
Incremental Delay, d2		440.7		25.7	7.0						0.2	
Delay (s)		501.5		83.4	64.3						0.4	
Level of Service		F		F	E						A	
Approach Delay (s)		501.5			69.9			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	68.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Baseline + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*9887*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2246*	pc/h/ln	Design LOS v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
S	*58.7*	mi/h	S
D = v_p / S	*38.2*	pc/mi/ln	D = v_p / S
LOS	*E*		Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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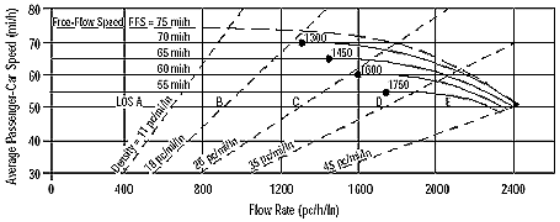
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Baseline + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*7189*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1633*	pc/h/ln	Design LOS
S	*69.3*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*23.6*	pc/mi/ln	S
LOS	*C*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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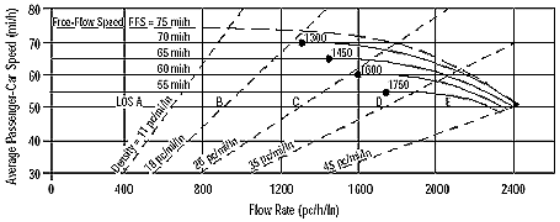
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Baseline + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*6560*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1490*	pc/h/ln	Design LOS
S	*69.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*21.3*	pc/mi/ln	S
LOS	*C*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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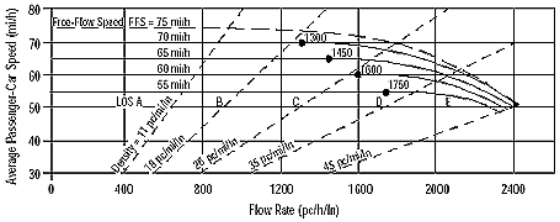
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Baseline + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*8398*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1908*	pc/h/ln	Design LOS
S	*66.4*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*28.7*	pc/mi/ln	S
LOS	*D*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8035	0.92	Level	10	0	0.952	1.00	9170
Ramp	397	0.92	Level	10	0	0.952	1.00	453
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 1917 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9623	See Exhibit 25-7	Yes
V_{R12}	2370	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -607.3 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.683 (Exibit 25-19)

S_R= 218.7 mph (Exhibit 25-19)

S_0= 50.5 mph(Exhibit 25-19)

S= 62.3 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6735	0.92	Level	10	0	0.952	1.00	7687
Ramp	1542	0.92	Level	10	0	0.952	1.00	1760
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 1607 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9447	See Exhibit 25-7	Yes
V_{R12}	3367	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -600.1 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.611 (Exibit 25-19)

S_R= 217.1 mph (Exhibit 25-19)

S_0= 54.0 mph(Exhibit 25-19)

S= 73.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6248	0.92	Level	10	0	0.952	1.00	7131
Ramp	312	0.92	Level	10	0	0.952	1.00	356
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.269 using Equation (Exhibit 25-5)

V_{12}= 1917 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	7487	See Exhibit 25-7	No
V_{R12}	2273	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 21.2 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.338 (Exibit 25-19)

S_R= 57.2 mph (Exhibit 25-19)

S_0= 56.6 mph(Exhibit 25-19)

S= 56.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	$v=V/PHF\ f_{HV}\ f_p$
Freeway	7385	0.92	Level	10	0	0.952	1.00	8429
Ramp	1013	0.92	Level	10	0	0.952	1.00	1156
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.169 using Equation (Exhibit 25-5)

V_{12}= 1423 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	9585	See Exhibit 25-7	Yes
V_{R12}	2579	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 23.2 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.351 (Exibit 25-19)

S_R= 56.9 mph (Exhibit 25-19)

S_0= 51.3 mph(Exhibit 25-19)

S= 52.7 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9876	0.92	Level	10	0	0.952	1.00	11272
Ramp	1852	0.92	Level	10	0	0.952	1.00	2114
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4495 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11272	9400	Yes
V_{12}	4495	4400:All	Yes
$V_{FO} = V_F - V_R$	9158	9400	No
V_R	2114	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 35.4 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.618 (Exhibit 25-19)

S_R= 50.8 mph (Exhibit 25-19)

S_0= 62.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 57.0 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7118	0.92	Level	10	0	0.952	1.00	8124
Ramp	454	0.92	Level	10	0	0.952	1.00	518
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 2496 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	8124	9400	No
V_{12}	2496	4400:All	No
$V_{FO} = V_F - V_R$	7606	9400	No
V_R	518	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 18.2 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.475 (Exhibit 25-19)

S_R= 54.1 mph (Exhibit 25-19)

S_0= 64.2 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 60.7 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	7738	0.92	Level	10	0	0.952	1.00	8831
Ramp	1497	0.92	Level	10	0	0.952	1.00	1709
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3561 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	8831	9400	No
V_{12}	3561	4400:All	No
$V_{FO} = V_F - V_R$	7122	9400	No
V_R	1709	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -17.3 (pc/ mi /ln)

LOS= A (Exhibit 25-4)

Speed Estimation

D_s = 0.582 (Exhibit 25-19)

S_R= 51.6 mph (Exhibit 25-19)

S_0= 64.9 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 58.8 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Baseline plus Proposed Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	8455	0.92	Level	10	0	0.952	1.00	9650
Ramp	1120	0.92	Level	10	0	0.952	1.00	1278
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 3455 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	9650	9400	Yes
V_{12}	3455	4400:All	No
$V_{FO} = V_F - V_R$	8372	9400	No
V_R	1278	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -18.2 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.543 (Exhibit 25-19)

S_R= 52.5 mph (Exhibit 25-19)

S_0= 63.1 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 58.9 mph (Exhibit 25-15)

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Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1995	96	79	166	2013
v/c Ratio	1.63	0.22	0.24	0.24	2.82
Control Delay	317.9	36.9	33.7	32.5	839.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	317.9	36.9	33.7	32.5	839.5
Queue Length 50th (ft)	~536	30	45	47	~968
Queue Length 95th (ft)	#613	56	90	78	#1083
Internal Link Dist (ft)	1409			132	
Turn Bay Length (ft)					
Base Capacity (vph)	1221	439	333	691	715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.63	0.22	0.24	0.24	2.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1484	217	218	460	494
v/c Ratio	1.40dr	0.49	0.65	0.66	0.69
Control Delay	143.6	41.7	45.5	40.2	41.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	143.6	41.7	45.5	40.2	41.7
Queue Length 50th (ft)	~340	71	139	146	127
Queue Length 95th (ft)	#415	113	229	204	175
Internal Link Dist (ft)	1667			132	
Turn Bay Length (ft)					
Base Capacity (vph)	1212	439	333	699	715
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.22	0.49	0.65	0.66	0.69

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

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

Appendix E:

Worksheets for
Cumulative (2030) Conditions

The Creamery
1: C St. & 12th St.

Cumulative
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	8	8	5	5	0	0	0	0	354	3729	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1563			1636						5738	
Flt Permitted		1.00			0.92						1.00	
Satd. Flow (perm)		1563			1550						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	8	8	5	5	0	0	0	0	354	3729	19
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	16	0	0	10	0	0	0	0	0	4101	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		359			357						3385	
v/s Ratio Prot		c0.01									c0.71	
v/s Ratio Perm					0.01							
v/c Ratio		0.04			0.03						1.21	
Uniform Delay, d1		15.0			14.9						10.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.2			0.1						98.1	
Delay (s)		15.2			15.1						108.4	
Level of Service		B			B						F	
Approach Delay (s)		15.2			15.1			0.0			108.4	
Approach LOS		B			B			A			F	

Intersection Summary			
HCM Average Control Delay	107.8	HCM Level of Service	F
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	50.0	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

The Creamery
2: C St. & 14th St.

Cumulative
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	420	7	3	10	2	5	5	2	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	420	7	3	10	2	5	5	2	5	5	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	434	15	12	15
Volume Left (vph)	7	3	5	5
Volume Right (vph)	7	2	2	5
Hadj (s)	0.03	-0.01	0.02	-0.10
Departure Headway (s)	4.0	4.4	4.9	4.8
Degree Utilization, x	0.48	0.02	0.02	0.02
Capacity (veh/h)	889	790	668	680
Control Delay (s)	10.7	7.5	8.0	7.9
Approach Delay (s)	10.7	7.5	8.0	7.9
Approach LOS	B	A	A	A

Intersection Summary			
Delay	10.5		
HCM Level of Service	B		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	148	0	0	3	12	67	3311	44	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5750				
Flt Permitted	0.76	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1267	1676			1676	1425		5750				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	148	0	0	3	12	67	3311	44	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	1	0	3	0	0	0	0
Lane Group Flow (vph)	58	148	0	0	3	11	0	3419	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	11.0	11.0			11.0	11.0		31.0				
Effective Green, g (s)	11.0	11.0			11.0	11.0		31.0				
Actuated g/C Ratio	0.22	0.22			0.22	0.22		0.62				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	279	369			369	314		3565				
v/s Ratio Prot		c0.09			0.00							
v/s Ratio Perm	0.05					0.01		0.59				
v/c Ratio	0.21	0.40			0.01	0.04		0.96				
Uniform Delay, d1	15.9	16.7			15.2	15.3		8.9				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	1.7	3.2			0.0	0.2		8.2				
Delay (s)	17.6	19.9			15.3	15.5		17.1				
Level of Service	B	B			B	B		B				
Approach Delay (s)		19.3			15.5			17.1			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	17.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	45	19	51	40	7	19	5	46	5	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	45	19	51	40	7	19	5	46	5	5	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					792							
pX, platoon unblocked												
vC, conflicting volume	47			64			218	214	54	258	220	44
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	47			64			218	214	54	258	220	44
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			97	99	95	99	99	100
cM capacity (veh/h)	1560			1538			711	659	1012	641	654	1027

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	69	98	70	15
Volume Left	5	51	19	5
Volume Right	19	7	46	5
cSH	1560	1538	878	738
Volume to Capacity	0.00	0.03	0.08	0.02
Queue Length 95th (ft)	0	3	6	2
Control Delay (s)	0.6	4.0	9.5	10.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.6	4.0	9.5	10.0
Approach LOS			A	A

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	43	3	9	99	20	3	4	10	2	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	16	43	3	9	99	20	3	4	10	2	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	119			46			208	214	44	216	205	109
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	119			46			208	214	44	216	205	109
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	99	99	100	100	100
cM capacity (veh/h)	1469			1562			735	673	1025	721	680	945

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	62	128	17	8
Volume Left	16	9	3	2
Volume Right	3	20	10	3
cSH	1469	1562	859	772
Volume to Capacity	0.01	0.01	0.02	0.01
Queue Length 95th (ft)	1	0	2	1
Control Delay (s)	2.0	0.6	9.3	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	2.0	0.6	9.3	9.7
Approach LOS			A	A

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	42	25	2	5	0	0	0	0	53	3295	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1592			1653						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1592			1598						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	42	25	2	5	0	0	0	0	53	3295	119
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	66	0	0	7	0	0	0	0	0	3457	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		366			368						3612	
v/s Ratio Prot		c0.04									c0.60	
v/s Ratio Perm					0.00							
v/c Ratio		0.18			0.02						0.96	
Uniform Delay, d1		15.5			14.9						8.6	
Progression Factor		1.00			1.00						0.09	
Incremental Delay, d2		1.1			0.1						1.0	
Delay (s)		16.5			15.0						1.7	
Level of Service		B			B						A	
Approach Delay (s)		16.5			15.0			0.0			1.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	2.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	18	5	5	108	14	27	49	33	18	5	85
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	18	5	5	108	14	27	49	33	18	5	85

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	24	127	27	82	108
Volume Left (vph)	1	5	27	0	18
Volume Right (vph)	5	14	0	33	85
Hadj (s)	-0.08	-0.02	0.53	-0.25	-0.40
Departure Headway (s)	4.5	4.4	5.5	4.7	4.1
Degree Utilization, x	0.03	0.15	0.04	0.11	0.12
Capacity (veh/h)	761	774	632	735	847
Control Delay (s)	7.6	8.2	7.5	7.0	7.6
Approach Delay (s)	7.6	8.2	7.2		7.6
Approach LOS	A	A	A		A

Intersection Summary			
Delay		7.7	
HCM Level of Service		A	
Intersection Capacity Utilization		29.9%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	38	0	0	85	16	5	5	5	16	0	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	38	0	0	85	16	5	5	5	16	0	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	101			38			161	147	38	146	139	93
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	101			38			161	147	38	146	139	93
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	100	98	100	98
cM capacity (veh/h)	1491			1572			784	742	1034	812	750	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	42	101	15	38
Volume Left	4	0	5	16
Volume Right	0	16	5	22
cSH	1491	1700	836	894
Volume to Capacity	0.00	0.06	0.02	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	0.7	0.0	9.4	9.2
Lane LOS	A		A	A
Approach Delay (s)	0.7	0.0	9.4	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay		2.7	
Intersection Capacity Utilization		16.3%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	20	8	4	22	0	0	0	0	217	2841	59
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.74	1.00						1.00	
Satd. Flow (perm)		1612		1239	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	20	8	4	22	0	0	0	0	217	2841	59
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	26	0	4	22	0	0	0	0	0	3112	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		371		285	385						3611	
v/s Ratio Prot		c0.02			0.01							
v/s Ratio Perm				0.00							0.54	
v/c Ratio		0.07		0.01	0.06						0.86	
Uniform Delay, d1		15.1		14.9	15.0						7.5	
Progression Factor		1.00		1.00	1.00						0.02	
Incremental Delay, d2		0.4		0.1	0.3						1.0	
Delay (s)		15.4		15.0	15.3						1.1	
Level of Service		B		B	B						A	
Approach Delay (s)		15.4			15.3			0.0			1.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	1.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1386	0	0	0	0	1768
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5					3.5
Lane Util. Factor	0.94					0.91
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	4491					4577
Flt Permitted	0.95					1.00
Satd. Flow (perm)	4491					4577
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1386	0	0	0	0	1768
RTOR Reduction (vph)	6	0	0	0	0	0
Lane Group Flow (vph)	1380	0	0	0	0	1768
Turn Type						
Protected Phases	2					1
Permitted Phases						
Actuated Green, G (s)	21.5					21.5
Effective Green, g (s)	21.5					21.5
Actuated g/C Ratio	0.43					0.43
Clearance Time (s)	3.5					3.5
Lane Grp Cap (vph)	1931					1968
v/s Ratio Prot	c0.31					c0.39
v/s Ratio Perm						
v/c Ratio	0.71					0.90
Uniform Delay, d1	11.7					13.2
Progression Factor	0.88					1.00
Incremental Delay, d2	1.9					7.0
Delay (s)	12.2					20.2
Level of Service	B					C
Approach Delay (s)	12.2		0.0			20.2
Approach LOS	B		A			C

Intersection Summary			
HCM Average Control Delay	16.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	902	109	287	311	0	0	0	15
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				4.0
Lane Util. Factor					0.91		1.00	0.95				1.00
Frt					0.98		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					4503		1593	3185				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					4503		1593	3185				1450
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	902	109	287	311	0	0	0	15
RTOR Reduction (vph)	0	0	0	0	15	0	185	0	0	0	0	11
Lane Group Flow (vph)	0	0	0	0	996	0	102	311	0	0	0	4
Turn Type							Perm					custom
Protected Phases					2			1				3
Permitted Phases							1					
Actuated Green, G (s)					29.5		35.5	35.5				24.0
Effective Green, g (s)					29.5		35.5	35.5				24.0
Actuated g/C Ratio					0.30		0.36	0.36				0.24
Clearance Time (s)					3.5		3.5	3.5				4.0
Lane Grp Cap (vph)					1328		566	1131				348
v/s Ratio Prot					c0.22			c0.10				c0.00
v/s Ratio Perm							0.06					
v/c Ratio					0.75		0.18	0.27				0.01
Uniform Delay, d1					31.9		22.2	23.1				29.0
Progression Factor					1.00		0.90	0.70				1.00
Incremental Delay, d2					3.9		0.5	0.5				0.1
Delay (s)					35.8		20.6	16.6				29.0
Level of Service					D		C	B				C
Approach Delay (s)		0.0			35.8			18.5			29.0	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1572	243	300	1038	0	0	0	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					0.86		0.97	0.95				0.88
Frt					0.98		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5651		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5651		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1572	243	300	1038	0	0	0	5
RTOR Reduction (vph)	0	0	0	0	56	0	228	0	0	0	0	5
Lane Group Flow (vph)	0	0	0	0	1759	0	72	1038	0	0	0	1
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					21.0		12.0	12.0				5.0
Effective Green, g (s)					21.0		12.0	12.0				5.0
Actuated g/C Ratio					0.42		0.24	0.24				0.10
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2373		742	764				251
v/s Ratio Prot					c0.31		0.02	c0.33				c0.00
v/s Ratio Perm												
v/c Ratio					0.74		0.10	1.36				0.00
Uniform Delay, d1					12.2		14.8	19.0				20.3
Progression Factor					0.46		1.00	1.00				1.00
Incremental Delay, d2					1.1		0.3	169.9				0.0
Delay (s)					6.7		15.0	188.9				20.3
Level of Service					A		B	F				C
Approach Delay (s)		0.0			6.7			149.9			20.3	
Approach LOS		A			A			F			C	

