

Cogeneration Plant Expansion at Anderson SPI Facility

Traffic Impact Study

Prepared for:

Sierra Pacific Industries



Prepared by:



**Cogeneration Plant Expansion at Anderson SPI Facility
Traffic Impact Study**

**Prepared For:
Sierra Pacific Industries**

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INTRODUCTION

OMNI-MEANS has been retained by Sierra Pacific Industries to prepare a traffic impact study for the expansion of their Cogeneration Plant at the Anderson SPI facility. The project will add an additional boiler to the Cogeneration Plant. The project is described in further detail in a subsequent section of this report. **Figure 1** illustrates the location of the proposed project within Shasta County.

Included in this report is a description of the existing transportation setting and an analysis and discussion of the following items:

- Analysis of the existing transportation setting with the development of the proposed project.
- The projected cumulative (year 2030) peak hour intersection operations with and without the development of the proposed project.

The following traffic scenarios have been analyzed as a part of this report:

- *Existing Conditions*
- *Existing Plus Project Conditions*
- *Cumulative No Project Conditions*
- *Cumulative Plus Project Conditions*

Existing Conditions describes the existing transportation facilities serving the project site, and the traffic operations which currently exist for those facilities.

Cumulative Conditions are assumed as those which will exist in the year 2030. The *Cumulative No Project* condition investigates projected traffic operations in 2030, but excluding development of the proposed project. The *Cumulative Plus Project* condition is the analysis scenario in which traffic impacts associated with the proposed project are investigated in comparison to the *Cumulative No Project* condition scenario.

The above traffic scenarios are described in further detail and evaluated in subsequent sections of this report.

EXISTING CONDITIONS

Existing Conditions describes the existing transportation facilities serving the project site.

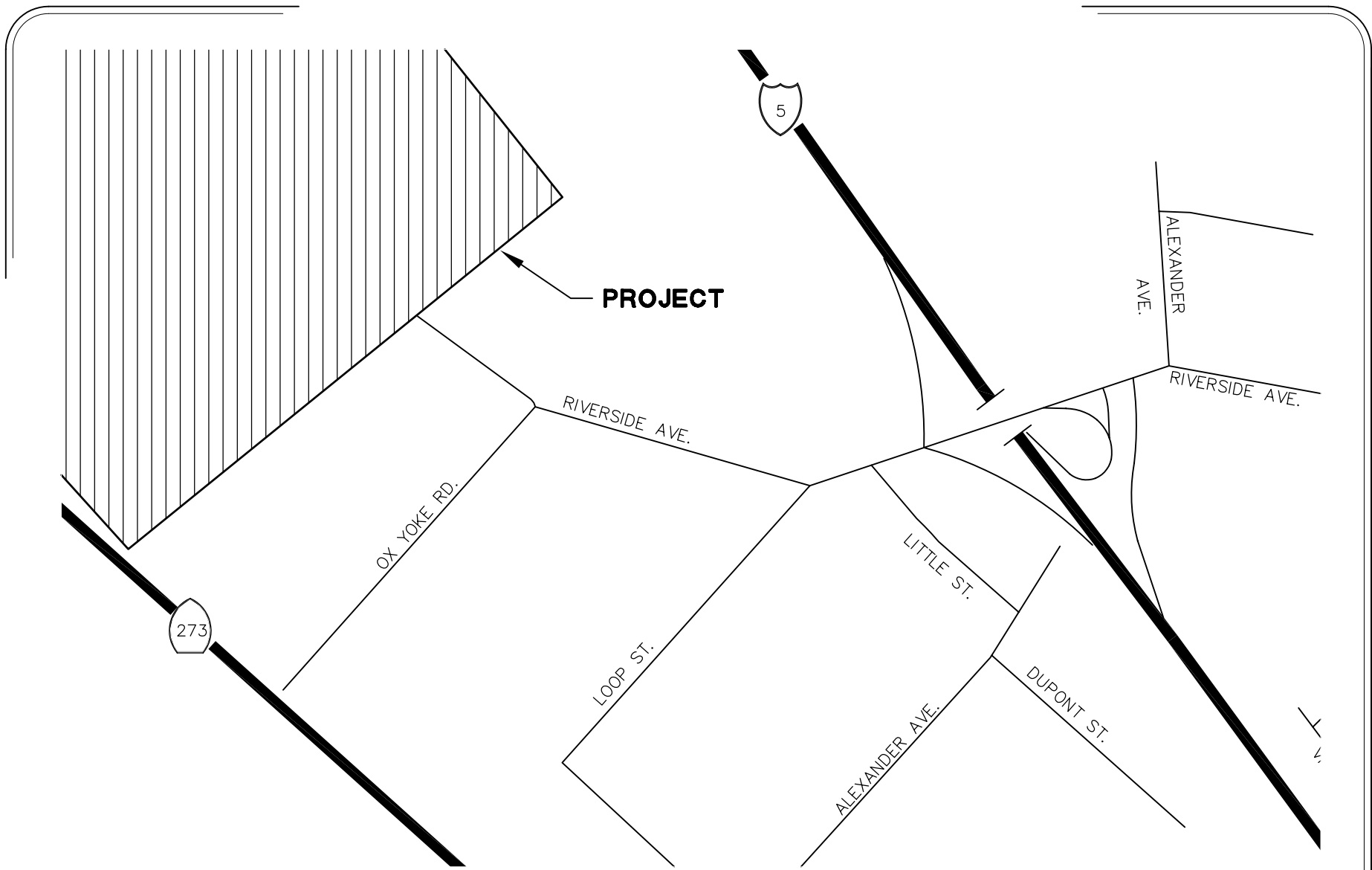
Existing Roadways

Riverside Avenue is a 2-lane arterial street that begins at North St. and extends to the west until it becomes Ox Yoke Road.

STUDY INTERSECTIONS

The following list of critical study intersections were selected for analysis within this study for weekday AM and PM peak hour condition:

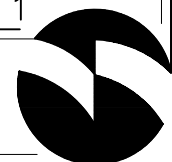
1. Ox Yoke Road/Riverside Avenue
2. I-5 SB Ramps/Riverside Avenue
3. I-5 NB Ramps /Riverside Avenue



SPI Cogeneration Plant Expansion TIS

Figure 1

Location Map



EXISTING TRAFFIC VOLUMES

Existing traffic counts were obtained from the data collected by OMNI-MEANS for the Shasta County RTPA for the “*Ox Yoke Road/Riverside Avenue Corridor Study and Traffic Impact Fee Program Updated Working Paper No. 1 – August 24, 2007*”. The AM peak hour is defined as the one-hour of peak traffic flow (which is the highest total volume count over four consecutive 15-minute count periods) counted between 7:00 AM and 9:00 AM on a typical weekday. The PM peak hour is defined as the one-hour of peak traffic flow counted between 4:00 PM and 6:00 PM on a typical weekday.

Level-of-Service Methodologies

Traffic operations were quantified through the determination of "Level of Service" (LOS). Level of Service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection, representing progressively worsening traffic operations.

Levels of Service were calculated for all intersection control types using methods documented in the Transportation Research Board (TRB) Publication *Highway Capacity Manual, Fourth Edition, 2000* (HCM-2000). For two-way-stop-controlled (TWSC) intersections, the “worst-case” movement delays and LOS is reported, computed based on HCM-2000. For signalized intersections and all-way-stop-controlled (AWSC) intersections, the average intersection delays and LOS were reported, computed based on HCM-2000. The delay-based LOS criteria for different types of intersection control are outlined in **Table 1**. The LOS definitions shown in this table were used in the traffic study.