Intersection Summary			
HCM Average Control Delay	67.4	HCM Level of Service	E
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	301	1780	0	0	0	0	0	552	552
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.92	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4234	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4234	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	301	1780	0	0	0	0	0	552	552
RTOR Reduction (vph)	0	0	0	116	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	185	1780	0	0	0	0	0	1102	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				21.5	21.5						21.5	
Effective Green, g (s)				21.5	21.5						21.5	
Actuated g/C Ratio				0.43	0.43						0.43	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				685	1968						1821	
v/s Ratio Prot					c0.39						c0.26	
v/s Ratio Perm				0.12								
v/c Ratio				0.27	0.90						0.88dr	
Uniform Delay, d1				9.2	13.3						11.0	
Progression Factor				0.00	0.27						1.00	
Incremental Delay, d2				0.2	1.9						1.5	
Delay (s)				0.2	5.5						12.5	
Level of Service				A	A						B	
Approach Delay (s)		0.0			4.7			0.0			12.5	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1829	232	247	678	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4499			4516				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4499			4516				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1829	232	247	678	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	32	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2029	0	0	924	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					21.0			21.5				
Effective Green, g (s)					21.0			21.5				
Actuated g/C Ratio					0.42			0.43				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					1890			1942				
v/s Ratio Prot					c0.45							
v/s Ratio Perm								0.20				
v/c Ratio					1.07			0.48				
Uniform Delay, d1					14.5			10.2				
Progression Factor					1.00			1.27				
Incremental Delay, d2					43.7			0.5				
Delay (s)					58.2			13.5				
Level of Service					E			B				
Approach Delay (s)		0.0			58.2			13.5			0.0	
Approach LOS		A			E			B			A	

Intersection Summary			
HCM Average Control Delay	44.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	2031	1213	89	168	122	1724	466
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.94		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5444		2508	1449	2995	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5444		2508	1449	2995	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2031	1213	89	168	122	1724	466
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	3244	0	89	94	196	2190	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	58.0		11.9	11.9	11.9	68.1	
Effective Green, g (s)	58.0		11.9	11.9	11.9	68.1	
Actuated g/C Ratio	0.39		0.08	0.08	0.08	0.45	
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)	2105		199	115	238	1475	
v/s Ratio Prot	c0.60					c0.67	
v/s Ratio Perm			0.04	0.06	0.07		
v/c Ratio	2.16dr		0.45	0.82	0.82	1.48	
Uniform Delay, d1	46.0		65.9	68.0	68.0	41.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	245.9		7.1	45.2	26.5	221.8	
Delay (s)	291.9		73.0	113.2	94.5	262.8	
Level of Service	F		E	F	F	F	
Approach Delay (s)	291.9				100.5		
Approach LOS	F				F		

Intersection Summary			
HCM Average Control Delay	268.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	135.0%	ICU Level of Service	H
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1852	216	0	0	0	0	0	0	205	764	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4505									4529	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4505									4529	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1852	216	0	0	0	0	0	0	205	764	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	2054	0	0	0	0	0	0	0	0	967	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		46.5									46.5	
Effective Green, g (s)		46.5									46.5	
Actuated g/C Ratio		0.46									0.46	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		2095									2106	
v/s Ratio Prot		c0.46										
v/s Ratio Perm											0.21	
v/c Ratio		0.98									0.46	
Uniform Delay, d1		26.3									18.2	
Progression Factor		1.00									0.92	
Incremental Delay, d2		15.5									0.7	
Delay (s)		41.8									17.3	
Level of Service		D									B	
Approach Delay (s)		41.8			0.0			0.0			17.3	
Approach LOS		D			A			A			B	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Cumulative
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	376	1695	0	0	0	0	0	939	363	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4536						3034	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4536						3034	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	376	1695	0	0	0	0	0	939	363	0	0	0
RTOR Reduction (vph)	0	35	0	0	0	0	0	3	4	0	0	0
Lane Group Flow (vph)	0	2036	0	0	0	0	0	972	323	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		46.5						46.5	46.5			
Effective Green, g (s)		46.5						46.5	46.5			
Actuated g/C Ratio		0.46						0.46	0.46			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		2109						1411	603			
v/s Ratio Prot								c0.32				
v/s Ratio Perm		0.45							0.25			
v/c Ratio		0.97						0.69	0.54			
Uniform Delay, d1		26.0						21.1	19.1			
Progression Factor		0.22						1.00	1.00			
Incremental Delay, d2		6.3						2.8	3.4			
Delay (s)		12.0						23.8	22.5			
Level of Service		B						C	C			
Approach Delay (s)		12.0			0.0			23.5			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM Average Control Delay	16.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Cumulative (w/ LRT)
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	8	8	5	5	0	0	0	0	354	3729	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1563			1636						5738	
Flt Permitted		1.00			0.91						1.00	
Satd. Flow (perm)		1563			1520						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	8	8	5	5	0	0	0	0	354	3729	19
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	0	0	10	0	0	0	0	0	4102	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		135			131						4854	
v/s Ratio Prot		c0.01									c0.71	
v/s Ratio Perm					0.01							
v/c Ratio		0.10			0.08						0.84	
Uniform Delay, d1		56.0			55.9						5.5	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		1.6			1.1						2.0	
Delay (s)		57.6			57.0						7.5	
Level of Service		E			E						A	
Approach Delay (s)		57.6			57.0			0.0			7.5	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	133.0	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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	42	25	2	5	0	0	0	0	53	3295	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1592			1653						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1592			1584						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	42	25	2	5	0	0	0	0	53	3295	119
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	62	0	0	7	0	0	0	0	0	3463	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		138			137						4936	
v/s Ratio Prot		c0.04									c0.60	
v/s Ratio Perm					0.00							
v/c Ratio		0.45			0.05						0.70	
Uniform Delay, d1		57.8			55.7						3.2	
Progression Factor		1.00			1.00						1.08	
Incremental Delay, d2		10.3			0.7						0.4	
Delay (s)		68.1			56.4						3.9	
Level of Service		E			E						A	
Approach Delay (s)		68.1			56.4			0.0			3.9	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	5.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	20	8	4	22	0	0	0	0	217	2841	59
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.74	1.00						1.00	
Satd. Flow (perm)		1612		1239	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	20	8	4	22	0	0	0	0	217	2841	59
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	21	0	4	22	0	0	0	0	0	3115	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		139		107	145						4934	
v/s Ratio Prot		0.01			c0.01							
v/s Ratio Perm				0.00							0.54	
v/c Ratio		0.15		0.04	0.15						0.63	
Uniform Delay, d1		56.2		55.7	56.2						2.8	
Progression Factor		1.00		1.00	1.00						0.01	
Incremental Delay, d2		2.3		0.7	2.2						0.4	
Delay (s)		58.5		56.3	58.4						0.5	
Level of Service		E		E	E						A	
Approach Delay (s)		58.5			58.1			0.0			0.5	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	1.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Cumulative
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	32	10	5	33	0	0	0	0	389	4055	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1623			1666						5741	
Flt Permitted		1.00			0.98						1.00	
Satd. Flow (perm)		1623			1635						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	32	10	5	33	0	0	0	0	389	4055	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	42	0	0	38	0	0	0	0	0	4449	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		373			376						3387	
v/s Ratio Prot		c0.03									c0.77	
v/s Ratio Perm					0.02							
v/c Ratio		0.11			0.10						1.31	
Uniform Delay, d1		15.2			15.2						10.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.6			0.5						143.2	
Delay (s)		15.8			15.7						153.5	
Level of Service		B			B						F	
Approach Delay (s)		15.8			15.7			0.0			153.5	
Approach LOS		B			B			A			F	

Intersection Summary			
HCM Average Control Delay	151.1	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
2: C St. & 14th St.

Cumulative
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	544	44	5	33	5	2	2	211	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	544	44	5	33	5	2	2	211	5	5	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	594	43	215	15
Volume Left (vph)	6	5	2	5
Volume Right (vph)	44	5	211	5
Hadj (s)	-0.01	-0.01	-0.55	-0.10
Departure Headway (s)	4.6	5.2	4.9	5.7
Degree Utilization, x	0.75	0.06	0.29	0.02
Capacity (veh/h)	770	631	659	559
Control Delay (s)	19.9	8.6	9.9	8.8
Approach Delay (s)	19.9	8.6	9.9	8.8
Approach LOS	C	A	A	A

Intersection Summary			
Delay	16.7		
HCM Level of Service	C		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	391	155	0	0	33	517	5	4089	8	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5765				
Flt Permitted	0.74	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1233	1676			1676	1425		5765				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	391	155	0	0	33	517	5	4089	8	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	391	155	0	0	33	517	0	4102	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	21.0	21.0			21.0	21.0		71.0				
Effective Green, g (s)	21.0	21.0			21.0	21.0		71.0				
Actuated g/C Ratio	0.21	0.21			0.21	0.21		0.71				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	259	352			352	299		4093				
v/s Ratio Prot		0.09			0.02							
v/s Ratio Perm	0.32					c0.36		0.71				
v/c Ratio	1.51	0.44			0.09	1.73		1.00				
Uniform Delay, d1	39.5	34.4			31.8	39.5		14.5				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	248.4	4.0			0.5	341.8		14.6				
Delay (s)	287.9	38.3			32.4	381.3		29.1				
Level of Service	F	D			C	F		C				
Approach Delay (s)		217.0			360.4			29.1			0.0	
Approach LOS		F			F			C			A	

Intersection Summary			
HCM Average Control Delay	83.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	135.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	235	30	76	69	5	2	0	58	5	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	235	30	76	69	5	2	0	58	5	5	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					792							
pX, platoon unblocked												
vC, conflicting volume	74			265			491	486	250	542	498	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	74			265			491	486	250	542	498	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			100	100	93	99	99	99
cM capacity (veh/h)	1526			1299			459	452	789	399	444	991

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	270	150	60	15
Volume Left	5	76	2	5
Volume Right	30	5	58	5
cSH	1526	1299	770	520
Volume to Capacity	0.00	0.06	0.08	0.03
Queue Length 95th (ft)	0	5	6	2
Control Delay (s)	0.2	4.3	10.1	12.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	4.3	10.1	12.1
Approach LOS			B	B

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	247	15	20	52	16	4	18	27	24	59	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	247	15	20	52	16	4	18	27	24	59	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	68			262			460	402	254	430	402	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			262			460	402	254	430	402	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			99	97	97	95	89	96
cM capacity (veh/h)	1533			1302			441	521	784	492	522	1005

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	282	88	49	119
Volume Left	20	20	4	24
Volume Right	15	16	27	36
cSH	1533	1302	628	602
Volume to Capacity	0.01	0.02	0.08	0.20
Queue Length 95th (ft)	1	1	6	18
Control Delay (s)	0.6	1.9	11.2	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.6	1.9	11.2	12.4
Approach LOS			B	B

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	254	28	2	4	0	0	0	0	86	3560	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1649						5752	
Flt Permitted		1.00			0.91						1.00	
Satd. Flow (perm)		1654			1532						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	254	28	2	4	0	0	0	0	86	3560	37
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	282	0	0	6	0	0	0	0	0	3680	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		380			352						3624	
v/s Ratio Prot		c0.17									c0.64	
v/s Ratio Perm					0.00							
v/c Ratio		0.74			0.02						1.02	
Uniform Delay, d1		17.9			14.9						9.2	
Progression Factor		1.00			1.00						0.08	
Incremental Delay, d2		12.3			0.1						9.2	
Delay (s)		30.2			15.0						9.9	
Level of Service		C			B						A	
Approach Delay (s)		30.2			15.0			0.0			9.9	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	11.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	182	5	5	123	13	9	56	66	25	5	165
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	182	5	5	123	13	9	56	66	25	5	165

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	194	141	9	122	195
Volume Left (vph)	7	5	9	0	25
Volume Right (vph)	5	13	0	66	165
Hadj (s)	0.03	-0.01	0.53	-0.34	-0.45
Departure Headway (s)	4.9	5.0	6.1	5.2	4.6
Degree Utilization, x	0.26	0.19	0.02	0.18	0.25
Capacity (veh/h)	680	668	550	637	724
Control Delay (s)	9.7	9.1	8.0	8.1	9.1
Approach Delay (s)	9.7	9.1	8.1		9.1
Approach LOS	A	A	A		A

Intersection Summary			
Delay		9.1	
HCM Level of Service		A	
Intersection Capacity Utilization		45.0%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	6	232	0	0	75	11	5	5	5	79	0	46
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	232	0	0	75	11	5	5	5	79	0	46
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	86			232			370	330	232	332	324	80
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	86			232			370	330	232	332	324	80
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	87	100	95
cM capacity (veh/h)	1510			1336			557	587	807	612	591	980

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	238	86	15	125
Volume Left	6	0	5	79
Volume Right	0	11	5	46
cSH	1510	1700	633	710
Volume to Capacity	0.00	0.05	0.02	0.18
Queue Length 95th (ft)	0	0	2	16
Control Delay (s)	0.2	0.0	10.8	11.2
Lane LOS	A		B	B
Approach Delay (s)	0.2	0.0	10.8	11.2
Approach LOS			B	B

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		40.1%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	237	17	10	21	0	0	0	0	383	2812	43
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.45	1.00						0.99	
Satd. Flow (perm)		1661		761	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	237	17	10	21	0	0	0	0	383	2812	43
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	252	0	10	21	0	0	0	0	0	3235	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		382		175	385						3605	
v/s Ratio Prot		c0.15			0.01							
v/s Ratio Perm				0.01							0.57	
v/c Ratio		0.66		0.06	0.05						0.90	
Uniform Delay, d1		17.5		15.0	15.0						7.9	
Progression Factor		1.00		1.00	1.00						0.03	
Incremental Delay, d2		8.7		0.6	0.3						0.4	
Delay (s)		26.2		15.6	15.3						0.6	
Level of Service		C		B	B						A	
Approach Delay (s)		26.2			15.4			0.0			0.6	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	2.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1203	0	0	0	0	2053
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5					3.5
Lane Util. Factor	0.94					0.91
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	4491					4577
Flt Permitted	0.95					1.00
Satd. Flow (perm)	4491					4577
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1203	0	0	0	0	2053
RTOR Reduction (vph)	2	0	0	0	0	0
Lane Group Flow (vph)	1201	0	0	0	0	2053
Turn Type						
Protected Phases	2					1
Permitted Phases						
Actuated Green, G (s)	21.5					21.5
Effective Green, g (s)	21.5					21.5
Actuated g/C Ratio	0.43					0.43
Clearance Time (s)	3.5					3.5
Lane Grp Cap (vph)	1931					1968
v/s Ratio Prot	c0.27					c0.45
v/s Ratio Perm						
v/c Ratio	0.62					1.04
Uniform Delay, d1	11.1					14.3
Progression Factor	0.62					1.00
Incremental Delay, d2	1.0					32.6
Delay (s)	7.9					46.9
Level of Service	A					D
Approach Delay (s)	7.9		0.0			46.9
Approach LOS	A		A			D

Intersection Summary			
HCM Average Control Delay	32.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1153	78	361	882	0	0	0	15
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				4.0
Lane Util. Factor					0.91		1.00	0.95				1.00
Frt					0.99		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					4533		1593	3185				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					4533		1593	3185				1450
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1153	78	361	882	0	0	0	15
RTOR Reduction (vph)	0	0	0	0	7	0	194	0	0	0	0	13
Lane Group Flow (vph)	0	0	0	0	1224	0	167	882	0	0	0	2
Turn Type							Perm					custom
Protected Phases					2			1				3
Permitted Phases							1					3
Actuated Green, G (s)					33.5		39.5	39.5				16.0
Effective Green, g (s)					33.5		39.5	39.5				16.0
Actuated g/C Ratio					0.34		0.40	0.40				0.16
Clearance Time (s)					3.5		3.5	3.5				4.0
Lane Grp Cap (vph)					1519		629	1258				232
v/s Ratio Prot					c0.27			c0.28				c0.00
v/s Ratio Perm							0.11					
v/c Ratio					0.81		0.27	0.70				0.01
Uniform Delay, d1					30.3		20.5	25.3				35.3
Progression Factor					1.00		0.00	0.43				1.00
Incremental Delay, d2					4.7		0.8	2.7				0.1
Delay (s)					34.9		0.9	13.6				35.4
Level of Service					C		A	B				D
Approach Delay (s)		0.0			34.9			9.9			35.4	
Approach LOS		A			C			A			D	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	100.0	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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	3945	53	1258	913	0	0	0	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					0.86		0.97	0.95				0.88
Frt					1.00		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5756		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5756		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	3945	53	1258	913	0	0	0	5
RTOR Reduction (vph)	0	0	0	0	2	0	340	0	0	0	0	1
Lane Group Flow (vph)	0	0	0	0	3996	0	918	913	0	0	0	4
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					46.0		28.0	28.0				14.0
Effective Green, g (s)					46.0		28.0	28.0				14.0
Actuated g/C Ratio					0.46		0.28	0.28				0.14
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2648		865	892				351
v/s Ratio Prot					c0.69		c0.30	0.29				c0.00
v/s Ratio Perm												
v/c Ratio					1.51		1.06	1.02				0.01
Uniform Delay, d1					27.0		36.0	36.0				37.0
Progression Factor					0.73		1.00	1.00				1.00
Incremental Delay, d2					230.5		48.3	36.2				0.1
Delay (s)					250.1		84.3	72.2				37.1
Level of Service					F		F	E				D
Approach Delay (s)		0.0			250.1			79.2			37.1	
Approach LOS		A			F			E			D	

Intersection Summary			
HCM Average Control Delay	189.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	117.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	321	2046	0	0	0	0	0	1082	958
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.93	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4254	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4254	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	321	2046	0	0	0	0	0	1082	958
RTOR Reduction (vph)	0	0	0	26	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	0	295	2046	0	0	0	0	0	2039	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.5	46.5						46.5	
Effective Green, g (s)				46.5	46.5						46.5	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				741	2128						1978	
v/s Ratio Prot					c0.45						c0.48	
v/s Ratio Perm				0.19								
v/c Ratio				0.40	0.96						1.42dr	
Uniform Delay, d1				17.6	25.9						26.7	
Progression Factor				1.49	1.21						1.00	
Incremental Delay, d2				0.1	1.7						28.6	
Delay (s)				26.3	32.9						55.4	
Level of Service				C	C						E	
Approach Delay (s)		0.0			32.0			0.0			55.4	
Approach LOS		A			C			A			E	

Intersection Summary			
HCM Average Control Delay	42.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	2485	129	419	896	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4543			4505				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4543			4505				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2485	129	419	896	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2609	0	0	1315	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					46.0			46.5				
Effective Green, g (s)					46.0			46.5				
Actuated g/C Ratio					0.46			0.46				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					2090			2095				
v/s Ratio Prot					c0.57							
v/s Ratio Perm								0.29				
v/c Ratio					1.25			0.63				
Uniform Delay, d1					27.0			20.2				
Progression Factor					1.00			1.06				
Incremental Delay, d2					115.8			1.2				
Delay (s)					142.8			22.6				
Level of Service					F			C				
Approach Delay (s)		0.0			142.8			22.6			0.0	
Approach LOS		A			F			C			A	

Intersection Summary			
HCM Average Control Delay	102.6	HCM Level of Service	F
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	920	818	279	456	379	849	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.93		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5360		2508	1449	3002	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5360		2508	1449	3002	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	920	818	279	456	379	849	324
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1738	0	279	274	561	1173	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	63.0		27.0	27.0	27.0	48.0	
Effective Green, g (s)	63.0		27.0	27.0	27.0	48.0	
Actuated g/C Ratio	0.42		0.18	0.18	0.18	0.32	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	2251		451	261	540	1040	
v/s Ratio Prot	c0.32					c0.36	
v/s Ratio Perm			0.11	c0.19	0.19		
v/c Ratio	1.34dr		0.62	1.05	1.04	1.13	
Uniform Delay, d1	37.3		56.7	61.5	61.5	51.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.6		6.2	69.4	49.2	70.1	
Delay (s)	40.0		63.0	130.9	110.7	121.1	
Level of Service	D		E	F	F	F	
Approach Delay (s)	40.0				117.3		
Approach LOS	D				F		

Intersection Summary			
HCM Average Control Delay	81.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2072	295	0	0	0	0	0	0	317	1552	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4491									4538	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4491									4538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2072	295	0	0	0	0	0	0	317	1552	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	2363	0	0	0	0	0	0	0	0	1868	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		21.5									21.5	
Effective Green, g (s)		21.5									21.5	
Actuated g/C Ratio		0.43									0.43	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		1931									1951	
v/s Ratio Prot		c0.53										
v/s Ratio Perm											0.41	
v/c Ratio		1.22									0.96	
Uniform Delay, d1		14.3									13.8	
Progression Factor		1.00									1.04	
Incremental Delay, d2		105.5									10.1	
Delay (s)		119.8									24.4	
Level of Service		F									C	
Approach Delay (s)		119.8			0.0			0.0			24.4	
Approach LOS		F			A			A			C	

Intersection Summary			
HCM Average Control Delay	77.7	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	98.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Cumulative
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	2067	0	0	0	0	0	804	362	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		4554						3032	1297			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		4554						3032	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	226	2067	0	0	0	0	0	804	362	0	0	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	1	1	0	0	0
Lane Group Flow (vph)	0	2267	0	0	0	0	0	839	325	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		21.5						21.5	21.5			
Effective Green, g (s)		21.5						21.5	21.5			
Actuated g/C Ratio		0.43						0.43	0.43			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		1958						1304	558			
v/s Ratio Prot								c0.28				
v/s Ratio Perm		0.50							0.25			
v/c Ratio		1.16						0.64	0.58			
Uniform Delay, d1		14.3						11.2	10.8			
Progression Factor		0.24						1.00	1.00			
Incremental Delay, d2		71.6						2.5	4.4			
Delay (s)		75.1						13.7	15.3			
Level of Service		E						B	B			
Approach Delay (s)		75.1			0.0			14.1			0.0	
Approach LOS		E			A			B			A	

Intersection Summary			
HCM Average Control Delay	54.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Cumulative (w/ LRT)
PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	32	10	5	33	0	0	0	0	389	4055	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1623			1666						5741	
Flt Permitted		1.00			0.97						1.00	
Satd. Flow (perm)		1623			1625						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	32	10	5	33	0	0	0	0	389	4055	5
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	41	0	0	38	0	0	0	0	0	4449	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		140			141						4856	
v/s Ratio Prot		c0.03									c0.77	
v/s Ratio Perm					0.02							
v/c Ratio		0.29			0.27						0.92	
Uniform Delay, d1		56.9			56.8						7.0	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		5.3			4.6						3.7	
Delay (s)		62.2			61.5						10.7	
Level of Service		E			E						B	
Approach Delay (s)		62.2			61.5			0.0			10.7	
Approach LOS		E			E			A			B	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	254	28	2	4	0	0	0	0	86	3560	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1649						5752	
Flt Permitted		1.00			0.54						1.00	
Satd. Flow (perm)		1654			908						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	254	28	2	4	0	0	0	0	86	3560	37
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	279	0	0	6	0	0	0	0	0	3682	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		143			79						4952	
v/s Ratio Prot		c0.17									c0.64	
v/s Ratio Perm					0.01							
v/c Ratio		1.95			0.08						0.74	
Uniform Delay, d1		60.8			55.9						3.6	
Progression Factor		1.00			1.00						1.23	
Incremental Delay, d2		453.2			1.9						0.4	
Delay (s)		513.9			57.7						4.8	
Level of Service		F			E						A	
Approach Delay (s)		513.9			57.7			0.0			4.8	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	41.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

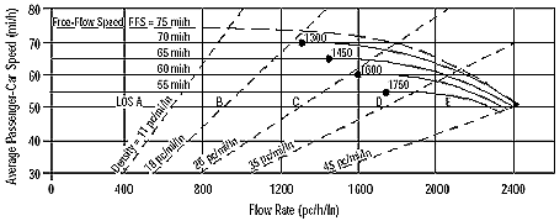
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	237	17	10	21	0	0	0	0	383	2812	43
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.35	1.00						0.99	
Satd. Flow (perm)		1661		583	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	237	17	10	21	0	0	0	0	383	2812	43
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	252	0	10	21	0	0	0	0	0	3237	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		144		50	145						4926	
v/s Ratio Prot		c0.15			0.01							
v/s Ratio Perm				0.02							0.57	
v/c Ratio		1.75		0.20	0.14						0.66	
Uniform Delay, d1		60.8		56.5	56.2						3.0	
Progression Factor		1.00		1.00	1.00						0.03	
Incremental Delay, d2		365.0		8.8	2.1						0.5	
Delay (s)		425.8		65.3	58.3						0.6	
Level of Service		F		E	E						A	
Approach Delay (s)		425.8			60.5			0.0			0.6	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	31.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information			***Site Information***	
Analyst			Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*		From/To	
Date Performed	*1/28/2008*		Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*		Analysis Year	*Cumulative*
Project Description				
☑ Oper.(LOS)		☐ Des.(N)		☐ Planning Dat
Flow Inputs				
Volume, V	*11735*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	
Calculate Flow Adjustments				
f_p	*1.00*		E_R	*1.2*
E_T	*1.5*		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*
Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		
LOS and Performance Measures			**Design (N)**	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2666*	pc/h/ln	Design LOS	
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	
D = v_p / S		pc/mi/ln	S	
LOS	*F*		D = v_p / S	
			Required Number of Lanes, N	
Glossary			**Factor Location**	
N - Number of lanes	S - Speed			

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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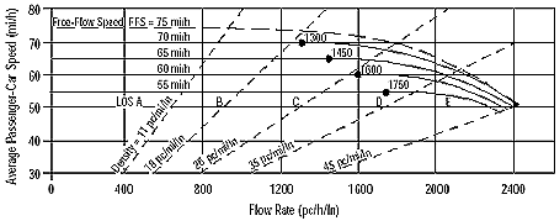

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information			***Site Information***	
Analyst			Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*		From/To	
Date Performed	*1/28/2008*		Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*		Analysis Year	*Cumulative*
Project Description				

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*11042*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
			Design LOS
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2508*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
S		mi/h	S
D = v_p / S		pc/mi/ln	D = v_p / S
LOS	*F*		Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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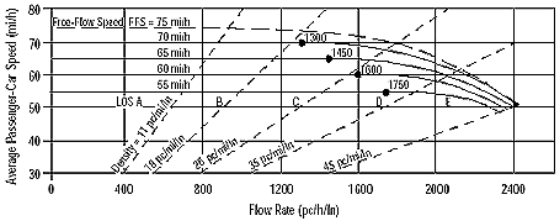

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Cumulative*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*7268*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			Calc Speed Adj and FFS	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			Design (N)
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1651*	pc/h/ln	Design LOS
S	*69.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*23.9*	pc/mi/ln	S
LOS	*C*		D = v_p / S
			Required Number of Lanes, N

Glossary		Factor Location
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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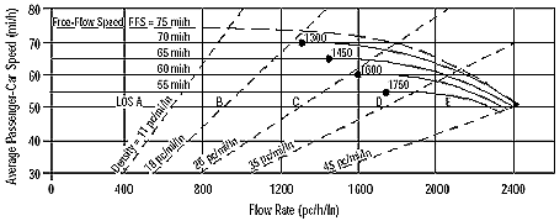

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		Site Information	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Cumulative*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*10395*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			Calc Speed Adj and FFS	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			Design (N)
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2361*	pc/h/ln	Design LOS
S	*54.8*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*43.1*	pc/mi/ln	S
LOS	*E*		D = v_p / S
			Required Number of Lanes, N

Glossary		Factor Location
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9876	0.92	Level	10	0	0.952	1.00	11272
Ramp	734	0.92	Level	10	0	0.952	1.00	838
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 2356 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	12110	See Exhibit 25-7	Yes
V_{R12}	3194	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -601.1 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.629 (Exibit 25-19)

S_R= 217.5 mph (Exhibit 25-19)

S_0= 45.5 mph(Exhibit 25-19)

S= 57.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9582	0.92	Level	10	0	0.952	1.00	10936
Ramp	2383	0.92	Level	10	0	0.952	1.00	2720
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 2286 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	13656	See Exhibit 25-7	Yes
V_{R12}	5006	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -587.8 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.142 (Exibit 25-19)

S_R= 206.3 mph (Exhibit 25-19)

S_0= 46.3 mph(Exhibit 25-19)

S= 64.7 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6907	0.92	Level	10	0	0.952	1.00	7883
Ramp	361	0.92	Level	10	0	0.952	1.00	412
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.262 using Equation (Exhibit 25-5)

V_{12}= 2064 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	8295	See Exhibit 25-7	No
V_{R12}	2476	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 22.7 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.346 (Exibit 25-19)

S_R= 57.0 mph (Exhibit 25-19)

S_0= 54.8 mph(Exhibit 25-19)

S= 55.5 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9019	0.92	Level	10	0	0.952	1.00	10293
Ramp	1376	0.92	Level	10	0	0.952	1.00	1570
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.117 using Equation (Exhibit 25-5)

V_{12}= 1206 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11863	See Exhibit 25-7	Yes
V_{R12}	2776	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 24.5 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.363 (Exibit 25-19)

S_R= 56.7 mph (Exhibit 25-19)

S_0= 45.0 mph(Exhibit 25-19)

S= 47.3 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FI}=V_F			
V_{12}			
V_{FO} = V_F - V_R			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11735	0.92	Level	10	0	0.952	1.00	13393
Ramp	2290	0.92	Level	10	0	0.952	1.00	2614
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 5417 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	13393	9400	Yes
V_{12}	5417	4400:All	Yes
$V_{FO} = V_F - V_R$	10779	9400	Yes
V_R	2614	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 43.4 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.663 (Exhibit 25-19)

S_R= 49.7 mph (Exhibit 25-19)

S_0= 59.7 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 55.2 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11042	0.92	Level	10	0	0.952	1.00	12602
Ramp	1460	0.92	Level	10	0	0.952	1.00	1666
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4509 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	12602	9400	Yes
V_{12}	4509	4400:All	Yes
$V_{FO} = V_F - V_R$	10936	9400	Yes
V_R	1666	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 35.6 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.578 (Exhibit 25-19)

S_R= 51.7 mph (Exhibit 25-19)

S_0= 59.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 56.4 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

General Information		Site Information	
Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp	Terrain: Level	Downstream Adj Ramp
☐ Yes ☐ On		☐ Yes ☐ On
☑ No ☐ Off		☑ No ☐ Off
L_{up} = ft	S_{FF} = 65.0 mph S_{FR} = 35.0 mph	L_{down} = ft
Vu = veh/h	Sketch (show lanes, L_A, L_D, V_R, V_f)	VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9980	0.92	Level	10	0	0.952	1.00	11390
Ramp	3073	0.92	Level	10	0	0.952	1.00	3507
UpStream								
DownStream								

Estimation of v_{12} — Merge Areas

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Estimation of v_{12} — Diverge Areas

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 5557 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11390	9400	Yes
V_{12}	5557	4400:All	Yes
$V_{FO} = V_F - V_R$	7883	9400	No
V_R	3507	3800	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -0.2 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Speed Estimation

D_s = 0.744 (Exhibit 25-19)

S_R= 47.9 mph (Exhibit 25-19)

S_0= 63.8 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) | S = 54.9 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11258	0.92	Level	10	0	0.952	1.00	12849
Ramp	2277	0.92	Level	10	0	0.952	1.00	2599
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 5264 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	12849	9400	Yes
V_{12}	5264	4400:All	Yes
$V_{FO} = V_F - V_R$	10250	9400	Yes
V_R	2599	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = -2.7 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.662 (Exhibit 25-19)

S_R= 49.8 mph (Exhibit 25-19)

S_0= 60.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 55.6 mph (Exhibit 25-15)

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Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	3244	89	94	196	2190
v/c Ratio	2.16dr	0.45	0.82	0.83	1.48
Control Delay	278.9	73.5	112.9	94.9	253.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	278.9	73.5	112.9	94.9	253.3
Queue Length 50th (ft)	~1292	48	101	105	~1293
Queue Length 95th (ft)	#1344	82	#216	#176	#1400
Internal Link Dist (ft)	1565			132	
Turn Bay Length (ft)					
Base Capacity (vph)	2105	201	116	239	1476
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.54	0.44	0.81	0.82	1.48