LOS Threshold

Shasta County uses LOS “C” and the City of Anderson uses LOS “D”. Since the County is the lead on this project, a LOS of “C” has been utilized. Base improvements and project-related mitigation measures have been recommended for all instances where appropriate LOS standards are not met.

Significance Threshold

In accordance with current regional practice, the following thresholds of significance are used to determine if an impact is significant and requires mitigation:

A) *Signalized Intersections*: The project is considered to have a significant effect if it would:

- Result in a signalized intersection currently operating at an acceptable LOS to deteriorate to an unacceptable LOS: or
- Increase the delay by more than 5 seconds at a signalized intersection that is/will operate at an unacceptable LOS without the project.

B) *Unsignalized Intersections*: The project is considered to have a significant effect if it would:

- Result in an unsignalized intersection movement/approach currently operating at an acceptable LOS to deteriorate to an unacceptable LOS, and also cause the intersection to meet the peak hour signal warrant: or
- For an unsignalized intersection that meets the peak hour signal warrant, increase the delay by more than 5 seconds at a movement/approach that is operating at an unacceptable LOS without the project.

- C) Creates a significant impact on local streets based on the standards set out in the City/County General Plan policies or Subdivision Ordinance, or based on other established standards which, in the consultant's professional judgment, should be applied.

Technical Analysis Parameters

The traffic operations analysis incorporates appropriate heavy vehicle adjustment factors, peak hour factors, and signal lost-time factors and reports the resulting intersection delays and LOS as estimated using HCM-2000 based analysis methodologies. Appropriate Peak Hour Factor (PHF) were applied in the analysis of all study intersections under all analysis scenarios in this study. The HCM-2000 analysis methodologies are implemented using the simulation software *Synchro 6* developed by Trafficware.

Traffic Signal Warrant Analysis Criteria

A supplemental traffic signal “warrant” analysis has been completed to determine if any of the unsignalized intersections meet the warrant criteria. The term “signal warrants” refers to the list of established criteria used by public agencies to quantitatively justify or ascertain the need for installation of a traffic signal at an otherwise unsignalized intersection location. This study employed the signal warrant criteria presented in the latest edition of the *California Manual on Uniform Traffic Control Devices (MUTCD)*. The signal warrant criteria are based upon several factors including volume of vehicular and pedestrian traffic, frequency of accidents, location of school areas etc. *California MUTCD* indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. Consistent with industry standards, this study utilized the Peak-Hour-Volume based Warrant 3 as one representative type of traffic signal warrant analysis.

It should be noted that the Peak-Hour-Volume Warrant was only applied when the LOS was found to be lower than the acceptable threshold (LOS “C”). Therefore, there may be instances when the unsignalized intersection operates at acceptable LOS conditions but still meets the Peak-Hour-Volume Warrant.

**TABLE 1
LEVEL-OF-SERVICE CRITERIA FOR INTERSECTIONS**

LEVEL OF SERVICE	TYPE OF FLOW	DELAY	MANEUVERABILITY	DELAY/VEHICLE (SEC)		
				SIGNALIZED (V/C)	TWO-WAY-STOP	ALL-WAY-STOP
A	Stable Flow	Very slight delay. Progression is very favorable, with most vehicles arriving during the green phase not stopping at all.	Turning movements are easily made, and nearly all drivers find freedom of operation.	≤ 0.6	≤ 10.0	≤ 10.0
B	Stable Flow	Good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	Vehicle platoons are formed. Many drivers begin to feel somewhat restricted within groups of vehicles.	>0.6 and ≤ 0.7	>10 and ≤ 15.0	>10 and ≤ 15.0
C	Stable Flow	Higher delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	Back-ups may develop behind turning vehicles. Most drivers feel somewhat restricted	>0.7 and ≤ 0.8	>15 and ≤ 25.0	>15 and ≤ 25.0
D	Approaching Unstable Flow	The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume-to-capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	Maneuverability is severely limited during short periods due to temporary back-ups.	>0.8 and ≤ 0.9	>25 and ≤ 35.0	>25 and ≤ 35.0
E	Unstable Flow	Generally considered to be the limit of acceptable delay. Indicative of poor progression, long cycle lengths, and high volume-to-capacity ratios. Individual cycle failures are frequent occurrences.	There are typically long queues of vehicles waiting upstream of the intersection.	>0.9 and ≤ 1.0	>35 and ≤ 50.0	>35 and ≤ 50.0
F	Forced Flow	Generally considered to be unacceptable to most drivers. Often occurs with over saturation. May also occur at high volume-to-capacity ratios. There are many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors.	Jammed conditions. Back-ups from other locations restrict or prevent movement. Volumes may vary widely, depending principally on the downstream back-up conditions.	> 1.0	> 50.0	> 50.0

References: 1. Planning method in Transportation Research Board Circular 212, *Interim Materials on Highway Capacity*, 1980.
2. Highway Capacity Manual, Special Report No. 209, Transportation Research Board, Third Edition, Updated December 1997.

EXISTING CONDITIONS

Existing AM and PM peak hour intersection traffic operations have been quantified utilizing the existing traffic volumes (shown on **Figure 2**), and the existing intersection lane geometrics and control (shown on **Figure 2**). **Table 2** contains a summary of the existing intersection LOS conditions.

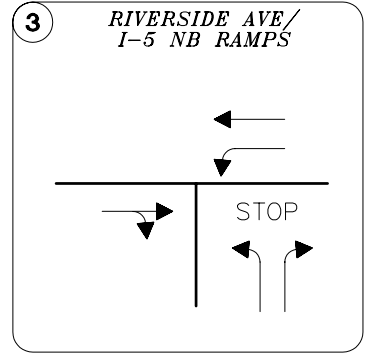
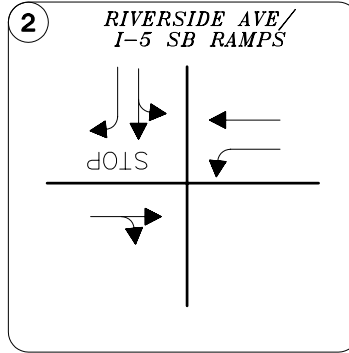
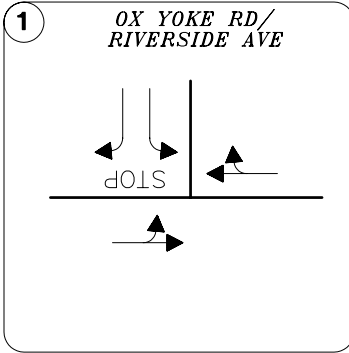
TABLE 2
EXISTING CONDITIONS: INTERSECTION LEVELS-OF-SERVICE

No	Intersection	Control	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Warrant Met?	Delay (sec/veh)	LOS	Warrant Met?
1	Ox Yoke Rd./Riverside Ave.	TWSC	14.6	B	No	19.0	C	No
2	I-5 SB Ramps/Riverside Ave.	TWSC	15.3	C	No	52.2	F	Yes
3	I-5 NB Ramps/Riverside Ave.	TWSC	32.1	D	No	25.4	D	No