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

Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1738	279	274	561	1173
v/c Ratio	1.34dr	0.62	1.05	1.04	1.13
Control Delay	40.3	63.5	127.0	107.6	116.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	63.5	127.0	107.6	116.1
Queue Length 50th (ft)	420	144	~319	~324	~581
Queue Length 95th (ft)	468	202	#525	#453	#697
Internal Link Dist (ft)	1882			132	
Turn Bay Length (ft)					
Base Capacity (vph)	2250	451	261	540	1040
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	0.77	0.62	1.05	1.04	1.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Appendix F:

Worksheets for
Cumulative (2030) plus Proposed Project Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	12	12	5	5	0	0	0	0	356	3748	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1563			1636						5738	
Flt Permitted		1.00			0.92						1.00	
Satd. Flow (perm)		1563			1547						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	12	12	5	5	0	0	0	0	356	3748	19
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	24	0	0	10	0	0	0	0	0	4122	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		359			356						3385	
v/s Ratio Prot		c0.02									c0.72	
v/s Ratio Perm					0.01							
v/c Ratio		0.07			0.03						1.22	
Uniform Delay, d1		15.1			14.9						10.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.4			0.1						100.8	
Delay (s)		15.4			15.1						111.1	
Level of Service		B			B						F	
Approach Delay (s)		15.4			15.1			0.0			111.1	
Approach LOS		B			B			A			F	

Intersection Summary			
HCM Average Control Delay	110.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	416	7	3	10	2	5	5	3	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	416	7	3	10	2	5	5	3	5	5	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	430	15	13	15
Volume Left (vph)	7	3	5	5
Volume Right (vph)	7	2	3	5
Hadj (s)	0.03	-0.01	-0.03	-0.10
Departure Headway (s)	4.0	4.4	4.9	4.8
Degree Utilization, x	0.48	0.02	0.02	0.02
Capacity (veh/h)	888	790	675	681
Control Delay (s)	10.7	7.4	7.9	7.9
Approach Delay (s)	10.7	7.4	7.9	7.9
Approach LOS	B	A	A	A

Intersection Summary			
Delay	10.4		
HCM Level of Service	B		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	154	0	0	3	12	68	3365	44	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5750				
Flt Permitted	0.76	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1267	1676			1676	1425		5750				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	60	154	0	0	3	12	68	3365	44	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	60	154	0	0	3	12	0	3474	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	11.0	11.0			11.0	11.0		31.0				
Effective Green, g (s)	11.0	11.0			11.0	11.0		31.0				
Actuated g/C Ratio	0.22	0.22			0.22	0.22		0.62				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	279	369			369	314		3565				
v/s Ratio Prot		c0.09			0.00							
v/s Ratio Perm	0.05					0.01		0.60				
v/c Ratio	0.22	0.42			0.01	0.04		0.97				
Uniform Delay, d1	16.0	16.7			15.2	15.3		9.1				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	1.8	3.4			0.0	0.2		10.2				
Delay (s)	17.7	20.2			15.3	15.6		19.3				
Level of Service	B	C			B	B		B				
Approach Delay (s)		19.5			15.5			19.3			0.0	
Approach LOS		B			B			B			A	

Intersection Summary				
HCM Average Control Delay	19.3	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	82.8%	ICU Level of Service	E	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	55	23	56	43	7	23	6	55	5	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	55	23	56	43	7	23	6	55	5	5	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					792							
pX, platoon unblocked												
vC, conflicting volume	50			78			242	238	66	293	246	46
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			78			242	238	66	293	246	46
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			97	99	94	99	99	100
cM capacity (veh/h)	1557			1520			682	636	997	600	630	1023

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	83	106	84	15
Volume Left	5	56	23	5
Volume Right	23	7	55	5
cSH	1557	1520	855	709
Volume to Capacity	0.00	0.04	0.10	0.02
Queue Length 95th (ft)	0	3	8	2
Control Delay (s)	0.5	4.1	9.7	10.2
Lane LOS	A	A	A	B
Approach Delay (s)	0.5	4.1	9.7	10.2
Approach LOS			A	B

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	47	3	9	91	18	5	8	18	2	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	47	3	9	91	18	5	8	18	2	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	109			50			207	212	48	224	204	100
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	109			50			207	212	48	224	204	100
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	99	98	100	100	100
cM capacity (veh/h)	1481			1557			736	674	1020	702	680	956

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	68	118	31	8
Volume Left	18	9	5	2
Volume Right	3	18	18	3
cSH	1481	1557	854	769
Volume to Capacity	0.01	0.01	0.04	0.01
Queue Length 95th (ft)	1	0	3	1
Control Delay (s)	2.0	0.6	9.4	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	2.0	0.6	9.4	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay		2.6		
Intersection Capacity Utilization		19.2%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	50	29	3	9	0	0	0	0	54	3339	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1593			1656						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1593			1600						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	50	29	3	9	0	0	0	0	54	3339	121
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	78	0	0	12	0	0	0	0	0	3504	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		366			368						3612	
v/s Ratio Prot		c0.05									c0.61	
v/s Ratio Perm					0.01							
v/c Ratio		0.21			0.03						0.97	
Uniform Delay, d1		15.6			14.9						8.8	
Progression Factor		1.00			1.00						0.06	
Incremental Delay, d2		1.3			0.2						1.3	
Delay (s)		16.9			15.1						1.9	
Level of Service		B			B						A	
Approach Delay (s)		16.9			15.1			0.0			1.9	
Approach LOS		B			B			A			A	

Intersection Summary				
HCM Average Control Delay		2.3	HCM Level of Service	A
HCM Volume to Capacity ratio		0.77		
Actuated Cycle Length (s)		50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization		71.9%	ICU Level of Service	C
Analysis Period (min)		15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	18	5	5	122	16	34	62	41	22	5	105
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	18	5	5	122	16	34	62	41	22	5	105

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	24	143	34	103	132
Volume Left (vph)	1	5	34	0	22
Volume Right (vph)	5	16	0	41	105
Hadj (s)	-0.08	-0.03	0.53	-0.24	-0.41
Departure Headway (s)	4.6	4.5	5.5	4.8	4.2
Degree Utilization, x	0.03	0.18	0.05	0.14	0.15
Capacity (veh/h)	719	749	623	723	819
Control Delay (s)	7.8	8.5	7.6	7.3	7.9
Approach Delay (s)	7.8	8.5	7.4		7.9
Approach LOS	A	A	A		A

Intersection Summary				
Delay		7.9		
HCM Level of Service		A		
Intersection Capacity Utilization	32.5%		ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	48	0	0	117	23	5	5	5	13	0	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	48	0	0	117	23	5	5	5	13	0	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	140			48			204	198	48	194	186	128
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	140			48			204	198	48	194	186	128
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	100	98	100	98
cM capacity (veh/h)	1443			1559			737	695	1021	755	706	921

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	53	140	15	31
Volume Left	5	0	5	13
Volume Right	0	23	5	18
cSH	1443	1700	795	844
Volume to Capacity	0.00	0.08	0.02	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	0.7	0.0	9.6	9.4
Lane LOS	A		A	A
Approach Delay (s)	0.7	0.0	9.6	9.4
Approach LOS			A	A

Intersection Summary				
Average Delay		2.0		
Intersection Capacity Utilization		18.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	30	12	5	28	0	0	0	0	218	2857	59
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.73	1.00						1.00	
Satd. Flow (perm)		1612		1223	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	30	12	5	28	0	0	0	0	218	2857	59
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	40	0	5	28	0	0	0	0	0	3129	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		371		281	385						3611	
v/s Ratio Prot		c0.03			0.02							
v/s Ratio Perm				0.00							0.55	
v/c Ratio		0.11		0.02	0.07						0.87	
Uniform Delay, d1		15.2		14.9	15.1						7.5	
Progression Factor		1.00		1.00	1.00						0.03	
Incremental Delay, d2		0.6		0.1	0.4						1.0	
Delay (s)		15.8		15.0	15.4						1.2	
Level of Service		B		B	B						A	
Approach Delay (s)		15.8			15.4			0.0			1.2	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	1.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1432	0	0	0	0	1819
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5					3.5
Lane Util. Factor	0.94					0.91
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	4491					4577
Flt Permitted	0.95					1.00
Satd. Flow (perm)	4491					4577
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1432	0	0	0	0	1819
RTOR Reduction (vph)	5	0	0	0	0	0
Lane Group Flow (vph)	1427	0	0	0	0	1819
Turn Type						
Protected Phases	2					1
Permitted Phases						
Actuated Green, G (s)	21.5					21.5
Effective Green, g (s)	21.5					21.5
Actuated g/C Ratio	0.43					0.43
Clearance Time (s)	3.5					3.5
Lane Grp Cap (vph)	1931					1968
v/s Ratio Prot	c0.32					c0.40
v/s Ratio Perm						
v/c Ratio	0.74					0.92
Uniform Delay, d1	11.9					13.5
Progression Factor	0.74					1.00
Incremental Delay, d2	2.1					8.9
Delay (s)	10.9					22.3
Level of Service	B					C
Approach Delay (s)	10.9		0.0			22.3
Approach LOS	B		A			C

Intersection Summary			
HCM Average Control Delay	17.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	925	112	309	334	0	0	0	15
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				4.0
Lane Util. Factor					0.91		1.00	0.95				1.00
Frt					0.98		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					4503		1593	3185				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					4503		1593	3185				1450
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	925	112	309	334	0	0	0	15
RTOR Reduction (vph)	0	0	0	0	15	0	199	0	0	0	0	11
Lane Group Flow (vph)	0	0	0	0	1022	0	110	334	0	0	0	4
Turn Type							Perm					custom
Protected Phases					2			1				3
Permitted Phases							1					
Actuated Green, G (s)					29.5		35.5	35.5				24.0
Effective Green, g (s)					29.5		35.5	35.5				24.0
Actuated g/C Ratio					0.30		0.36	0.36				0.24
Clearance Time (s)					3.5		3.5	3.5				4.0
Lane Grp Cap (vph)					1328		566	1131				348
v/s Ratio Prot					c0.23			c0.10				c0.00
v/s Ratio Perm							0.07					
v/c Ratio					0.77		0.19	0.30				0.01
Uniform Delay, d1					32.2		22.3	23.2				29.0
Progression Factor					1.00		0.82	0.68				1.00
Incremental Delay, d2					4.3		0.6	0.5				0.1
Delay (s)					36.5		18.9	16.2				29.0
Level of Service					D		B	B				C
Approach Delay (s)		0.0			36.5			17.5			29.0	
Approach LOS		A			D			B			C	

Intersection Summary				
HCM Average Control Delay	29.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.38			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	55.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1617	250	305	1053	0	0	0	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					0.86		0.97	0.95				0.88
Frt					0.98		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5651		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5651		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1617	250	305	1053	0	0	0	5
RTOR Reduction (vph)	0	0	0	0	56	0	232	0	0	0	0	5
Lane Group Flow (vph)	0	0	0	0	1811	0	73	1053	0	0	0	1
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					21.0		12.0	12.0				5.0
Effective Green, g (s)					21.0		12.0	12.0				5.0
Actuated g/C Ratio					0.42		0.24	0.24				0.10
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2373		742	764				251
v/s Ratio Prot					c0.32		0.02	c0.33				c0.00
v/s Ratio Perm												
v/c Ratio					0.76		0.10	1.38				0.00
Uniform Delay, d1					12.4		14.8	19.0				20.3
Progression Factor					0.44		1.00	1.00				1.00
Incremental Delay, d2					1.2		0.3	178.4				0.0
Delay (s)					6.7		15.1	197.4				20.3
Level of Service					A		B	F				C
Approach Delay (s)		0.0			6.7			156.5			20.3	
Approach LOS		A			A			F			C	

Intersection Summary				
HCM Average Control Delay	69.7	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.86			
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	69.7%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	305	1809	0	0	0	0	0	560	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.92	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4234	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4234	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	305	1809	0	0	0	0	0	560	560
RTOR Reduction (vph)	0	0	0	113	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	0	0	192	1809	0	0	0	0	0	1118	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				21.5	21.5						21.5	
Effective Green, g (s)				21.5	21.5						21.5	
Actuated g/C Ratio				0.43	0.43						0.43	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				685	1968						1821	
v/s Ratio Prot					c0.40						c0.26	
v/s Ratio Perm				0.12								
v/c Ratio				0.28	0.92						0.90dr	
Uniform Delay, d1				9.2	13.4						11.0	
Progression Factor				0.00	0.27						1.00	
Incremental Delay, d2				0.1	0.9						1.6	
Delay (s)				0.1	4.6						12.6	
Level of Service				A	A						B	
Approach Delay (s)		0.0			3.9			0.0			12.6	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	6.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1845	234	261	718	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.98			1.00				
Flt Protected					1.00			0.99				
Satd. Flow (prot)					4499			4517				
Flt Permitted					1.00			0.99				
Satd. Flow (perm)					4499			4517				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1845	234	261	718	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	32	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2047	0	0	978	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					21.0			21.5				
Effective Green, g (s)					21.0			21.5				
Actuated g/C Ratio					0.42			0.43				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					1890			1942				
v/s Ratio Prot					c0.45							
v/s Ratio Perm								0.22				
v/c Ratio					1.08			0.50				
Uniform Delay, d1					14.5			10.4				
Progression Factor					1.00			1.28				
Incremental Delay, d2					47.2			0.5				
Delay (s)					61.7			13.9				
Level of Service					E			B				
Approach Delay (s)		0.0			61.7			13.9			0.0	
Approach LOS		A			E			B			A	

Intersection Summary			
HCM Average Control Delay	46.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
15: J St. & 3rd St.

Cumulative plus Proposed Project
AM Peak

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	2036	1213	89	168	122	1731	466
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.94		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5444		2508	1449	2995	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5444		2508	1449	2995	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2036	1213	89	168	122	1731	466
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	3249	0	89	94	196	2197	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	58.0		11.9	11.9	11.9	68.1	
Effective Green, g (s)	58.0		11.9	11.9	11.9	68.1	
Actuated g/C Ratio	0.39		0.08	0.08	0.08	0.45	
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)	2105		199	115	238	1475	
v/s Ratio Prot	c0.60					c0.68	
v/s Ratio Perm			0.04	0.06	0.07		
v/c Ratio	2.16dr		0.45	0.82	0.82	1.49	
Uniform Delay, d1	46.0		65.9	68.0	68.0	41.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	247.0		7.1	45.2	26.5	223.9	
Delay (s)	293.0		73.0	113.2	94.5	264.9	
Level of Service	F		E	F	F	F	
Approach Delay (s)	293.0				100.5		
Approach LOS	F				F		

Intersection Summary			
HCM Average Control Delay	269.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	135.3%	ICU Level of Service	H
Analysis Period (min)	15		

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

The Creamery
16: J St. & 9th St.

Cumulative plus Proposed Project
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1854	217	0	0	0	0	0	0	210	786	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4505									4529	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4505									4529	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1854	217	0	0	0	0	0	0	210	786	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	2057	0	0	0	0	0	0	0	0	994	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		46.5									46.5	
Effective Green, g (s)		46.5									46.5	
Actuated g/C Ratio		0.46									0.46	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		2095									2106	
v/s Ratio Prot		c0.46										
v/s Ratio Perm											0.22	
v/c Ratio		0.98									0.47	
Uniform Delay, d1		26.3									18.3	
Progression Factor		1.00									0.93	
Incremental Delay, d2		15.8									0.7	
Delay (s)		42.1									17.7	
Level of Service		D									B	
Approach Delay (s)		42.1			0.0			0.0			17.7	
Approach LOS		D			A			A			B	

Intersection Summary			
HCM Average Control Delay	34.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
17: J St. & 10th St.

Cumulative plus Proposed Project
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	377	1698	0	0	0	0	0	985	381	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4536						3034	1297			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4536						3034	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	377	1698	0	0	0	0	0	985	381	0	0	0
RTOR Reduction (vph)	0	34	0	0	0	0	0	3	4	0	0	0
Lane Group Flow (vph)	0	2041	0	0	0	0	0	1020	339	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		46.5						46.5	46.5			
Effective Green, g (s)		46.5						46.5	46.5			
Actuated g/C Ratio		0.46						0.46	0.46			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		2109						1411	603			
v/s Ratio Prot								c0.34				
v/s Ratio Perm		0.45							0.26			
v/c Ratio		0.97						0.72	0.56			
Uniform Delay, d1		26.0						21.6	19.4			
Progression Factor		0.22						1.00	1.00			
Incremental Delay, d2		6.5						3.2	3.8			
Delay (s)		12.4						24.8	23.1			
Level of Service		B						C	C			
Approach Delay (s)		12.4			0.0			24.4			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

The Creamery
1: C St. & 12th St.