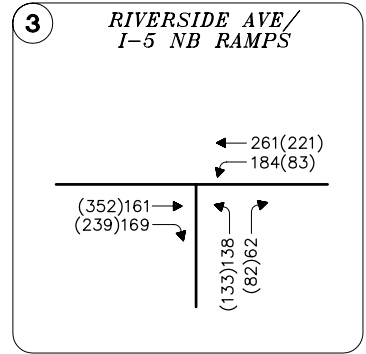
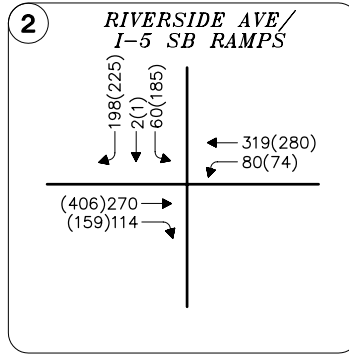
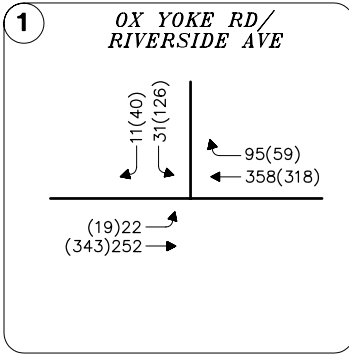
Legend: TWSC – Two Way Stop Controlled Intersection
 LOS – Minor Street Approach Level of Service for Two-way-stop-controlled intersections
 Delay - Minor Street Approach Delay for Two-way-stop-controlled Intersections
 Warrant – MUTCD Peak Hour Warrant-3

As shown in **Table 2**, the I-5 SB Ramps/Riverside Avenue intersection will operate at unacceptable LOS during the PM peak hour and the I-5 NB Ramps/Riverside Avenue intersection will operate at unacceptable LOS during the AM and PM peak hours.

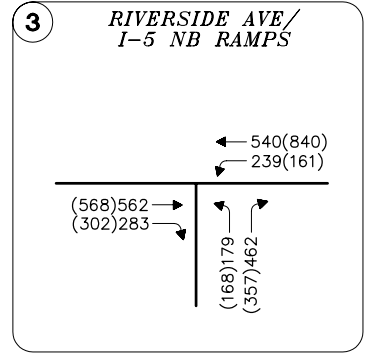
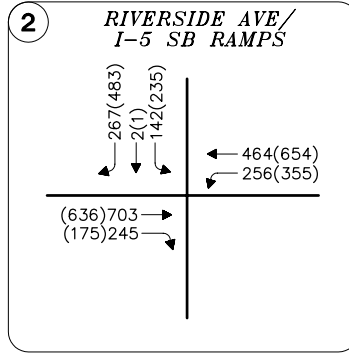
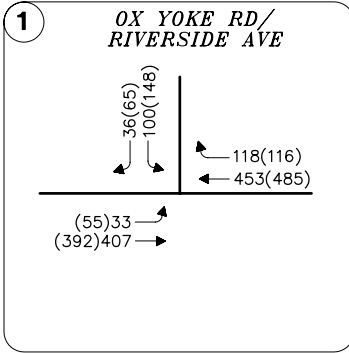
LANE GEOMETRICS & CONTROL



**EXISTING TRAFFIC VOLUMES
(WITHOUT PROJECT)**

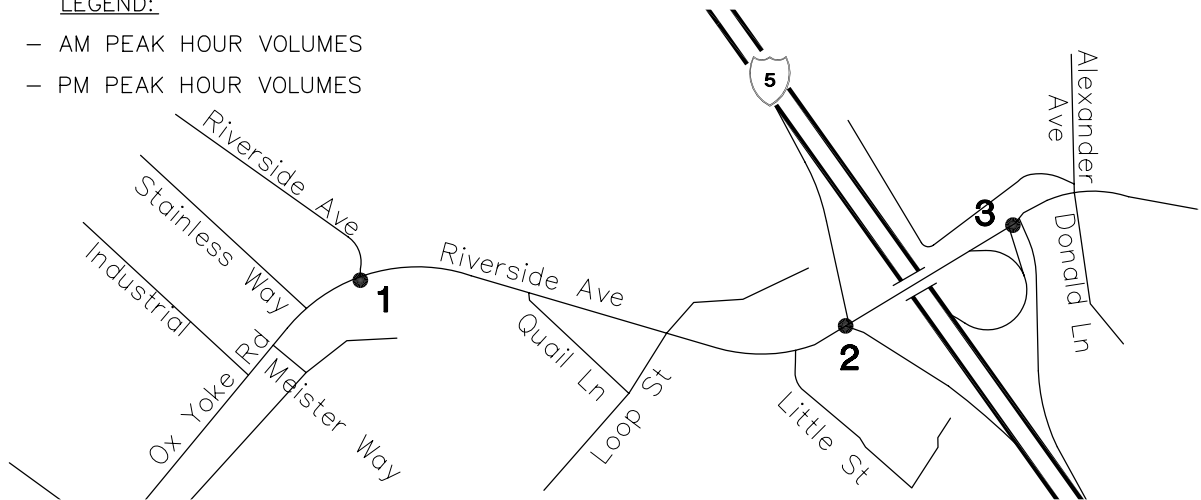


**CUMULATIVE TRAFFIC VOLUMES
(WITHOUT PROJECT)**



LEGEND:

- xx - AM PEAK HOUR VOLUMES
- (xx) - PM PEAK HOUR VOLUMES



SPI Cogeneration Plant Expansion TIAR

Figure 2

Intersection Geometrics, Control & Volumes



PROPOSED PROJECT

The proposed project consists of the expansion of the existing Cogeneration Plant at the Anderson SPI facility. This will consist of the addition of a 250,000 pound capacity boiler. The entire project will be assumed to be developed in a single development phase.

PROJECT TRIP GENERATION AND DISTRIBUTION

The proposed project will require an additional 23 truck trips per day to deliver the additional fuel to the facility. It is expected that between two (2) and three (3) trucks will be used on a daily basis to supply the additional biomass needed. In addition to the increased fuel needs, the expansion of the Cogeneration Plant will require 6 additional employees split between rotating shifts. Table 3 is a summary of the traffic that is assumed to be generated by the project during the AM and PM peak hours.

**TABLE 3
PROPOSED PROJECT TRIP GENERATION**

Peak Hour	Trucks Entering	Trucks Departing	Passenger Cars Entering	Passenger Cars Departing
AM	3	3	3	3
PM	3	3	3	3

The assumed project trip generation in Table 3 is a conservative estimate. It assumes that all three delivery trucks enter and leave the facility both in the AM and PM peak hours. In reality, these trips will be distributed throughout the day. It also assumes that each additional employee will generate an additional trip entering (3 going to work) and departing (3 leaving work) the facility in the peak hours. Based on information contained in the Institute of Transportation Engineers (ITE) Publication *Trip Generation (Eighth Edition)*, for General Heavy Industrial (ITE Code 120) there is not a one to one ratio for number of employees to trips generated in the peak hours. Each employee will generate less than one peak hour trip both in the AM and PM peak hours.

The additional fuel deliveries may come from a variety of sources, situated at various locations inside and outside of the County of Shasta. This report will assume that all of the additional fuel will be supplied by the SPI facility in the City of Shasta Lake. This assumption will burden the I-5/Riverside Ave interchange to the greatest degree; therefore creating a “worst case scenario”. The additional employee trips are assumed to originate from the Redding area since it is the largest residential area in the vicinity of the project site. For a “worst case scenario”, the employee trips were assumed to utilize Interstate 5 and Riverside Avenue.

EXISTING PLUS PROJECT CONDITIONS

Existing Plus Project AM and PM peak hour intersection traffic operations have been quantified utilizing the existing traffic volumes (shown on **Figure 2**) plus the project trips in **Table 3**, and the existing intersection lane geometrics and control (shown on **Figure 2**). **Table 4** contains a summary of the *Existing Plus Project* intersection LOS conditions.

**TABLE 4
EXISTING PLUS PROJECT CONDITIONS: INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Control	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Warrant Met?	Delay (sec/veh)	LOS	Warrant Met?
1	Ox Yoke Rd./Riverside Ave.	TWSC	15.0	B	No	19.6	C	No
2	I-5 SB Ramps/Riverside Ave.	TWSC	15.4	C	No	53.1	F	Yes
3	I-5 NB Ramps/Riverside Ave.	TWSC	32.4	D	No	25.6	D	No

Legend: TWSC – Two Way Stop Controlled Intersection
LOS – Minor Street Approach Level of Service for Two-way-stop-controlled intersections
Delay - Minor Street Approach Delay for Two-way-stop-controlled Intersections
Warrant – MUTCD Peak Hour Warrant-3

As shown in **Table 4**, the I-5 SB Ramps/Riverside Avenue intersection will operate at unacceptable LOS during the PM peak hour. The I-5 NB Ramps/Riverside Avenue intersection will operate at unacceptable LOS during the AM and PM peak hours.

CUMULATIVE CONDITIONS

Cumulative Conditions refer to analysis scenarios that would exist following assumed build out of the local General Plan, and typically refer to analysis scenarios approximately 20 years in the future. Within this analysis, *Cumulative* Conditions are assumed as those that will exist in the year 2030 consistent with the Shasta County Regional Travel Demand Model. *Cumulative No Project* Conditions assume that the project would remain undeveloped (i.e., a “vacant” project site) through year 2030, and year 2030 model land uses are assumed elsewhere. *Cumulative Plus Project* Conditions were then simulated by superimposing the proposed project-generated traffic on top of the *Cumulative No Project* traffic volumes.

PLANNED/PROGRAMMED IMPROVEMENTS

Shasta County Regional Transportation Plan identifies widening improvements to the Riverside Corridor. However, the specifics of the improvements are not mentioned. At a very minimum, it is assumed that signalization of the I-5 Ramp intersections with Riverside Avenue will occur with the corridor improvements. Since the corridor improvements are not in a program with identified funding, for analysis purposes, no corridor improvements will be assumed to be in place for *Cumulative* Conditions.

CUMULATIVE NO PROJECT CONDITIONS

Cumulative No Project Conditions peak hour intersection traffic operations were analyzed utilizing Year 2030 traffic volumes obtained from the Shasta County RTPA “Ox Yoke Road/Riverside Avenue Corridor Study and Traffic Impact Fee Program Updated Working Paper No. 1 – August 24, 2007”. **Table 5** provides a summary of the *Cumulative No Project* Conditions peak hour intersection levels of service.

**TABLE 5
CUMULATIVE CONDITIONS: INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Control	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Warrant Met?	Delay (sec/veh)	LOS	Warrant Met?
1	Ox Yoke Rd./Riverside Ave.	TWSC	27.4	D	No	48.0	E	Yes
2	I-5 SB Ramps/Riverside Ave.	TWSC	OVR	F	Yes	OVR	F	Yes
3	I-5 NB Ramps/Riverside Ave.	TWSC	OVR	F	Yes	OVR	F	Yes

*Legend: TWSC – Two Way Stop Controlled Intersection
LOS – Minor Street Approach Level of Service for Two-way-stop-controlled intersections
Delay - Minor Street Approach Delay for Two-way-stop-controlled Intersections
Warrant – MUTCD Peak Hour Warrant-3
OVR – Represents “overflow” conditions, where reported delay is greater than 999 seconds.*

As shown in **Table 5**, all of the study intersections will operate at unacceptable LOS conditions.

CUMULATIVE PLUS PROJECT CONDITIONS

Cumulative Plus Project AM and PM peak hour intersection traffic operations have been quantified utilizing the *Cumulative No Project* traffic volumes plus the project trips in **Table 3**. **Table 6** contains a summary of the *Cumulative Plus Project* intersection LOS conditions.

**TABLE 6
CUMULATIVE PLUS PROJECT CONDITIONS: INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Control	AM Peak Hour			PM Peak Hour		
			Delay (sec/veh)	LOS	Warrant Met?	Delay (sec/veh)	LOS	Warrant Met?
1	Ox Yoke Rd./Riverside Ave.	TWSC	28.8	D	No	52.3	F	Yes
2	I-5 SB Ramps/Riverside Ave.	TWSC	OVR	F	Yes	OVR	F	Yes
3	I-5 NB Ramps/Riverside Ave.	TWSC	OVR	F	Yes	OVR	F	Yes

*Legend: TWSC – Two Way Stop Controlled Intersection
LOS – Minor Street Approach Level of Service for Two-way-stop-controlled intersections
Delay - Minor Street Approach Delay for Two-way-stop-controlled Intersections
Warrant – MUTCD Peak Hour Warrant-3
OVR – Represents “overflow” conditions, where reported delay is greater than 999 seconds.*

As shown in **Table 6**, all of the study intersections will operate at unacceptable LOS conditions.

CONCLUSIONS/RECOMMENDED MITIGATIONS

This section describes any project impacts at study intersections that were been identified in the *Existing Plus Project* and *Cumulative Plus Project* analyses. This section also presents recommended improvements that mitigate identified project impacts at study intersections by providing acceptable LOS. Mitigated LOS results are presented at the end of this section in **Table 7**.

EXISTING PLUS PROJECT CONDITIONS

Ox Yoke/Riverside Avenue: This intersection operates acceptably during *Existing Plus Project* Conditions. Therefore, the **project does not have a significant impact** on this intersection and no mitigations are required.

I-5 SB Ramps/Riverside Avenue: This intersection operates at unacceptable LOS during *Existing Plus Project* Conditions. However, the addition of project traffic does not increase the delay by more than 5 seconds. Therefore, the **project does not have a significant impact** on this intersection and no mitigations are required.

I-5 NB Ramps/Riverside Avenue: This intersection operates at unacceptable LOS during *Existing Plus Project* Conditions. However, the addition of project traffic does not increase the delay by more than 5 seconds. Therefore, the **project does not have a significant impact** on this intersection and no mitigations are required.

CUMULATIVE PLUS PROJECT CONDITIONS

Ox Yoke/Riverside Avenue: This intersection operates at unacceptable LOS during *Cumulative Plus Project* Conditions. However, the addition of project traffic does not increase the delay by more than 5 seconds. Therefore, the **project does not have a significant impact** on this intersection and no mitigations are required.

I-5 SB Ramps/Riverside Avenue: This intersection operates at unacceptable LOS during *Cumulative Plus Project* Conditions. The addition of project traffic does increase the delay by more than 5 seconds (delay was reported as overflow, because calculated delay is over 999 seconds). Therefore, the **project has a significant impact** on this intersection. The following improvement is recommended to mitigate *Cumulative Plus Project* Conditions:

- Install Actuated-Coordinated Signal (coordinate with I-5 NB Ramps/Riverside Avenue intersection);
- Widen eastbound approach to construct a dedicated right-turn pocket; and,
- Widen southbound approach to construct a free-right “channelized” right-turn pocket with appropriate westbound receiving lane.

I-5 NB Ramps/Riverside Avenue: This intersection operates at unacceptable LOS during *Cumulative Plus Project* Conditions. The addition of project traffic does increase the delay by more than 5 seconds (delay was reported as overflow, because calculated delay is over 999 seconds). Therefore, the **project has a significant impact** on this intersection. The following improvement is recommended to mitigate *Cumulative Plus Project* Conditions:

- Install Actuated-Coordinated Signal (coordinate with I-5 SB Ramps/Riverside Avenue intersection)

**TABLE 7
CUMULATIVE PLUS PROJECT CONDITIONS: MITIGATED INTERSECTION LEVELS-OF-SERVICE**

No	Intersection	Control	AM Peak Hour		PM Peak Hour	
			Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2	I-5 SB Ramps/Riverside Ave.	Signal	10.2	B	24.4	C
3	I-5 NB Ramps/Riverside Ave.	Signal	19.9	B	18.3	B

*Legend: LOS – Average LOS for All Approaches at Signalized Intersections
Delay – Average Delay for All Approaches at Signalized Intersections*

As presented in Table 7, construction of the improvements described above will result in acceptable LOS operations during *Cumulative Plus Project* conditions.