Cumulative plus Proposed Project (w/ LRT)
AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	12	12	5	5	0	0	0	0	356	3748	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.93			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1563			1636						5738	
Flt Permitted		1.00			0.90						1.00	
Satd. Flow (perm)		1563			1516						5738	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	12	12	5	5	0	0	0	0	356	3748	19
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	22	0	0	10	0	0	0	0	0	4123	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		135			131						4854	
v/s Ratio Prot		c0.01									c0.72	
v/s Ratio Perm					0.01							
v/c Ratio		0.16			0.08						0.85	
Uniform Delay, d1		56.3			55.9						5.6	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		2.6			1.1						2.0	
Delay (s)		58.9			57.0						7.6	
Level of Service		E			E						A	
Approach Delay (s)		58.9			57.0			0.0			7.6	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	50	29	3	9	0	0	0	0	54	3339	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.95			1.00						0.99	
Flt Protected		1.00			0.99						1.00	
Satd. Flow (prot)		1593			1656						5733	
Flt Permitted		1.00			0.95						1.00	
Satd. Flow (perm)		1593			1584						5733	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	50	29	3	9	0	0	0	0	54	3339	121
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	74	0	0	12	0	0	0	0	0	3510	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		138			137						4936	
v/s Ratio Prot		c0.05									c0.61	
v/s Ratio Perm					0.01							
v/c Ratio		0.54			0.09						0.71	
Uniform Delay, d1		58.2			55.9						3.3	
Progression Factor		1.00			1.00						1.07	
Incremental Delay, d2		14.3			1.3						0.5	
Delay (s)		72.5			57.2						4.0	
Level of Service		E			E						A	
Approach Delay (s)		72.5			57.2			0.0			4.0	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	5.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	30	12	5	28	0	0	0	0	218	2857	59
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.96		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						1.00	
Satd. Flow (prot)		1612		1593	1676						5731	
Flt Permitted		1.00		0.73	1.00						1.00	
Satd. Flow (perm)		1612		1223	1676						5731	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	30	12	5	28	0	0	0	0	218	2857	59
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	32	0	5	28	0	0	0	0	0	3132	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		139		106	145						4934	
v/s Ratio Prot		c0.02			0.02							
v/s Ratio Perm				0.00							0.55	
v/c Ratio		0.23		0.05	0.19						0.63	
Uniform Delay, d1		56.6		55.7	56.4						2.8	
Progression Factor		1.00		1.00	1.00						0.04	
Incremental Delay, d2		3.8		0.8	2.9						0.4	
Delay (s)		60.4		56.6	59.4						0.5	
Level of Service		E		E	E						A	
Approach Delay (s)		60.4			59.0			0.0			0.5	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	1.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	45	14	5	5	0	0	0	0	393	4097	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1623			1636						5741	
Flt Permitted		1.00			0.91						1.00	
Satd. Flow (perm)		1623			1533						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	45	14	5	5	0	0	0	0	393	4097	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	59	0	0	10	0	0	0	0	0	4495	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						29.5	
Effective Green, g (s)		11.5			11.5						29.5	
Actuated g/C Ratio		0.23			0.23						0.59	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		373			353						3387	
v/s Ratio Prot		c0.04									c0.78	
v/s Ratio Perm					0.01							
v/c Ratio		0.16			0.03						1.33	
Uniform Delay, d1		15.4			14.9						10.2	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.9			0.1						149.3	
Delay (s)		16.3			15.1						159.5	
Level of Service		B			B						F	
Approach Delay (s)		16.3			15.1			0.0			159.5	
Approach LOS		B			B			A			F	

Intersection Summary			
HCM Average Control Delay	157.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	7	612	50	5	1	5	2	2	172	5	5	5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	612	50	5	1	5	2	2	172	5	5	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	669	11	176	15
Volume Left (vph)	7	5	2	5
Volume Right (vph)	50	5	172	5
Hadj (s)	-0.01	-0.15	-0.55	-0.10
Departure Headway (s)	4.4	5.0	5.0	5.7
Degree Utilization, x	0.82	0.02	0.24	0.02
Capacity (veh/h)	800	663	675	580
Control Delay (s)	24.1	8.1	9.6	8.8
Approach Delay (s)	24.1	8.1	9.6	8.8
Approach LOS	C	A	A	A

Intersection Summary			
Delay	20.7		
HCM Level of Service	C		
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	375	149	0	0	33	513	5	4130	8	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5765				
Flt Permitted	0.74	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1233	1676			1676	1425		5765				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	375	149	0	0	33	513	5	4130	8	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	375	149	0	0	33	513	0	4143	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	21.0	21.0			21.0	21.0		71.0				
Effective Green, g (s)	21.0	21.0			21.0	21.0		71.0				
Actuated g/C Ratio	0.21	0.21			0.21	0.21		0.71				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Grp Cap (vph)	259	352			352	299		4093				
v/s Ratio Prot		0.09			0.02							
v/s Ratio Perm	0.30					c0.36		0.72				
v/c Ratio	1.45	0.42			0.09	1.72		1.01				
Uniform Delay, d1	39.5	34.2			31.8	39.5		14.5				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	221.9	3.7			0.5	335.9		17.1				
Delay (s)	261.4	38.0			32.4	375.4		31.6				
Level of Service	F	D			C	F		C				
Approach Delay (s)		197.9			354.7			31.6			0.0	
Approach LOS		F			F			C			A	

Intersection Summary			
HCM Average Control Delay	82.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	135.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	243	31	51	46	5	3	5	86	5	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	243	31	51	46	5	3	5	86	5	5	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					792							
pX, platoon unblocked												
vC, conflicting volume	51			274			426	422	258	508	434	48
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	51			274			426	422	258	508	434	48
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			99	99	89	99	99	100
cM capacity (veh/h)	1555			1289			514	501	780	406	493	1020

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	279	102	94	15
Volume Left	5	51	3	5
Volume Right	31	5	86	5
cSH	1555	1289	746	548
Volume to Capacity	0.00	0.04	0.13	0.03
Queue Length 95th (ft)	0	3	11	2
Control Delay (s)	0.2	4.1	10.5	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	4.1	10.5	11.7
Approach LOS			B	B

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	230	14	30	80	25	5	22	32	16	39	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	19	230	14	30	80	25	5	22	32	16	39	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					397							
pX, platoon unblocked												
vC, conflicting volume	105			244			470	440	237	470	434	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	105			244			470	440	237	470	434	92
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			99	96	96	96	92	98
cM capacity (veh/h)	1486			1322			450	493	802	454	497	965

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	263	135	59	78
Volume Left	19	30	5	16
Volume Right	14	25	32	23
cSH	1486	1322	617	567
Volume to Capacity	0.01	0.02	0.10	0.14
Queue Length 95th (ft)	1	2	8	12
Control Delay (s)	0.6	1.9	11.5	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.6	1.9	11.5	12.4
Approach LOS			B	B

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	258	28	4	9	0	0	0	0	87	3591	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1651						5752	
Flt Permitted		1.00			0.91						1.00	
Satd. Flow (perm)		1654			1525						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	258	28	4	9	0	0	0	0	87	3591	37
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	286	0	0	13	0	0	0	0	0	3712	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						31.5	
Effective Green, g (s)		11.5			11.5						31.5	
Actuated g/C Ratio		0.23			0.23						0.63	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		380			351						3624	
v/s Ratio Prot		c0.17									c0.65	
v/s Ratio Perm					0.01							
v/c Ratio		0.75			0.04						1.02	
Uniform Delay, d1		17.9			14.9						9.2	
Progression Factor		1.00			1.00						0.08	
Incremental Delay, d2		12.9			0.2						12.6	
Delay (s)		30.8			15.1						13.4	
Level of Service		C			B						B	
Approach Delay (s)		30.8			15.1			0.0			13.4	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	8	199	5	5	126	14	11	74	87	22	5	147
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	8	199	5	5	126	14	11	74	87	22	5	147

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	212	145	11	161	174
Volume Left (vph)	8	5	11	0	22
Volume Right (vph)	5	14	0	87	147
Hadj (s)	0.03	-0.02	0.53	-0.34	-0.45
Departure Headway (s)	5.0	5.1	6.2	5.3	4.7
Degree Utilization, x	0.29	0.20	0.02	0.24	0.23
Capacity (veh/h)	669	651	546	632	696
Control Delay (s)	10.1	9.3	8.1	8.7	9.1
Approach Delay (s)	10.1	9.3	8.7		9.1
Approach LOS	B	A	A		A

Intersection Summary				
Delay		9.3		
HCM Level of Service		A		
Intersection Capacity Utilization		47.6%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	255	0	0	44	7	5	5	5	106	0	62
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	7	255	0	0	44	7	5	5	5	106	0	62
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					395							
pX, platoon unblocked												
vC, conflicting volume	51			255			378	320	255	324	316	48
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	51			255			378	320	255	324	316	48
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	83	100	94
cM capacity (veh/h)	1555			1310			542	594	784	619	597	1022

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	262	51	15	168
Volume Left	7	0	5	106
Volume Right	0	7	5	62
cSH	1555	1700	624	724
Volume to Capacity	0.00	0.03	0.02	0.23
Queue Length 95th (ft)	0	0	2	22
Control Delay (s)	0.2	0.0	10.9	11.5
Lane LOS	A		B	B
Approach Delay (s)	0.2	0.0	10.9	11.5
Approach LOS			B	B

Intersection Summary				
Average Delay		4.3		
Intersection Capacity Utilization		45.2%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	248	18	16	34	0	0	0	0	389	2861	43
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.43	1.00						0.99	
Satd. Flow (perm)		1661		722	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	248	18	16	34	0	0	0	0	389	2861	43
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	264	0	16	34	0	0	0	0	0	3290	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						31.5	
Effective Green, g (s)		11.5		11.5	11.5						31.5	
Actuated g/C Ratio		0.23		0.23	0.23						0.63	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		382		166	385						3605	
v/s Ratio Prot		c0.16			0.02							
v/s Ratio Perm				0.02							0.57	
v/c Ratio		0.69		0.10	0.09						0.91	
Uniform Delay, d1		17.6		15.2	15.1						8.1	
Progression Factor		1.00		1.00	1.00						0.03	
Incremental Delay, d2		9.9		1.2	0.5						0.5	
Delay (s)		27.5		16.3	15.6						0.7	
Level of Service		C		B	B						A	
Approach Delay (s)		27.5			15.8			0.0			0.7	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM Average Control Delay	2.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	1204	0	0	0	0	2047
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5					3.5
Lane Util. Factor	0.94					0.91
Frt	1.00					1.00
Flt Protected	0.95					1.00
Satd. Flow (prot)	4491					4577
Flt Permitted	0.95					1.00
Satd. Flow (perm)	4491					4577
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1204	0	0	0	0	2047
RTOR Reduction (vph)	2	0	0	0	0	0
Lane Group Flow (vph)	1202	0	0	0	0	2047
Turn Type						
Protected Phases	2					1
Permitted Phases						
Actuated Green, G (s)	21.5					21.5
Effective Green, g (s)	21.5					21.5
Actuated g/C Ratio	0.43					0.43
Clearance Time (s)	3.5					3.5
Lane Grp Cap (vph)	1931					1968
v/s Ratio Prot	c0.27					c0.45
v/s Ratio Perm						
v/c Ratio	0.62					1.04
Uniform Delay, d1	11.1					14.3
Progression Factor	0.54					1.00
Incremental Delay, d2	1.1					31.6
Delay (s)	7.0					45.9
Level of Service	A					D
Approach Delay (s)	7.0		0.0			45.9
Approach LOS	A		A			D

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	1145	78	373	912	0	0	0	15
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				4.0
Lane Util. Factor					0.91		1.00	0.95				1.00
Frt					0.99		1.00	1.00				0.86
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					4533		1593	3185				1450
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					4533		1593	3185				1450
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	1145	78	373	912	0	0	0	15
RTOR Reduction (vph)	0	0	0	0	7	0	194	0	0	0	0	13
Lane Group Flow (vph)	0	0	0	0	1216	0	179	912	0	0	0	2
Turn Type							Perm					custom
Protected Phases					2			1				3
Permitted Phases							1					3
Actuated Green, G (s)					33.5		39.5	39.5				16.0
Effective Green, g (s)					33.5		39.5	39.5				16.0
Actuated g/C Ratio					0.34		0.40	0.40				0.16
Clearance Time (s)					3.5		3.5	3.5				4.0
Lane Grp Cap (vph)					1519		629	1258				232
v/s Ratio Prot					c0.27			c0.29				c0.00
v/s Ratio Perm							0.11					
v/c Ratio					0.80		0.29	0.72				0.01
Uniform Delay, d1					30.2		20.6	25.6				35.3
Progression Factor					1.00		1.42	0.83				1.00
Incremental Delay, d2					4.5		0.9	3.0				0.1
Delay (s)					34.7		30.2	24.2				35.4
Level of Service					C		C	C				D
Approach Delay (s)		0.0			34.7			25.9			35.4	
Approach LOS		A			C			C			D	

Intersection Summary				
HCM Average Control Delay	30.2	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.62			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	11.0	
Intersection Capacity Utilization	62.8%	ICU Level of Service	B	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	3970	53	1265	918	0	0	0	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					0.86		0.97	0.95				0.88
Frt					1.00		1.00	1.00				0.85
Flt Protected					1.00		0.95	1.00				1.00
Satd. Flow (prot)					5756		3090	3185				2508
Flt Permitted					1.00		0.95	1.00				1.00
Satd. Flow (perm)					5756		3090	3185				2508
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	3970	53	1265	918	0	0	0	5
RTOR Reduction (vph)	0	0	0	0	2	0	340	0	0	0	0	1
Lane Group Flow (vph)	0	0	0	0	4021	0	925	918	0	0	0	4
Turn Type							Prot					custom
Protected Phases					4		5	2				3
Permitted Phases												
Actuated Green, G (s)					46.0		28.0	28.0				14.0
Effective Green, g (s)					46.0		28.0	28.0				14.0
Actuated g/C Ratio					0.46		0.28	0.28				0.14
Clearance Time (s)					4.0		4.0	4.0				4.0
Lane Grp Cap (vph)					2648		865	892				351
v/s Ratio Prot					c0.70		c0.30	0.29				c0.00
v/s Ratio Perm												
v/c Ratio					1.52		1.07	1.03				0.01
Uniform Delay, d1					27.0		36.0	36.0				37.0
Progression Factor					0.74		1.00	1.00				1.00
Incremental Delay, d2					234.7		51.0	37.8				0.1
Delay (s)					254.6		87.0	73.8				37.1
Level of Service					F		F	E				D
Approach Delay (s)		0.0			254.6			81.4			37.1	
Approach LOS		A			F			F			D	

Intersection Summary				
HCM Average Control Delay	193.6	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.14			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0	
Intersection Capacity Utilization	118.3%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	322	2055	0	0	0	0	0	1107	980
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				3.5	3.5						3.5	
Lane Util. Factor				1.00	0.91						0.91	
Frt				1.00	1.00						0.93	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1593	4577						4254	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1593	4577						4254	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	322	2055	0	0	0	0	0	1107	980
RTOR Reduction (vph)	0	0	0	24	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	0	0	298	2055	0	0	0	0	0	2086	0
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				46.5	46.5						46.5	
Effective Green, g (s)				46.5	46.5						46.5	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				3.5	3.5						3.5	
Lane Grp Cap (vph)				741	2128						1978	
v/s Ratio Prot					c0.45						c0.49	
v/s Ratio Perm				0.19								
v/c Ratio				0.40	0.97						1.45dr	
Uniform Delay, d1				17.6	26.0						26.7	
Progression Factor				1.49	1.22						1.00	
Incremental Delay, d2				0.1	1.9						36.4	
Delay (s)				26.5	33.6						63.2	
Level of Service				C	C						E	
Approach Delay (s)		0.0			32.6			0.0			63.2	
Approach LOS		A			C			A			E	

Intersection Summary			
HCM Average Control Delay	46.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	2499	130	433	927	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			3.5				
Lane Util. Factor					0.91			0.91				
Frt					0.99			1.00				
Flt Protected					1.00			0.98				
Satd. Flow (prot)					4543			4505				
Flt Permitted					1.00			0.98				
Satd. Flow (perm)					4543			4505				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	2499	130	433	927	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	2624	0	0	1360	0	0	0	0
Turn Type							Perm					
Protected Phases					2			8				
Permitted Phases							8					
Actuated Green, G (s)					46.0			46.5				
Effective Green, g (s)					46.0			46.5				
Actuated g/C Ratio					0.46			0.46				
Clearance Time (s)					4.0			3.5				
Lane Grp Cap (vph)					2090			2095				
v/s Ratio Prot					c0.58							
v/s Ratio Perm								0.30				
v/c Ratio					1.26			0.65				
Uniform Delay, d1					27.0			20.5				
Progression Factor					1.00			0.82				
Incremental Delay, d2					119.0			1.2				
Delay (s)					146.0			18.0				
Level of Service					F			B				
Approach Delay (s)		0.0			146.0			18.0			0.0	
Approach LOS		A			F			B			A	