PRO RATA SHARE CALCULATIONS

The proposed project’s theoretical equitable share is calculated using the method for calculating equitable mitigation measures outlined in the *Caltrans Guide for the Preparation of Traffic Impact Studies* (State of California, DOT, December 2002) as a guide. The formula is shown below:

$$P=T/(T_B - T_E)$$

Where:

P = The equitable share for the proposed project’s traffic impact.

T = The vehicle trips generated by the project during the peak hour of adjacent roadway facility in vehicles per hour (vph).

T_B = The forecasted traffic volume on a impacted roadway facility 20 years into the future (vph).

T_E = The traffic volume existing on the impacted roadway (vph).

Table 8 presents the project’s theoretical pro rata contribution to intersections that require mitigation.

**TABLE 8
“YEAR 2030” PRO RATA SHARE CALCULATIONS**

Intersection ¹	Existing Volume	Future Volume ¹	Project Only Volume ²	Pro Rata %
I-5 SB Ramps/Riverside Ave.	1,330	2,539	12	1.0%
I-5 NB Ramps/Riverside Ave.	1,110	2,396	6	0.5%

Notes:

1. Future Volume = Sum of “Cumulative Plus Project” PM peak-hour intersection turning movements.

2. Project Only Volume = Sum of project-generated turning movements

It should be noted that the methodology employed to generate the results in **Table 8** is neither intended as, nor does it establish, a legal standard for determining equitable responsibility and cost of the project’s traffic impact; the intent is to provide:

1. A starting point for early discussions to address traffic mitigation equitably;
2. A means for calculating the equitable share for mitigating traffic impacts; and
3. A means for establishing rough proportionality [Dolan vs. City of Tigard, 1994, 512 U.S. 374 (114 S. Ct. 2309)].

APPENDIX

Level-of-Service Worksheets

Ox Yoke Road-Riverside Avenue Corridor
6: Ox Yoke Road & Riverside Ave

Existing Conditions
AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	22	252	358	95	31	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	274	389	103	34	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	492				762	441
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	492				762	441
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				91	98
cM capacity (veh/h)	1071				364	616

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	298	492	34	12
Volume Left	24	0	34	0
Volume Right	0	103	0	12
cSH	1071	1700	364	616
Volume to Capacity	0.02	0.29	0.09	0.02
Queue Length 95th (ft)	2	0	8	1
Control Delay (s)	0.9	0.0	15.9	11.0
Lane LOS	A		C	B
Approach Delay (s)	0.9	0.0	14.6	
Approach LOS			B	

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization	41.5%		ICU Level of Service A
Analysis Period (min)		15	

Ox Yoke Road-Riverside Avenue Corridor
 10: Riverside Ave & I-5 SB Off-Ramp

Existing Conditions
 AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔						↔	↔
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	270	114	80	319	0	0	0	0	60	2	198
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	293	124	87	347	0	0	0	0	65	2	215
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	347			417			1092	876	355	876	938	347
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	347			417			1092	876	355	876	938	347
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			92			100	100	100	74	99	69
cM capacity (veh/h)	1212			1142			124	265	689	254	244	696

Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2
Volume Total	417	87	347	67	215
Volume Left	0	87	0	65	0
Volume Right	124	0	0	0	215
cSH	1700	1142	1700	253	696
Volume to Capacity	0.25	0.08	0.20	0.27	0.31
Queue Length 95th (ft)	0	6	0	26	33
Control Delay (s)	0.0	8.4	0.0	24.3	12.5
Lane LOS		A		C	B
Approach Delay (s)	0.0	1.7		15.3	
Approach LOS				C	

Intersection Summary		
Average Delay		4.5
Intersection Capacity Utilization	39.0%	ICU Level of Service
Analysis Period (min)		15
		A

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	161	169	184	261	138	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	175	184	200	284	150	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			359	951	267	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			359	951	267	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			83	38	91	
cM capacity (veh/h)			1200	240	772	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	359	200	284	150	67	
Volume Left	0	200	0	150	0	
Volume Right	184	0	0	0	67	
cSH	1700	1200	1700	240	772	
Volume to Capacity	0.21	0.17	0.17	0.62	0.09	
Queue Length 95th (ft)	0	15	0	94	7	
Control Delay (s)	0.0	8.6	0.0	42.0	10.1	
Lane LOS		A		E	B	
Approach Delay (s)	0.0	3.6		32.1		
Approach LOS				D		
Intersection Summary						
Average Delay			8.2			
Intersection Capacity Utilization			46.7%	ICU Level of Service	A	
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	19	343	318	59	126	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	373	346	64	137	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	410				792	378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410				792	378
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				61	94
cM capacity (veh/h)	1149				352	669

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	393	410	137	43
Volume Left	21	0	137	0
Volume Right	0	64	0	43
cSH	1149	1700	352	669
Volume to Capacity	0.02	0.24	0.39	0.06
Queue Length 95th (ft)	1	0	45	5
Control Delay (s)	0.6	0.0	21.6	10.8
Lane LOS	A		C	B
Approach Delay (s)	0.6	0.0	19.0	
Approach LOS			C	

Intersection Summary			
Average Delay		3.7	
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Conditions
10: Riverside Ave & I-5 SB Off-Ramp

Existing Conditions
PM Peak Hour

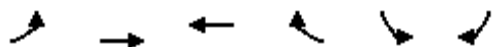


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔						↔	↔
Sign Control		Free		Free	Free			Stop			Stop	Stop
Grade		0%		0%	0%			0%			0%	0%
Volume (veh/h)	0	406	159	74	280	0	0	0	0	185	1	225
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	441	173	80	304	0	0	0	0	201	1	245
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	304			614			1238	993	528	993	1079	304
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	304			614			1238	993	528	993	1079	304
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			92			100	100	100	4	99	67
cM capacity (veh/h)	1256			965			95	225	551	210	200	735
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	614	80	304	202	245							
Volume Left	0	80	0	201	0							
Volume Right	173	0	0	0	245							
cSH	1700	965	1700	210	735							
Volume to Capacity	0.36	0.08	0.18	0.96	0.33							
Queue Length 95th (ft)	0	7	0	206	36							
Control Delay (s)	0.0	9.1	0.0	100.3	12.3							
Lane LOS		A		F	B							
Approach Delay (s)	0.0	1.9		52.2								
Approach LOS				F								
Intersection Summary												
Average Delay				16.6								
Intersection Capacity Utilization			55.4%		ICU Level of Service					B		
Analysis Period (min)			15									

Existing Conditions
11: Riverside Ave & I-5 NB On-Ramp

Existing Conditions
PM Peak Hour


















	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	352	239	83	221	133	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	383	260	90	240	145	89
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			642	933	512	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			642	933	512	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			90	46	84	
cM capacity (veh/h)			942	267	562	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	642	90	240	145	89	
Volume Left	0	90	0	145	0	
Volume Right	260	0	0	0	89	
cSH	1700	942	1700	267	562	
Volume to Capacity	0.38	0.10	0.14	0.54	0.16	
Queue Length 95th (ft)	0	8	0	74	14	
Control Delay (s)	0.0	9.2	0.0	33.3	12.6	
Lane LOS		A		D	B	
Approach Delay (s)	0.0	2.5		25.4		
Approach LOS				D		
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			55.1%	ICU Level of Service	B	
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	22	252	358	101	37	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	274	389	110	40	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	499				766	444
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	499				766	444
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				89	98
cM capacity (veh/h)	1065				363	614
Direction, Lane #	EB 1	WB 1	SB 1	SB 2		
Volume Total	298	499	40	12		
Volume Left	24	0	40	0		
Volume Right	0	110	0	12		
cSH	1065	1700	363	614		
Volume to Capacity	0.02	0.29	0.11	0.02		
Queue Length 95th (ft)	2	0	9	1		
Control Delay (s)	0.9	0.0	16.2	11.0		
Lane LOS	A		C	B		
Approach Delay (s)	0.9	0.0	15.0			
Approach LOS			B			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			41.5%		ICU Level of Service	A
Analysis Period (min)			15			

Ox Yoke Road-Riverside Avenue Corridor
 10: Riverside Ave & I-5 SB Off-Ramp

Existing Conditions + Project
 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	276	114	80	319	0	0	0	0	60	2	204
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	300	124	87	347	0	0	0	0	65	2	222
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	347			424			1105	883	362	883	945	347
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	347			424			1105	883	362	883	945	347
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			92			100	100	100	74	99	68
cM capacity (veh/h)	1212			1135			120	263	683	251	242	696
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	424	87	347	67	222							
Volume Left	0	87	0	65	0							
Volume Right	124	0	0	0	222							
cSH	1700	1135	1700	251	696							
Volume to Capacity	0.25	0.08	0.20	0.27	0.32							
Queue Length 95th (ft)	0	6	0	26	34							
Control Delay (s)	0.0	8.4	0.0	24.6	12.6							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	1.7		15.4								
Approach LOS				C								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			39.3%			ICU Level of Service			A			
Analysis Period (min)			15									

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	161	175	184	261	138	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	175	190	200	284	150	67
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			365	954	270	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			365	954	270	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			83	37	91	
cM capacity (veh/h)			1193	239	769	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	365	200	284	150	67	
Volume Left	0	200	0	150	0	
Volume Right	190	0	0	0	67	
cSH	1700	1193	1700	239	769	
Volume to Capacity	0.21	0.17	0.17	0.63	0.09	
Queue Length 95th (ft)	0	15	0	94	7	
Control Delay (s)	0.0	8.6	0.0	42.5	10.1	
Lane LOS		A		E	B	
Approach Delay (s)	0.0	3.6		32.4		
Approach LOS				D		
Intersection Summary						
Average Delay			8.2			
Intersection Capacity Utilization			47.0%	ICU Level of Service	A	
Analysis Period (min)			15			




















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	19	343	318	65	132	40
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	373	346	71	143	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	416				795	381
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	416				795	381
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				59	93
cM capacity (veh/h)	1143				350	666

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	393	416	143	43
Volume Left	21	0	143	0
Volume Right	0	71	0	43
cSH	1143	1700	350	666
Volume to Capacity	0.02	0.24	0.41	0.07
Queue Length 95th (ft)	1	0	48	5
Control Delay (s)	0.6	0.0	22.2	10.8
Lane LOS	A		C	B
Approach Delay (s)	0.6	0.0	19.6	
Approach LOS			C	

Intersection Summary			
Average Delay		3.9	
Intersection Capacity Utilization	47.5%		ICU Level of Service A
Analysis Period (min)		15	

Existing Conditions
10: Riverside Ave & I-5 SB Off-Ramp

Existing Conditions + Project
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	412	159	74	280	0	0	0	0	185	1	231
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	448	173	80	304	0	0	0	0	201	1	251
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	304			621			1251	999	534	999	1086	304
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	304			621			1251	999	534	999	1086	304
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			92			100	100	100	3	99	66
cM capacity (veh/h)	1256			960			92	223	546	208	198	735
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	621	80	304	202	251							
Volume Left	0	80	0	201	0							
Volume Right	173	0	0	0	251							
cSH	1700	960	1700	208	735							
Volume to Capacity	0.37	0.08	0.18	0.97	0.34							
Queue Length 95th (ft)	0	7	0	209	38							
Control Delay (s)	0.0	9.1	0.0	103.6	12.4							
Lane LOS		A		F	B							
Approach Delay (s)	0.0	1.9		53.1								
Approach LOS				F								
Intersection Summary												
Average Delay			17.0									
Intersection Capacity Utilization			55.8%		ICU Level of Service					B		
Analysis Period (min)			15									

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	352	245	83	221	133	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	383	266	90	240	145	89
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			649		936	516
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			649		936	516
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		46	84
cM capacity (veh/h)			937		266	559
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	649	90	240	145	89	
Volume Left	0	90	0	145	0	
Volume Right	266	0	0	0	89	
cSH	1700	937	1700	266	559	
Volume to Capacity	0.38	0.10	0.14	0.54	0.16	
Queue Length 95th (ft)	0	8	0	75	14	
Control Delay (s)	0.0	9.3	0.0	33.6	12.7	
Lane LOS		A		D	B	
Approach Delay (s)	0.0	2.5		25.6		
Approach LOS				D		
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			55.4%		ICU Level of Service	B
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↔	↔		↔	↔
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	33	407	453	118	100	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	442	492	128	109	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	621				1071	557
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	621				1071	557
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				54	93
cM capacity (veh/h)	960				235	530

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	478	621	109	39
Volume Left	36	0	109	0
Volume Right	0	128	0	39
cSH	960	1700	235	530
Volume to Capacity	0.04	0.37	0.46	0.07
Queue Length 95th (ft)	3	0	56	6
Control Delay (s)	1.1	0.0	32.8	12.3
Lane LOS	A		D	B
Approach Delay (s)	1.1	0.0	27.4	
Approach LOS			D	

Intersection Summary			
Average Delay		3.7	
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

Ox Yoke Road-Riverside Avenue Corridor
 10: Riverside Ave & I-5 SB Off-Ramp

Cumulative Conditions
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	703	245	256	464	0	0	0	0	142	2	267
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	764	266	278	504	0	0	0	0	154	2	290
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	504			1030			2249	1958	897	1958	2091	504
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	504			1030			2249	1958	897	1958	2091	504
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			59			100	100	100	0	93	49
cM capacity (veh/h)	1060			674			9	37	338	32	31	568
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	1030	278	504	157	290							
Volume Left	0	278	0	154	0							
Volume Right	266	0	0	0	290							
cSH	1700	674	1700	32	568							
Volume to Capacity	0.61	0.41	0.30	4.84	0.51							
Queue Length 95th (ft)	0	51	0	Err	72							
Control Delay (s)	0.0	14.0	0.0	Err	17.8							
Lane LOS		B		F	C							
Approach Delay (s)	0.0	5.0		3514.9								
Approach LOS				F								
Intersection Summary												
Average Delay			696.6									
Intersection Capacity Utilization			84.1%		ICU Level of Service					E		
Analysis Period (min)			15									

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	562	283	239	540	179	462
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	611	308	260	587	195	502
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			918		1871	765
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			918		1871	765
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			65		0	0
cM capacity (veh/h)			743		52	403
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	918	260	587	195	502	
Volume Left	0	260	0	195	0	
Volume Right	308	0	0	0	502	
cSH	1700	743	1700	52	403	
Volume to Capacity	0.54	0.35	0.35	3.78	1.24	
Queue Length 95th (ft)	0	39	0	Err	531	
Control Delay (s)	0.0	12.4	0.0	Err	158.7	
Lane LOS		B		F	F	
Approach Delay (s)	0.0	3.8		2906.6		
Approach LOS				F		
Intersection Summary						
Average Delay			823.9			
Intersection Capacity Utilization			82.1%		ICU Level of Service	E
Analysis Period (min)			15			