Intersection Summary			
HCM Average Control Delay	102.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	99.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	958	818	279	456	379	906	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.93		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5369		2508	1449	3002	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5369		2508	1449	3002	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	958	818	279	456	379	906	324
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1776	0	279	274	561	1230	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	63.0		27.0	27.0	27.0	48.0	
Effective Green, g (s)	63.0		27.0	27.0	27.0	48.0	
Actuated g/C Ratio	0.42		0.18	0.18	0.18	0.32	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	2255		451	261	540	1040	
v/s Ratio Prot	c0.33					c0.38	
v/s Ratio Perm			0.11	c0.19	0.19		
v/c Ratio	1.34dr		0.62	1.05	1.04	1.18	
Uniform Delay, d1	37.7		56.7	61.5	61.5	51.0	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.9		6.2	69.4	49.2	92.2	
Delay (s)	40.6		63.0	130.9	110.7	143.2	
Level of Service	D		E	F	F	F	
Approach Delay (s)	40.6				117.3		
Approach LOS	D				F		

Intersection Summary			
HCM Average Control Delay	88.3	HCM Level of Service	F
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2082	297	0	0	0	0	0	0	323	1580	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4491									4538	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4491									4538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2082	297	0	0	0	0	0	0	323	1580	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	2375	0	0	0	0	0	0	0	0	1902	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		21.5									21.5	
Effective Green, g (s)		21.5									21.5	
Actuated g/C Ratio		0.43									0.43	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		1931									1951	
v/s Ratio Prot		c0.53										
v/s Ratio Perm											0.42	
v/c Ratio		1.23									0.98	
Uniform Delay, d1		14.3									14.0	
Progression Factor		1.00									1.64	
Incremental Delay, d2		108.2									12.4	
Delay (s)		122.5									35.3	
Level of Service		F									D	
Approach Delay (s)		122.5			0.0			0.0			35.3	
Approach LOS		F			A			A			D	

Intersection Summary			
HCM Average Control Delay	83.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	226	2067	0	0	0	0	0	847	381	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			
Lane Util. Factor		0.91						0.91	0.91			
Frt		1.00						0.99	0.85			
Flt Protected		1.00						1.00	1.00			
Satd. Flow (prot)		4554						3032	1297			
Flt Permitted		1.00						1.00	1.00			
Satd. Flow (perm)		4554						3032	1297			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	226	2067	0	0	0	0	0	847	381	0	0	0
RTOR Reduction (vph)	0	26	0	0	0	0	0	1	1	0	0	0
Lane Group Flow (vph)	0	2267	0	0	0	0	0	884	342	0	0	0
Turn Type	Perm								Perm			
Protected Phases		2						8				
Permitted Phases	2								8			
Actuated Green, G (s)		21.5						21.5	21.5			
Effective Green, g (s)		21.5						21.5	21.5			
Actuated g/C Ratio		0.43						0.43	0.43			
Clearance Time (s)		3.5						3.5	3.5			
Lane Grp Cap (vph)		1958						1304	558			
v/s Ratio Prot								c0.29				
v/s Ratio Perm		0.50							0.26			
v/c Ratio		1.16						0.68	0.61			
Uniform Delay, d1		14.3						11.5	11.0			
Progression Factor		0.26						1.00	1.00			
Incremental Delay, d2		71.6						2.9	5.0			
Delay (s)		75.2						14.3	16.0			
Level of Service		E						B	B			
Approach Delay (s)		75.2			0.0			14.8			0.0	
Approach LOS		E			A			B			A	

Intersection Summary			
HCM Average Control Delay	54.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	45	14	5	5	0	0	0	0	393	4097	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1623			1636						5741	
Flt Permitted		1.00			0.89						1.00	
Satd. Flow (perm)		1623			1499						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	45	14	5	5	0	0	0	0	393	4097	5
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	58	0	0	10	0	0	0	0	0	4495	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						112.5	
Effective Green, g (s)		11.5			11.5						112.5	
Actuated g/C Ratio		0.09			0.09						0.85	
Clearance Time (s)		3.5			3.5						5.5	
Lane Grp Cap (vph)		140			130						4856	
v/s Ratio Prot		c0.04									c0.78	
v/s Ratio Perm					0.01							
v/c Ratio		0.41			0.08						0.93	
Uniform Delay, d1		57.6			55.9						7.3	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		8.8			1.2						4.1	
Delay (s)		66.4			57.0						11.4	
Level of Service		E			E						B	
Approach Delay (s)		66.4			57.0			0.0			11.4	
Approach LOS		E			E			A			B	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	258	28	4	9	0	0	0	0	87	3591	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						3.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1654			1651						5752	
Flt Permitted		1.00			0.47						1.00	
Satd. Flow (perm)		1654			785						5752	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	258	28	4	9	0	0	0	0	87	3591	37
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	283	0	0	13	0	0	0	0	0	3714	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		11.5			11.5						114.5	
Effective Green, g (s)		11.5			11.5						114.5	
Actuated g/C Ratio		0.09			0.09						0.86	
Clearance Time (s)		3.5			3.5						3.5	
Lane Grp Cap (vph)		143			68						4952	
v/s Ratio Prot		c0.17									c0.65	
v/s Ratio Perm					0.02							
v/c Ratio		1.98			0.19						0.75	
Uniform Delay, d1		60.8			56.4						3.6	
Progression Factor		1.00			1.00						0.00	
Incremental Delay, d2		465.5			6.2						0.4	
Delay (s)		526.2			62.6						0.4	
Level of Service		F			E						A	
Approach Delay (s)		526.2			62.6			0.0			0.4	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	38.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

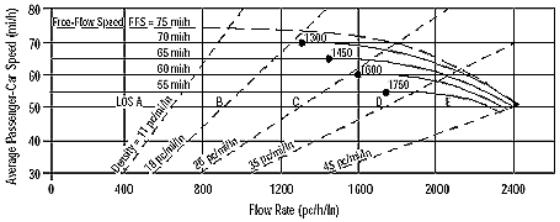
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	248	18	16	34	0	0	0	0	389	2861	43
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						3.5	
Lane Util. Factor		1.00		1.00	1.00						0.86	
Frt		0.99		1.00	1.00						1.00	
Flt Protected		1.00		0.95	1.00						0.99	
Satd. Flow (prot)		1661		1593	1676						5722	
Flt Permitted		1.00		0.35	1.00						0.99	
Satd. Flow (perm)		1661		583	1676						5722	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	248	18	16	34	0	0	0	0	389	2861	43
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	264	0	16	34	0	0	0	0	0	3292	0
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		11.5		11.5	11.5						114.5	
Effective Green, g (s)		11.5		11.5	11.5						114.5	
Actuated g/C Ratio		0.09		0.09	0.09						0.86	
Clearance Time (s)		3.5		3.5	3.5						3.5	
Lane Grp Cap (vph)		144		50	145						4926	
v/s Ratio Prot		c0.16			0.02							
v/s Ratio Perm				0.03							0.58	
v/c Ratio		1.83		0.32	0.23						0.67	
Uniform Delay, d1		60.8		57.1	56.6						3.0	
Progression Factor		1.00		1.00	1.00						0.00	
Incremental Delay, d2		401.3		16.1	3.8						0.5	
Delay (s)		462.0		73.2	60.4						0.5	
Level of Service		F		E	E						A	
Approach Delay (s)		462.0			64.5			0.0			0.5	
Approach LOS		F			E			A			A	

Intersection Summary			
HCM Average Control Delay	35.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	133.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Cumulative + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*11742*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2667*	pc/h/ln	Design LOS
S		mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S		pc/mi/ln	S
LOS	*F*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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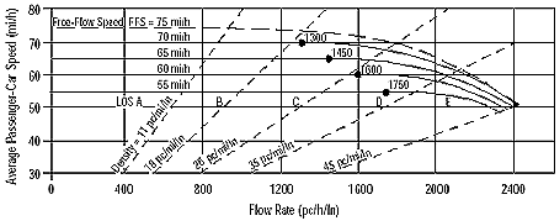

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 NB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Cumulative + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*11099*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
			Design LOS
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2521*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
S		mi/h	S
D = v_p / S		pc/mi/ln	D = v_p / S
LOS	*F*		Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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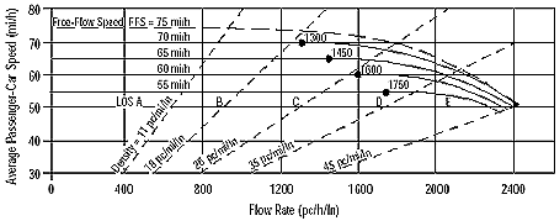
BASIC FREEWAY SEGMENTS WORKSHEET



Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*AM Peak*	Analysis Year	*Cumulative + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*7304*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1659*	pc/h/ln	Design LOS
S	*69.1*	mi/h	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
D = v_p / S	*24.0*	pc/mi/ln	S
LOS	*C*		D = v_p / S
			Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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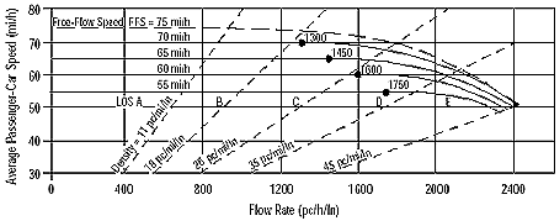

Application	Input
Operational (LOS)	FFS, N, v_p
Design (N)	FFS, LOS, v_p
Design (v_p)	FFS, LOS, N
Planning (LOS)	FFS, N, AADT
Planning (N)	FFS, LOS, AADT
Planning (v_p)	FFS, LOS, N

General Information		***Site Information***	
Analyst		Highway/Direction of Travel	*I-5 SB*
Agency or Company	*Kimley-Horn and Associates*	From/To	
Date Performed	*1/28/2008*	Jurisdiction	*City of Sacrament*
Analysis Time Period	*PM Peak*	Analysis Year	*Cumulative + PP*
Project Description			

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Dat

Flow Inputs				
Volume, V	*10450*	veh/h	Peak-Hour Factor, PHF	*0.92*
AADT		veh/day	%Trucks and Buses, P_T	*9*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
Driver type adjustment	*1.00*		Up/Down %	

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.957*

Speed Inputs			**Calc Speed Adj and FFS**	
Lane Width	*12.0*	ft	f_{LW}	
Rt-Shoulder Lat. Clearance	*6.0*	ft	f_{LC}	
Interchange Density	*0.50*	I/mi	f_{ID}	
Number of Lanes, N	*5*		f_N	
FFS (measured)	*70.0*	mi/h	FFS	*70.0*
Base free-flow Speed, BFFS		mi/h		

LOS and Performance Measures			**Design (N)**
Operational (LOS)			Design (N)
			Design LOS
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2374*	pc/h/ln	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)
S	*54.3*	mi/h	S
D = v_p / S	*43.7*	pc/mi/ln	D = v_p / S
LOS	*E*		Required Number of Lanes, N

Glossary		**Factor Location**
N - Number of lanes	S - Speed	

V - Hourly volume	D - Density	E_R - Exhibits23-8, 23-10	f_{LW} - Ex
v_p - Flow rate	FFS - Free-flow speed	E_T - Exhibits 23-8, 23-10, 23-11	f_{LC} - Exh
LOS - Level of service	BFFS - Base free-flow speed	f_p - Page 23-12	f_N - Exh
DDHV - Directional design hour volume		LOS, S, FFS, v_p - Exhibits 23-2, 23-3	f_{ID} - Exh

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9876	0.92	Level	10	0	0.952	1.00	11272
Ramp	756	0.92	Level	10	0	0.952	1.00	863
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 2356 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	12135	See Exhibit 25-7	Yes
V_{R12}	3219	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -600.9 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.627 (Exibit 25-19)

S_R= 217.4 mph (Exhibit 25-19)

S_0= 45.5 mph(Exhibit 25-19)

S= 57.6 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9582	0.92	Level	10	0	0.952	1.00	10936
Ramp	2403	0.92	Level	10	0	0.952	1.00	2743
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.209 using Equation (Exhibit 25-5)

V_{12}= 2286 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	13679	See Exhibit 25-7	Yes
V_{R12}	5029	4600:All	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = -587.6 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = -6.129 (Exibit 25-19)

S_R= 206.0 mph (Exhibit 25-19)

S_0= 46.3 mph(Exhibit 25-19)

S= 64.8 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	6907	0.92	Level	10	0	0.952	1.00	7883
Ramp	369	0.92	Level	10	0	0.952	1.00	421
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.261 using Equation (Exhibit 25-5)

V_{12}= 2055 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	8304	See Exhibit 25-7	No
V_{R12}	2476	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 22.7 (pc/ m/ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.346 (Exibit 25-19)

S_R= 57.0 mph (Exhibit 25-19)

S_0= 54.8 mph(Exhibit 25-19)

S= 55.4 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimely-Horn and Associates	Junction	Merge Lane @ I Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

V_u = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9019	0.92	Level	10	0	0.952	1.00	10293
Ramp	1400	0.92	Level	10	0	0.952	1.00	1598
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 0.114 using Equation (Exhibit 25-5)

V_{12}= 1170 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	11891	See Exhibit 25-7	Yes
V_{R12}	2768	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 24.4 (pc/ m/ln)

LOS = F (Exhibit 25-4)

Speed Estimation

M_S = 0.362 (Exibit 25-19)

S_R= 56.7 mph (Exhibit 25-19)

S_0= 44.9 mph(Exhibit 25-19)

S= 47.2 mph(Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$			
V_{12}			
$V_{FO} = V_F - V_R$			
V_R			

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = (pc/ m/ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph(Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S = mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11735	0.92	Level	10	0	0.952	1.00	13393
Ramp	2276	0.92	Level	10	0	0.952	1.00	2598
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 5405 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	13393	9400	Yes
V_{12}	5405	4400:All	Yes
$V_{FO} = V_F - V_R$	10795	9400	Yes
V_R	2598	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 43.3 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.662 (Exhibit 25-19)

S_R= 49.8 mph (Exhibit 25-19)

S_0= 59.6 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 55.2 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (NB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11042	0.92	Level	10	0	0.952	1.00	12602
Ramp	1462	0.92	Level	10	0	0.952	1.00	1669
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 4512 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	12602	9400	Yes
V_{12}	4512	4400:All	Yes
$V_{FO} = V_F - V_R$	10933	9400	Yes
V_R	1669	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 35.6 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.578 (Exhibit 25-19)

S_R= 51.7 mph (Exhibit 25-19)

S_0= 59.4 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 56.4 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	AM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	9980	0.92	Level	10	0	0.952	1.00	11390
Ramp	3606	0.92	Level	10	0	0.952	1.00	4116
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 6007 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	11390	9400	Yes
V_{12}	6007	4400:All	Yes
$V_{FO} = V_F - V_R$	7274	9400	No
V_R	4116	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 3.7 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.798 (Exhibit 25-19)

S_R= 46.6 mph (Exhibit 25-19)

S_0= 64.7 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 53.7 mph (Exhibit 25-15)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst		Freeway/Dir of Travel	Interstate-5 (SB)
Agency or Company	Kimley-Horn and Associates	Junction	Diverge Lane @ J Street
Date Performed	1/31/2008	Jurisdiction	City of Sacramento
Analysis Time Period	PM Peak	Analysis Year	Cumulative plus Project

Project Description

Inputs

Upstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{up} = ft

Vu = veh/h

Terrain: Level

S_{FF} = 65.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp

☐ Yes ☐ On

☑ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	11258	0.92	Level	10	0	0.952	1.00	12849
Ramp	3223	0.92	Level	10	0	0.952	1.00	3678
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}			
V_{R12}			

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.260 using Equation (Exhibit 25-11)

V_{12} = 6062 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	12849	9400	Yes
V_{12}	6062	4400:All	Yes
$V_{FO} = V_F - V_R$	9171	9400	No
V_R	3678	3800	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.0009\, L_D$

D_R = 4.2 (pc/ mi /ln)

LOS= F (Exhibit 25-4)

Speed Estimation

D_s = 0.759 (Exhibit 25-19)

S_R= 47.5 mph (Exhibit 25-19)

S_0= 62.0 mph (Exhibit 25-19)