Existing Conditions
6: Ox Yoke Road & Riverside Ave

Cumulative Conditions
PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	55	392	485	116	148	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	426	527	126	161	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	653				1136	590
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	653				1136	590
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				23	86
cM capacity (veh/h)	934				209	507

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	486	653	161	71
Volume Left	60	0	161	0
Volume Right	0	126	0	71
cSH	934	1700	209	507
Volume to Capacity	0.06	0.38	0.77	0.14
Queue Length 95th (ft)	5	0	133	12
Control Delay (s)	1.8	0.0	63.3	13.2
Lane LOS	A		F	B
Approach Delay (s)	1.8	0.0	48.0	
Approach LOS			E	

Intersection Summary			
Average Delay		8.8	
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)		15	

Existing Conditions
10: Riverside Ave & I-5 SB Off-Ramp

Cumulative Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↻		↻	↻						↻	↻
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	636	175	355	654	0	0	0	0	235	1	483
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	691	190	386	711	0	0	0	0	255	1	525
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	711			882			2795	2269	786	2269	2364	711
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	711			882			2795	2269	786	2269	2364	711
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			50			0	100	100	0	94	0
cM capacity (veh/h)	889			767			0	20	392	17	17	433
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	882	386	711	257	525							
Volume Left	0	386	0	255	0							
Volume Right	190	0	0	0	525							
cSH	1700	767	1700	17	433							
Volume to Capacity	0.52	0.50	0.42	14.83	1.21							
Queue Length 95th (ft)	0	72	0	Err	523							
Control Delay (s)	0.0	14.3	0.0	Err	143.6							
Lane LOS		B		F	F							
Approach Delay (s)	0.0	5.0		3378.5								
Approach LOS				F								
Intersection Summary												
Average Delay			958.7									
Intersection Capacity Utilization			86.9%		ICU Level of Service					E		
Analysis Period (min)			15									

Existing Conditions
11: Riverside Ave & I-5 NB On-Ramp

Cumulative Conditions
PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	568	302	161	840	168	357
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	617	328	175	913	183	388
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			946		2045	782
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			946		2045	782
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			76		0	2
cM capacity (veh/h)			726		47	395
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	946	175	913	183	388	
Volume Left	0	175	0	183	0	
Volume Right	328	0	0	0	388	
cSH	1700	726	1700	47	395	
Volume to Capacity	0.56	0.24	0.54	3.90	0.98	
Queue Length 95th (ft)	0	24	0	Err	292	
Control Delay (s)	0.0	11.5	0.0	Err	74.1	
Lane LOS		B		F	F	
Approach Delay (s)	0.0	1.9		3250.1		
Approach LOS				F		
Intersection Summary						
Average Delay			712.9			
Intersection Capacity Utilization			77.1%	ICU Level of Service	D	
Analysis Period (min)			15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	33	407	453	124	106	36
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	442	492	135	115	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	627				1074	560
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	627				1074	560
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				51	93
cM capacity (veh/h)	955				234	528

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	478	627	115	39
Volume Left	36	0	115	0
Volume Right	0	135	0	39
cSH	955	1700	234	528
Volume to Capacity	0.04	0.37	0.49	0.07
Queue Length 95th (ft)	3	0	62	6
Control Delay (s)	1.1	0.0	34.4	12.4
Lane LOS	A		D	B
Approach Delay (s)	1.1	0.0	28.8	
Approach LOS			D	

Intersection Summary			
Average Delay		3.9	
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

Ox Yoke Road-Riverside Avenue Corridor
 10: Riverside Ave & I-5 SB Off-Ramp

Cumulative Conditions + Project
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↻		↻	↻						↻	↻
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	709	245	256	464	0	0	0	0	142	2	273
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	771	266	278	504	0	0	0	0	154	2	297
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	504			1037			2262	1965	904	1965	2098	504
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	504			1037			2262	1965	904	1965	2098	504
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			58			100	100	100	0	93	48
cM capacity (veh/h)	1060			670			9	37	335	32	30	568
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	1037	278	504	157	297							
Volume Left	0	278	0	154	0							
Volume Right	266	0	0	0	297							
cSH	1700	670	1700	32	568							
Volume to Capacity	0.61	0.42	0.30	4.90	0.52							
Queue Length 95th (ft)	0	51	0	Err	75							
Control Delay (s)	0.0	14.1	0.0	Err	18.1							
Lane LOS		B		F	C							
Approach Delay (s)	0.0	5.0		3464.7								
Approach LOS				F								
Intersection Summary												
Average Delay			692.7									
Intersection Capacity Utilization			84.4%		ICU Level of Service				E			
Analysis Period (min)			15									

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	562	289	239	540	179	462
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	611	314	260	587	195	502
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			925	1874	768	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			925	1874	768	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			65	0	0	
cM capacity (veh/h)			739	51	402	
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	925	260	587	195	502	
Volume Left	0	260	0	195	0	
Volume Right	314	0	0	0	502	
cSH	1700	739	1700	51	402	
Volume to Capacity	0.54	0.35	0.35	3.80	1.25	
Queue Length 95th (ft)	0	40	0	Err	534	
Control Delay (s)	0.0	12.5	0.0	Err	160.9	
Lane LOS		B		F	F	
Approach Delay (s)	0.0	3.8		2908.2		
Approach LOS				F		
Intersection Summary						
Average Delay		822.2				
Intersection Capacity Utilization		82.5%		ICU Level of Service	E	
Analysis Period (min)		15				




















Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↔		↙	↘
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	55	392	485	122	154	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	426	527	133	167	71
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	660				1139	593
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660				1139	593
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				20	86
cM capacity (veh/h)	928				208	505

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	486	660	167	71
Volume Left	60	0	167	0
Volume Right	0	133	0	71
cSH	928	1700	208	505
Volume to Capacity	0.06	0.39	0.80	0.14
Queue Length 95th (ft)	5	0	144	12
Control Delay (s)	1.8	0.0	68.8	13.3
Lane LOS	A		F	B
Approach Delay (s)	1.8	0.0	52.3	
Approach LOS			F	

Intersection Summary			
Average Delay		9.6	
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

Existing Conditions
10: Riverside Ave & I-5 SB Off-Ramp

Cumulative Conditions + Project
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	642	175	355	654	0	0	0	0	235	1	489
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	698	190	386	711	0	0	0	0	255	1	532
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	711			888			2808	2276	793	2276	2371	711
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	711			888			2808	2276	793	2276	2371	711
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			49			0	100	100	0	94	0
cM capacity (veh/h)	889			763			0	20	389	17	17	433
Direction, Lane #	EB 1	WB 1	WB 2	SB 1	SB 2							
Volume Total	888	386	711	257	532							
Volume Left	0	386	0	255	0							
Volume Right	190	0	0	0	532							
cSH	1700	763	1700	17	433							
Volume to Capacity	0.52	0.51	0.42	15.05	1.23							
Queue Length 95th (ft)	0	72	0	Err	539							
Control Delay (s)	0.0	14.5	0.0	Err	149.4							
Lane LOS		B		F	F							
Approach Delay (s)	0.0	5.1		3355.6								
Approach LOS				F								
Intersection Summary												
Average Delay			955.7									
Intersection Capacity Utilization			87.2%		ICU Level of Service				E			
Analysis Period (min)			15									