S= mph (Exhibit 25-14) S = 54.2 mph (Exhibit 25-15)

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Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	3249	89	94	196	2197
v/c Ratio	2.16dr	0.45	0.82	0.83	1.49
Control Delay	279.9	73.5	112.9	94.9	255.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	279.9	73.5	112.9	94.9	255.4
Queue Length 50th (ft)	~1295	48	101	105	~1299
Queue Length 95th (ft)	#1347	82	#216	#176	#1407
Internal Link Dist (ft)	1565			132	
Turn Bay Length (ft)					
Base Capacity (vph)	2105	201	116	239	1476
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.54	0.44	0.81	0.82	1.49

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Lane Group	EBT	NBR	SBL	SBT	NER
Lane Group Flow (vph)	1776	279	274	561	1230
v/c Ratio	1.34dr	0.62	1.05	1.04	1.18
Control Delay	40.9	63.5	127.0	107.6	136.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	63.5	127.0	107.6	136.4
Queue Length 50th (ft)	434	144	~319	~324	~632
Queue Length 95th (ft)	482	202	#525	#453	#749
Internal Link Dist (ft)	1882			132	
Turn Bay Length (ft)					
Base Capacity (vph)	2255	451	261	540	1040
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	0.79	0.62	1.05	1.04	1.18

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Appendix G:

Worksheets for Mitigated Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	310	119	0	0	11	172	13	4531	9	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0				
Lane Util. Factor	1.00	1.00			1.00	1.00		0.86				
Frt	1.00	1.00			1.00	0.85		1.00				
Flt Protected	0.95	1.00			1.00	1.00		1.00				
Satd. Flow (prot)	1593	1676			1676	1425		5765				
Flt Permitted	0.75	1.00			1.00	1.00		1.00				
Satd. Flow (perm)	1258	1676			1676	1425		5765				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	310	119	0	0	11	172	13	4531	9	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	310	119	0	0	11	172	0	4553	0	0	0	0
Turn Type	Perm					Perm	Perm					
Protected Phases		2			2			4				
Permitted Phases	2					2	4					
Actuated Green, G (s)	21.0	21.0			21.0	21.0		71.0				
Effective Green, g (s)	21.0	21.0			21.0	21.0		71.0				
Actuated g/C Ratio	0.21	0.21			0.21	0.21		0.71				
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0				
Vehicle Extension (s)	2.0	2.0			2.0	2.0		2.0				
Lane Grp Cap (vph)	264	352			352	299		4093				
v/s Ratio Prot		0.07			0.01							
v/s Ratio Perm	c0.25					0.12		0.79				
v/c Ratio	1.17	0.34			0.03	0.58		1.11				
Uniform Delay, d1	39.5	33.6			31.4	35.5		14.5				
Progression Factor	1.00	1.00			1.00	1.00		1.00				
Incremental Delay, d2	110.9	0.2			0.0	1.7		54.6				
Delay (s)	150.4	33.8			31.4	37.2		69.1				
Level of Service	F	C			C	D		E				
Approach Delay (s)		118.1			36.8			69.1			0.0	
Approach LOS		F			D			E			A	

Intersection Summary			
HCM Average Control Delay	72.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	114.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	954	411	200	234	390	400	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		3.5	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.95		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (prot)	5507		2508	1449	3039	3249	
Flt Permitted	1.00		1.00	0.95	1.00	1.00	
Satd. Flow (perm)	5507		2508	1449	3039	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	954	411	200	234	390	400	54
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1365	0	200	201	423	454	0
Turn Type			custom	Split		custom	
Protected Phases	6		1!	2!	2	3	
Permitted Phases							
Actuated Green, G (s)	48.8		20.8	20.3	20.3	18.9	
Effective Green, g (s)	48.8		20.8	20.3	20.3	18.9	
Actuated g/C Ratio	0.49		0.21	0.20	0.20	0.19	
Clearance Time (s)	4.0		3.5	4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	2687		522	294	617	614	
v/s Ratio Prot	c0.25		0.08	0.14	c0.14	c0.14	
v/s Ratio Perm							
v/c Ratio	0.51		0.38	0.68	0.69	0.74	
Uniform Delay, d1	17.4		34.1	36.9	36.9	38.2	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.5	6.4	3.2	4.7	
Delay (s)	18.1		34.5	43.3	40.1	42.9	
Level of Service	B		C	D	D	D	
Approach Delay (s)	18.1				41.1		
Approach LOS	B				D		

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

The Creamery — Cumulative plus Proposed Project (Mitg.)

1: C St. & 12th St. — PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	45	14	5	5	0	0	0	0	393	4097	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.5						5.5	
Lane Util. Factor		1.00			1.00						0.86	
Frt		0.97			1.00						1.00	
Flt Protected		1.00			0.98						1.00	
Satd. Flow (prot)		1623			1636						5741	
Flt Permitted		1.00			0.86						1.00	
Satd. Flow (perm)		1623			1445						5741	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	45	14	5	5	0	0	0	0	393	4097	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	59	0	0	10	0	0	0	0	0	4495	0
Turn Type				Perm						Split		
Protected Phases		4			4					2	2	
Permitted Phases				4								
Actuated Green, G (s)		6.0			6.0						35.0	
Effective Green, g (s)		6.0			6.0						35.0	
Actuated g/C Ratio		0.12			0.12						0.70	
Clearance Time (s)		3.5			3.5						5.5	
Vehicle Extension (s)		3.0			3.0						0.2	
Lane Grp Cap (vph)		195			173						4019	
v/s Ratio Prot		c0.04									c0.78	
v/s Ratio Perm					0.01							
v/c Ratio		0.30			0.06						1.12	
Uniform Delay, d1		20.1			19.5						7.5	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.9			0.1						57.2	
Delay (s)		21.0			19.6						64.7	
Level of Service		C			B						E	
Approach Delay (s)		21.0			19.6			0.0			64.7	
Approach LOS		C			B			A			E	

Intersection Summary			
HCM Average Control Delay	64.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

The Creamery — Cumulative plus Proposed Project (Mitg.)

16: J St. & 9th St. — PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	2082	297	0	0	0	0	0	0	323	1580	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5									3.5	
Lane Util. Factor		0.91									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		4491									4538	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		4491									4538	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	2082	297	0	0	0	0	0	0	323	1580	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	2376	0	0	0	0	0	0	0	0	1900	0
Turn Type										Perm		
Protected Phases		1									2	
Permitted Phases										2		
Actuated Green, G (s)		79.5									63.5	
Effective Green, g (s)		79.5									63.5	
Actuated g/C Ratio		0.53									0.42	
Clearance Time (s)		3.5									3.5	
Lane Grp Cap (vph)		2380									1921	
v/s Ratio Prot		c0.53										
v/s Ratio Perm											0.42	
v/c Ratio		1.00									0.99	
Uniform Delay, d1		35.2									42.9	
Progression Factor		1.00									1.00	
Incremental Delay, d2		18.1									15.3	
Delay (s)		53.3									58.3	
Level of Service		D									E	
Approach Delay (s)		53.3			0.0			0.0			58.3	
Approach LOS		D			A			A			E	

Intersection Summary			
HCM Average Control Delay	55.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	NBR	SBL	SBT	NER	NER2
Lane Configurations							
Volume (vph)	958	818	279	456	379	906	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0	
Lane Util. Factor	0.86		0.88	0.91	0.91	0.76	
Frt	0.93		0.85	1.00	1.00	0.85	
Flt Protected	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (prot)	5369		2508	1449	3002	3249	
Flt Permitted	1.00		1.00	0.95	0.98	1.00	
Satd. Flow (perm)	5369		2508	1449	3002	3249	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	958	818	279	456	379	906	324
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1776	0	279	274	561	1230	0
Turn Type			custom	Perm		custom	
Protected Phases	6				2	3	
Permitted Phases			2	2			
Actuated Green, G (s)	52.0		29.0	29.0	29.0	57.0	
Effective Green, g (s)	52.0		29.0	29.0	29.0	57.0	
Actuated g/C Ratio	0.35		0.19	0.19	0.19	0.38	
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1861		485	280	580	1235	
v/s Ratio Prot	c0.33					c0.38	
v/s Ratio Perm			0.11	c0.19	0.19		
v/c Ratio	1.63dr		0.58	0.98	0.97	1.00	
Uniform Delay, d1	47.8		54.9	60.2	60.0	46.4	
Progression Factor	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.5		1.7	47.3	28.9	24.5	
Delay (s)	60.4		56.6	107.5	89.0	70.8	
Level of Service	E		E	F	F	E	
Approach Delay (s)	60.4				95.1		
Approach LOS	E				F		

Intersection Summary			
HCM Average Control Delay	70.3	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		

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

Appendix H:

Worksheets for
Traffic Signal Warrant Evaluation

Scenario Report

Scenario:	Existing AM
Command:	Default Command
Volume:	Existing AM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #1 C St. @ 14th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1    1    46     2    0     9     4  241     4     6   23     5
ApproachDel:       9.8              8.9           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=48]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=342]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=11]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=342]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #1 C St. @ 14th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1    1    46     2    0     9     4  241     4     6   23     5
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             283
Minor Approach Volume:           48
Minor Approach Volume Threshold: 556
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0    0  0  1! 0  0
Final Vol.:    20    5    48     0    4     0     0   24    10    45   35     6
ApproachDel:       9.2             10.1           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=73]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=197]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=4]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=197]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0    0  0  1! 0  0
Final Vol.:    20    5    48     0    4     0     0   24    10    45   35     6
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             120
Minor Approach Volume:           73
Minor Approach Volume Threshold: 785
```

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #3 D St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     4    6    13     4    7     6    17   44     3     8   84    17
ApproachDel:       9.3               9.7           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=23]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=213]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
-------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=17]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=213]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #3 D St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     4    6    13     4    7     6    17   44     3     8   84    17
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             173
Minor Approach Volume:           23
Minor Approach Volume Threshold: 687
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    31   57    38    10    0    47     2   39     0     0   90    12
ApproachDel:    xxxxxx           xxxxxx             10.6             11.0
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=41]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=326]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=102]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=326]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    31   57    38    10    0    47     2   39     0     0   90    12
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             183
Minor Approach Volume:           102
Minor Approach Volume Threshold: 870
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 E St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     1    0     1     8    0    11     8   85     0     0   93    18
ApproachDel:       9.3              9.3           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=2]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=225]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=19]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=225]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 E St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     1    0     1     8    0    11     8   85     0     0   93    18
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             204
Minor Approach Volume:           19
Minor Approach Volume Threshold: 643
```

Scenario Report

Scenario:	Existing PM
Command:	Default Command
Volume:	Existing PM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

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Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

****

Intersection #1 C St. @ 14th St.

****

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	1	0	0 0
Final Vol.:	2		2	218	10		0	4	1		86	7	3		16	0
ApproachDel:	9.8				10.6				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.6]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=222]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=349]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=14]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=349]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #1 C St. @ 14th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0
Final Vol.:     2    2   218    10    0     4     1   86     7     3   16     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             113
Minor Approach Volume:           222
Minor Approach Volume Threshold: 801
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    1  0  0  0  0    0  0  0  1  0    0  1  0  0  0
Final Vol.:     4    0   118     3    0     0     0  125    16    11   10     0
ApproachDel:       9.5             10.7           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=122]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=287]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=3]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=287]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    1  0  0  0  0    0  0  0  1  0    0  1  0  0  0
Final Vol.:     4    0   118     3    0     0     0  125    16    11   10     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             162
Minor Approach Volume:           122
Minor Approach Volume Threshold: 705
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                      Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1    4     6     4   10     6    18  220    13     6   16     5
ApproachDel:      10.1             10.3           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=11]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=309]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=20]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=309]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #3 D St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1    4     6     4   10     6    18  220    13     6   16     5
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             278
Minor Approach Volume:           20
Minor Approach Volume Threshold: 561
```



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #4 E St. @ 10th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:     Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    17  111   130     3    0    20     4  102     0     0   56     6
ApproachDel:    xxxxxx           xxxxxx             12.1             10.9
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.4]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=106]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=449]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
-------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=62]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=449]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    17  111   130     3    0    20     4  102     0     0   56     6
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             281
Minor Approach Volume:           106
Minor Approach Volume Threshold: 722
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                      Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 E St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  0  0  1    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     0    0     3    12    0     7     6  230     0     0   59     9
ApproachDel:       9.4             10.0           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=3]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=326]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=19]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=326]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		3	12		0		7	6		230		0	0		59		9

Major Street Volume: 304
Minor Approach Volume: 19
Minor Approach Volume Threshold: 537

Scenario Report

Scenario:	Baseline AM
Command:	Default Command
Volume:	Baseline AM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #1 C St. @ 14th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1    1    46     2    0     9     4  247     4     6   23     5
ApproachDel:       9.9              8.9           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=48]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=348]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=11]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=348]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #1 C St. @ 14th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1    1    46     2    0     9     4  247     4     6   23     5
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             289
Minor Approach Volume:           48
Minor Approach Volume Threshold: 550
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0    0  0  1! 0  0
Final Vol.:    20    5    48     0    4     0     0   24    10    45   35     6
ApproachDel:       9.2             10.1           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=73]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=197]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=4]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=197]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0    0  0  1! 0  0
Final Vol.:    20    5    48     0    4     0     0   24    10    45   35     6
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             120
Minor Approach Volume:           73
Minor Approach Volume Threshold: 785
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     4    9    13     4    7     6    17   44     3     8   84    17
ApproachDel:       9.4               9.7           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=26]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=216]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=17]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=216]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     4    9    13     4    7     6    17   44     3     8   84    17
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             173
Minor Approach Volume:           26
Minor Approach Volume Threshold: 687
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    31   57    41    10    0    47     2   39     0     0   90    12
ApproachDel:    xxxxxx           xxxxxx             10.7             11.0
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=41]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=329]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=102]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=329]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    31   57    41    10    0    47     2   39     0     0   90    12
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             186
Minor Approach Volume:           102
Minor Approach Volume Threshold: 864
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #5 E St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     1    0     1     8    0    11    11   85     0     0   93    18
ApproachDel:       9.3              9.3           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=2]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=228]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=19]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=228]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #5 E St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     1    0     1     8    0    11    11   85     0     0   93    18
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             207
Minor Approach Volume:           19
Minor Approach Volume Threshold: 639
```

Scenario Report

Scenario:	Baseline PM
Command:	Default Command
Volume:	Baseline PM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

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Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

****

Intersection #1 C St. @ 14th St.

****

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	1	0	0 0
Final Vol.:	2		2	218	10		0	4	1		99	7	3		16	0
ApproachDel:	9.9				10.7				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.6]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=222]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=362]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=14]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=362]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	1	0	0 0
Final Vol.:	2		2	218	10		0	4	1		99	7	3		16	0

Major Street Volume: 126
Minor Approach Volume: 222
Minor Approach Volume Threshold: 772

Peak Hour Delay Signal Warrant Report

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	1	0	0	0 0	0	0	0	1 0	0	1	0	0 0
Final Vol.:	4		0	118	3		0	0	0		125	16	11		10	0
ApproachDel:	9.5				10.7				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.3]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=122]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=287]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=3]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=287]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    1  0  0  0  0    0  0  0  1  0    0  1  0  0  0
Final Vol.:     4    0   118     3    0     0     0  125    16    11   10     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             162
Minor Approach Volume:           122
Minor Approach Volume Threshold: 705
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     1   15     6     4   10     6    18  220    13     6   16     5
ApproachDel:      10.7             10.3           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=22]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=320]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=20]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=320]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #3 D St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0
Final Vol.:	1		15	6	4		10	6	18		220	13	6		16	5

Major Street Volume: 278
Minor Approach Volume: 22
Minor Approach Volume Threshold: 561

Peak Hour Delay Signal Warrant Report

Intersection #4 E St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Uncontrolled				Uncontrolled				Stop Sign				Stop Sign			
Lanes:	1	0	0	1 0	0	0	1!	0 0	0	1	0	0 0	0	0	0	1 0
Final Vol.:	17		111	141	3		0	20	4		102	0	0		56	6
ApproachDel:	xxxxxx				xxxxxx				12.2				10.9			

Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.4]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=106]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=460]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=62]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=460]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #4 E St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Uncontrolled				Uncontrolled				Stop Sign				Stop Sign			
Lanes:	1	0	0	1 0	0	0	1!	0 0	0	1	0	0 0	0	0	0	1 0
Final Vol.:	17	111		141	3		0	20	4	102		0	0	56		6

Major Street Volume: 292
Minor Approach Volume: 106
Minor Approach Volume Threshold: 709

Peak Hour Delay Signal Warrant Report

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	0	0 1	0	0	1!	0 0	0	1	0	0 0	0	0	0	1 0
Final Vol.:	0		0	3	12		0	7	17	230		0	0	59		9
ApproachDel:	9.4				10.1				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=3]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=337]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=19]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=337]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		3	12		0		7	17		230		0	0		59		9

Major Street Volume: 315
Minor Approach Volume: 19
Minor Approach Volume Threshold: 527

Scenario Report

Scenario:	Baseline+PP AM
Command:	Default Command
Volume:	Baseline+PP AM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	0		0		2	0		0		0	2		124		2	3		12		3
ApproachDel:	8.9					xxxxxx					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=2]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=148]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	0		0		2	0		0		0	2		124		2	3		12		3

Major Street Volume: 146
Minor Approach Volume: 2
Minor Approach Volume Threshold: 733

Peak Hour Delay Signal Warrant Report

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Final Vol.:	25		6		59	0		0		0	0		19		8	48		37		6
ApproachDel:	9.2					xxxxxx					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=90]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=208]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Final Vol.:	25		6		59	0		0		0	0		19		8	48		37		6

Major Street Volume: 118
Minor Approach Volume: 90
Minor Approach Volume Threshold: 789

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  0  1  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     3    8    11     0    1     1     9   23     2     7   73    15
ApproachDel:       9.2              9.2           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=22]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=153]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=2]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=153]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  0  1  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     3    8    11     0    1     1     9   23     2     7   73    15
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             129
Minor Approach Volume:           22
Minor Approach Volume Threshold: 766
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0
Final Vol.:    32   60    43     2    0     9     0    4     0     0   19     2
ApproachDel:    xxxxxx           xxxxxx             10.1             10.0
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=4]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=171]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=21]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=171]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



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--------------------------------------------------------------------------------
                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0
Final Vol.:    32   60    43     2    0     9     0    4     0     0   19     2
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             146
Minor Approach Volume:           21
Minor Approach Volume Threshold: 948
```

Peak Hour Delay Signal Warrant Report

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	1		0		1	6		28		0	0		23		4
ApproachDel:	xxxxxx					8.6					xxxxxx					xxxxxx				

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=2]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=63]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	1		0		1	6		28		0	0		23		4

Major Street Volume: 61
Minor Approach Volume: 2
Minor Approach Volume Threshold: 965

Scenario Report

Scenario:	Baseline+PP PM
Command:	Default Command
Volume:	Baseline+PP PM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

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Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

****

Intersection #1 C St. @ 14th St.

****

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	0	0 1	0	0	1!	0 0	0	0	1!	0 0	0	1	0	0 0
Final Vol.:	0	0	6		0	0	0		3	298	23		49	263	0	
ApproachDel:	9.9				xxxxxx				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=6]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=642]
   FAIL - Total volume less than 650 for intersection
          with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	0	0 1	0	0	1!	0 0	0	0	1!	0 0	0	1	0	0 0
Final Vol.:	0		0	6	0		0	0	3		298	23	49		263	0

Major Street Volume: 636
Minor Approach Volume: 6
Minor Approach Volume Threshold: 340

Peak Hour Delay Signal Warrant Report

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	0	1 0	0	1	0	0 0
Final Vol.:	3		0	98	0		0	0	0		28	4	17		15	0
ApproachDel:	8.8				xxxxxx				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=101]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=165]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

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--------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
Final Vol.:     3    0    98     0    0     0     0   28     4    17   15     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             64
Minor Approach Volume:           101
Minor Approach Volume Threshold: 953
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     2   21    15     2    5     3     3   43     3    11   29     9
ApproachDel:       9.4              9.3            xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=38]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=146]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=10]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=146]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #3 D St. @ 11th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     2   21    15     2    5     3     3   43     3    11   29     9
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             98
Minor Approach Volume:           38
Minor Approach Volume Threshold: 839
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  0  1  0  0    0  0  0  1  0
Final Vol.:    13   82   108     6    0    40     0    9     0     0    8     1
ApproachDel:    xxxxxx           xxxxxx             10.6             10.2
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=9]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=267]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=9]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=267]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #4 E St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	0	1	0	0	0	1!	0	0	0	0	1	0	0	0	0	0	1	0
Final Vol.:	13		82		108	6		0		40	0		9		0	0		8		1

Major Street Volume: 249
Minor Approach Volume: 9
Minor Approach Volume Threshold: 764

Peak Hour Delay Signal Warrant Report

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	4		0		2	12		53		0	0		48		7
ApproachDel:	xxxxxx					9.0					xxxxxx					xxxxxx				

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=6]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=126]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	4		0		2	12		53		0	0		48		7

Major Street Volume: 120
Minor Approach Volume: 6
Minor Approach Volume Threshold: 785

Scenario Report

Scenario:	Cumulative AM
Command:	Default Command
Volume:	Cumulative AM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	0		0		2	0		0		0	7		420		7	3		10		2
ApproachDel:	10.7					xxxxxx					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=2]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=451]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	0		0		2	0		0		0	7		420		7	3		10		2

Major Street Volume: 449
Minor Approach Volume: 2
Minor Approach Volume Threshold: 433

Peak Hour Delay Signal Warrant Report

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Final Vol.:	19		5		46	0		0		0	0		45		19	51		40		7
ApproachDel:	9.3					xxxxxx					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=70]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=232]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Final Vol.:	19		5		46	0		0		0	0		45		19	51		40		7

Major Street Volume: 162
Minor Approach Volume: 70
Minor Approach Volume Threshold: 705

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #3 D St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     3    4    10     2    3     3    16   43     3     9   99    20
ApproachDel:       9.2              9.7           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=17]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=215]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
-------------------------------------------------------------------------------
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=8]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=215]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #3 D St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     3    4    10     2    3     3    16   43     3     9   99    20
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             190
Minor Approach Volume:           17
Minor Approach Volume Threshold: 662
```

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #4 E St. @ 10th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    27   49    33    18    0    85     1   18     0     0  108    14
ApproachDel:    xxxxxx           xxxxxx             10.6             11.5
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=19]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=353]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
-------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.4]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=122]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=353]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #4 E St. @ 10th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    27   49    33    18    0    85     1   18     0     0  108    14
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             212
Minor Approach Volume:           122
Minor Approach Volume Threshold: 819
```

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                    Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #5 E St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     0    0     0    16    0    22     4   38     0     0   85    16
ApproachDel:    xxxxxx              9.1           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=38]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=181]
   FAIL - Total volume less than 650 for intersection
          with less than four approaches.
```



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #5 E St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     0    0     0    16    0    22     4   38     0     0   85    16
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             143
Minor Approach Volume:           38
Minor Approach Volume Threshold: 738
```

Scenario Report

Scenario:	Cumulative PM
Command:	Default Command
Volume:	Cumulative PM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

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Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

****

Intersection #1 C St. @ 14th St.

****

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1	0 0
Final Vol.:	2		2	211	0		0	0	6		544	44	0		1	0
ApproachDel:	16.5				xxxxxx				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=1.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=215]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=810]
SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1	0 0
Final Vol.:	2		2	211	0		0	0	6		544	44	0		1	0

Major Street Volume: 595
Minor Approach Volume: 215
Minor Approach Volume Threshold: 358

Peak Hour Delay Signal Warrant Report

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	0	1 0	0	1	0	0 0
Final Vol.:	2		0	58	0		0	0	0		235	30	76		69	0
ApproachDel:	10.0				xxxxxx				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=60]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=470]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	0	1 0	0	1	0	0 0
Final Vol.:	2		0	58	0		0	0	0	235		30	76		69	0

Major Street Volume: 410
Minor Approach Volume: 60
Minor Approach Volume Threshold: 457

Peak Hour Delay Signal Warrant Report

Intersection #3 D St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0
Final Vol.:	4		18	27	24		59	36	20	247		15	20		52	16
ApproachDel:	11.2				12.3				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=49]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=538]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.4]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=119]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=538]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                 Peak Hour Volume Signal Warrant Report [Urban]
*******************************************************************************
Intersection #3 D St. @ 11th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0
Final Vol.:     4   18    27    24   59    36    20  247    15    20   52    16
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             370
Minor Approach Volume:           119
Minor Approach Volume Threshold: 485
```



```
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                      Peak Hour Delay Signal Warrant Report
*******************************************************************************
Intersection #4 E St. @ 10th St.
*******************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:      Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:     9   56    66    25    0   165     7  182     0     0  123    13
ApproachDel:    xxxxxx           xxxxxx             13.4             12.6
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.7]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=189]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=646]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
-------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.5]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=136]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=646]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #4 E St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	0	1	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	9		56		66	25		0		165	7		182		0	0		123		13

Major Street Volume: 321
Minor Approach Volume: 189
Minor Approach Volume Threshold: 676

Peak Hour Delay Signal Warrant Report

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	79		0		46	6		232		0	0		75		11
ApproachDel:	xxxxxx					10.7					xxxxxx					xxxxxx				

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.4]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=125]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=449]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	79		0		46	6		232		0	0		75		11

Major Street Volume: 324
Minor Approach Volume: 125
Minor Approach Volume Threshold: 520

Scenario Report

Scenario:	Cumulative+PP AM
Command:	Default Command
Volume:	Cumulative+PP AM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	0		0		3	0		0		0	7		416		7	3		10		2
ApproachDel:	10.7					xxxxxx					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=3]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=448]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #1 C St. @ 14th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	0	0	1	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	0		0		3	0		0		0	7		416		7	3		10		2

Major Street Volume: 445
Minor Approach Volume: 3
Minor Approach Volume Threshold: 435

Peak Hour Delay Signal Warrant Report

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Final Vol.:	23		6		55	0		0		0	0		55		23	56		43		7
ApproachDel:	9.5					xxxxxx					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=84]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=268]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	0	1!	0	0
Final Vol.:	23		6		55	0		0		0	0		55		23	56		43		7

Major Street Volume: 184
Minor Approach Volume: 84
Minor Approach Volume Threshold: 671

Peak Hour Delay Signal Warrant Report

Intersection #3 D St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0
Final Vol.:	5		8	18	2		3	3	18		47	3	9		91	18
ApproachDel:	9.3				9.7				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=31]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=225]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.0]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=8]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=225]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #3 D St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0
Final Vol.:	5		8	18	2		3	3	18		47	3	9		91	18

Major Street Volume: 186
Minor Approach Volume: 31
Minor Approach Volume Threshold: 668

```
--------------------------------------------------------------------------------
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                    Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    34   62    41    22    0   105     1   18     0     0  122    16
ApproachDel:    xxxxxx           xxxxxx             11.1             12.4
------------|---------------||---------------||---------------||---------------|
Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=19]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=421]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
--------------------------------------------------------------------------------
Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.5]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=138]
   SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=421]
   FAIL - Total volume less than 800 for intersection
          with four or more approaches.
```



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                    Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #4 E St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Lanes:        1  0  0  1  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
Final Vol.:    34   62    41    22    0   105     1   18     0     0  122    16
------------|---------------||---------------||---------------||---------------|
Major Street Volume:              264
Minor Approach Volume:            138
Minor Approach Volume Threshold: 744
```

Peak Hour Delay Signal Warrant Report

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	13		0		18	5		48		0	0		117		23
ApproachDel:	xxxxxx					9.3					xxxxxx					xxxxxx				

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.1]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=31]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=224]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	13		0		18	5		48		0	0		117		23

Major Street Volume: 193
Minor Approach Volume: 31
Minor Approach Volume Threshold: 658

Scenario Report

Scenario:	Cumulative+PP PM
Command:	Default Command
Volume:	Cumulative+PP PM
Geometry:	Default Geometry
Impact Fee:	Default Impact Fee
Trip Generation:	Default Trip Generation
Trip Distribution:	Default Trip Distribution
Paths:	Default Paths
Routes:	Default Routes
Configuration:	Default Configuration

Signal Warrant Summary Report

Intersection	Base Met [Del / Vol]	Future Met [Del / Vol]
# 1 C St. @ 14th St.	No / No	??? / ???
# 2 D St. @ 10th St.	No / No	??? / ???
# 3 D St. @ 11th St.	No / No	??? / ???
# 4 E St. @ 10th St.	No / No	??? / ???
# 5 E St. @ 11th St.	No / No	??? / ???

Peak Hour Delay Signal Warrant Report

****

Intersection #1 C St. @ 14th St.

****

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Stop Sign				Stop Sign				Uncontrolled				Uncontrolled			
Lanes:	0	0	1!	0 0	0	0	1!	0 0	0	0	1!	0 0	0	0	1	0 0
Final Vol.:	2		2	172	0		0	0	7		612	50	0		1	0
ApproachDel:	16.8				xxxxxx				xxxxxx				xxxxxx			

Approach[northbound][lanes=1][control=Stop]

Signal Warrant Rule #1: [vehicle-hours=0.8]

FAIL - Vehicle-hours less than 4 for one lane approach.

Signal Warrant Rule #2: [approach volume=176]

SUCCEED - Approach volume greater than or equal to 100 for one lane approach.

Signal Warrant Rule #3: [approach count=3][total volume=846]

SUCCEED - Total volume greater than or equal to 650 for intersection with less than four approaches.

```
--------------------------------------------------------------------------------
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                 Peak Hour Volume Signal Warrant Report [Urban]
********************************************************************************
Intersection #1 C St. @ 14th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  1! 0  0    0  0  1  0  0
Final Vol.:     2    2   172     0    0     0     7  612    50     0    1     0
------------|---------------||---------------||---------------||---------------|
Major Street Volume:             670
Minor Approach Volume:           176
Minor Approach Volume Threshold: 326
```



```
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                      Peak Hour Delay Signal Warrant Report
********************************************************************************
Intersection #2 D St. @ 10th St.
********************************************************************************
Base Volume Alternative: Peak Hour Warrant NOT Met
------------|---------------||---------------||---------------||---------------|
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Lanes:        0  0  1! 0  0    0  0  1! 0  0    0  0  0  1  0    0  1  0  0  0
Final Vol.:     3    0    86     0    0     0     0  243    31    51   46     0
ApproachDel:      10.2           xxxxxx           xxxxxx           xxxxxx
------------|---------------||---------------||---------------||---------------|
Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.3]
   FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=89]
   FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=460]
   FAIL - Total volume less than 650 for intersection
          with less than four approaches.
```

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #2 D St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	0	1	0	0	1	0	0	0
Final Vol.:	3		0		86	0		0		0	0		243		31	51		46		0

Major Street Volume: 371
Minor Approach Volume: 89
Minor Approach Volume Threshold: 484

Peak Hour Delay Signal Warrant Report

Intersection #3 D St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	5		22		32	16		39		23	19		230		14	30		80		25
ApproachDel:	11.4					12.3					xxxxxx					xxxxxx				

Approach[northbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.2]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=59]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=535]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.3]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=78]
FAIL - Approach volume less than 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=535]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #3 D St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Final Vol.:	5		22		32	16		39		23	19		230		14	30		80		25

Major Street Volume: 398
Minor Approach Volume: 78
Minor Approach Volume Threshold: 465

Peak Hour Delay Signal Warrant Report

Intersection #4 E St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	0	1	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	11		74		87	22		0		147	8		199		0	0		126		14
ApproachDel:	xxxxxx					xxxxxx					14.2					12.8				

Approach[eastbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.8]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=207]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=688]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Approach[westbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.5]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=140]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=4][total volume=688]
FAIL - Total volume less than 800 for intersection
with four or more approaches.

Peak Hour Volume Signal Warrant Report [Urban]

Intersection #4 E St. @ 10th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Lanes:	1	0	0	1	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	11		74		87	22		0		147	8		199		0	0		126		14

Major Street Volume: 341
Minor Approach Volume: 207
Minor Approach Volume Threshold: 655

Peak Hour Delay Signal Warrant Report

Intersection #5 E St. @ 11th St.

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	106		0		62	7		255		0	0		44		7
ApproachDel:	xxxxxx					10.9					xxxxxx					xxxxxx				

Approach[southbound][lanes=1][control=Stop]
Signal Warrant Rule #1: [vehicle-hours=0.5]
FAIL - Vehicle-hours less than 4 for one lane approach.
Signal Warrant Rule #2: [approach volume=168]
SUCCEED - Approach volume greater than or equal to 100 for one lane approach.
Signal Warrant Rule #3: [approach count=3][total volume=481]
FAIL - Total volume less than 650 for intersection
with less than four approaches.

Peak Hour Volume Signal Warrant Report [Urban]

****

Intersection #5 E St. @ 11th St.

****

Base Volume Alternative: Peak Hour Warrant NOT Met

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Final Vol.:	0		0		0	106		0		62	7		255		0	0		44		7

Major Street Volume: 313
Minor Approach Volume: 168
Minor Approach Volume Threshold: 529