Existing Conditions
11: Riverside Ave & I-5 NB On-Ramp

Cumulative Conditions + Project
PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	568	308	161	840	168	357
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	617	335	175	913	183	388
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			952		2048	785
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			952		2048	785
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			76		0	1
cM capacity (veh/h)			722		47	393
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	
Volume Total	952	175	913	183	388	
Volume Left	0	175	0	183	0	
Volume Right	335	0	0	0	388	
cSH	1700	722	1700	47	393	
Volume to Capacity	0.56	0.24	0.54	3.92	0.99	
Queue Length 95th (ft)	0	24	0	Err	294	
Control Delay (s)	0.0	11.6	0.0	Err	75.3	
Lane LOS		B		F	F	
Approach Delay (s)	0.0	1.9		3250.9		
Approach LOS				F		
Intersection Summary						
Average Delay			711.3			
Intersection Capacity Utilization			77.4%		ICU Level of Service	D
Analysis Period (min)			15			

Ox Yoke Road-Riverside Avenue Corridor
 10: Riverside Ave & I-5 SB Off-Ramp

Cumulative + Project Mitigated Conditions
 AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1775	1583
Flt Permitted		1.00	1.00	0.26	1.00						0.95	1.00
Satd. Flow (perm)		1863	1583	487	1863						1775	1583
Volume (vph)	0	709	245	256	464	0	0	0	0	142	2	273
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	771	266	278	504	0	0	0	0	154	2	297
RTOR Reduction (vph)	0	0	87	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	771	179	278	504	0	0	0	0	0	156	297
Turn Type			Perm	Perm						Perm		Free
Protected Phases		4			8						6	
Permitted Phases			4	8								Free
Actuated Green, G (s)		60.5	60.5	60.5	60.5						21.5	90.0
Effective Green, g (s)		60.5	60.5	60.5	60.5						21.5	90.0
Actuated g/C Ratio		0.67	0.67	0.67	0.67						0.24	1.00
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)		1252	1064	327	1252						424	1583
v/s Ratio Prot		0.41			0.27							
v/s Ratio Perm			0.11	c0.57							0.09	0.19
v/c Ratio		0.62	0.17	0.85	0.40						0.37	0.19
Uniform Delay, d1		8.2	5.5	11.3	6.6						28.6	0.0
Progression Factor		1.00	1.00	0.83	0.69						1.00	1.00
Incremental Delay, d2		0.9	0.1	16.9	0.2						2.5	0.3
Delay (s)		9.2	5.5	26.2	4.8						31.0	0.3
Level of Service		A	A	C	A						C	A
Approach Delay (s)		8.2			12.4			0.0			10.9	
Approach LOS		A			B			A			B	
Intersection Summary												
HCM Average Control Delay			10.2			HCM Level of Service					B	
HCM Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			69.5%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Ox Yoke Road-Riverside Avenue Corridor
 11: Riverside Ave & I-5 NB On-Ramp

Cumulative + Project Mitigated Conditions
 AM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.95		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1777		1770	1863	1770	1583
Flt Permitted	1.00		0.22	1.00	0.95	1.00
Satd. Flow (perm)	1777		415	1863	1770	1583
Volume (vph)	562	289	239	540	179	462
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	611	314	260	587	195	502
RTOR Reduction (vph)	19	0	0	0	0	303
Lane Group Flow (vph)	906	0	260	587	195	199
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	66.6		66.6	66.6	15.4	15.4
Effective Green, g (s)	66.6		66.6	66.6	15.4	15.4
Actuated g/C Ratio	0.74		0.74	0.74	0.17	0.17
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)	1315		307	1379	303	271
v/s Ratio Prot	0.51			0.32	0.11	
v/s Ratio Perm			c0.63			c0.13
v/c Ratio	0.69		0.85	0.43	0.64	0.74
Uniform Delay, d1	6.2		8.1	4.4	34.7	35.4
Progression Factor	0.63		1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3		18.9	0.2	10.1	16.3
Delay (s)	5.2		27.1	4.7	44.8	51.7
Level of Service	A		C	A	D	D
Approach Delay (s)	5.2			11.5	49.7	
Approach LOS	A			B	D	
Intersection Summary						
HCM Average Control Delay			19.9		HCM Level of Service	B
HCM Volume to Capacity ratio			0.83			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			82.5%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Existing Conditions
10: Riverside Ave & I-5 SB Off-Ramp

Cumulative + Project Mitigated Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↑	↑	↑						↑	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0	4.0	4.0						4.0	4.0
Lane Util. Factor		1.00	1.00	1.00	1.00						1.00	1.00
Frt		1.00	0.85	1.00	1.00						1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (prot)		1863	1583	1770	1863						1774	1583
Flt Permitted		1.00	1.00	0.95	1.00						0.95	1.00
Satd. Flow (perm)		1863	1583	1770	1863						1774	1583
Volume (vph)	0	642	175	355	654	0	0	0	0	235	1	489
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	698	190	386	711	0	0	0	0	255	1	532
RTOR Reduction (vph)	0	0	114	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	698	76	386	711	0	0	0	0	0	256	532
Turn Type			Perm	Prot						Split		Free
Protected Phases		4		3	8					6	6	
Permitted Phases			4									Free
Actuated Green, G (s)		35.8	35.8	21.9	61.7						20.3	90.0
Effective Green, g (s)		35.8	35.8	21.9	61.7						20.3	90.0
Actuated g/C Ratio		0.40	0.40	0.24	0.69						0.23	1.00
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)		741	630	431	1277						400	1583
v/s Ratio Prot		c0.37		c0.22	0.38						c0.14	
v/s Ratio Perm			0.05									0.34
v/c Ratio		0.94	0.12	0.90	0.56						0.64	0.34
Uniform Delay, d1		26.1	17.1	32.9	7.2						31.5	0.0
Progression Factor		1.00	1.00	0.88	0.75						1.00	1.00
Incremental Delay, d2		20.1	0.1	16.5	0.4						7.6	0.6
Delay (s)		46.2	17.2	45.6	5.8						39.2	0.6
Level of Service		D	B	D	A						D	A
Approach Delay (s)		40.0			19.8			0.0			13.1	
Approach LOS		D			B			A			B	
Intersection Summary												
HCM Average Control Delay			24.4			HCM Level of Service					C	
HCM Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			76.5%			ICU Level of Service					D	
Analysis Period (min)			15									
c Critical Lane Group												

Existing Conditions
11: Riverside Ave & I-5 NB On-Ramp

Cumulative + Project Mitigated Conditions
PM Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↗		↖	↗	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.95		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1774		1770	1863	1770	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	1774		1770	1863	1770	1583
Volume (vph)	568	308	161	840	168	357
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	617	335	175	913	183	388
RTOR Reduction (vph)	20	0	0	0	0	329
Lane Group Flow (vph)	932	0	175	913	183	59
Turn Type			Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases						2
Actuated Green, G (s)	54.2		10.0	68.2	13.8	13.8
Effective Green, g (s)	54.2		10.0	68.2	13.8	13.8
Actuated g/C Ratio	0.60		0.11	0.76	0.15	0.15
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)	1068		197	1412	271	243
v/s Ratio Prot	c0.53		c0.10	0.49	c0.10	
v/s Ratio Perm						0.04
v/c Ratio	0.87		0.89	0.65	0.68	0.24
Uniform Delay, d1	15.0		39.4	5.2	36.0	33.5
Progression Factor	0.17		1.00	1.00	1.00	1.00
Incremental Delay, d2	4.1		34.7	1.0	12.7	2.4
Delay (s)	6.6		74.2	6.2	48.7	35.9
Level of Service	A		E	A	D	D
Approach Delay (s)	6.6			17.1	40.0	
Approach LOS	A			B	D	
Intersection Summary						
HCM Average Control Delay			18.3		HCM Level of Service	B
HCM Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			90.0		Sum of lost time (s)	12.0
Intersection Capacity Utilization			77.4%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						