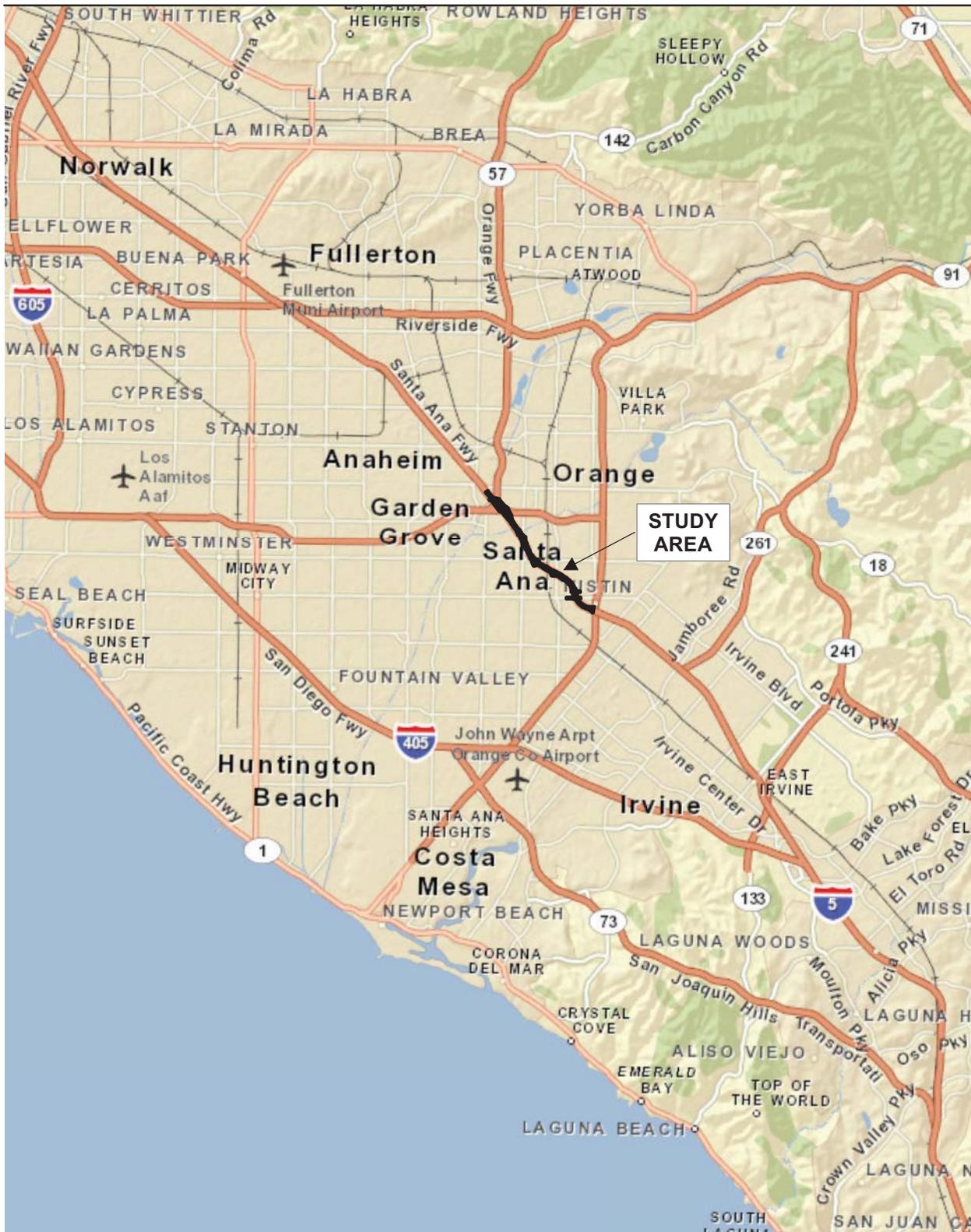


RTIP ID# <i>(required)</i> 2H0703	
TCWG Consideration Date	September 25, 2012
<p>Project Description <i>(clearly describe project)</i></p> <p>The Orange County Transportation Authority (OCTA), in cooperation with the California Department of Transportation - District 12 (Caltrans), is proposing improvements to the Interstate 5 Freeway (I-5) between State Route 55 (SR-55) (post mile 29.1) and State Route 57 (SR-57) (post mile 34.0), approximately 3.9 miles within the cities of Tustin, Santa Ana and Orange in Orange County. Figures 1 and 2 show the project location and vicinity, respectively. The proposed project is primarily funded by OCTA with Renewed Measure M2 local sales tax. The proposed improvements include the addition of one High Occupancy Vehicle (HOV) lane in each direction on I-5 to provide additional HOV capacity and reduce congestion in the HOV lanes. Proposed improvements to the First Street entrance ramp to southbound I-5 are to improve operations in the general purpose lanes. All proposed improvements would be constructed within Caltrans' existing ROW limits. In addition, temporary construction related activities (staging areas) would also be located within Caltrans' ROW limits. The following proposed project related improvements would be consistent across both of the proposed build alternatives in the EIS (Alternatives 2A/2B and Alternatives 5A/5B):</p> <ul style="list-style-type: none"> • The following entrance/exit ramp gore areas would be slightly adjusted to accommodate the HOV widening: <ul style="list-style-type: none"> ○ Southbound (SB) I-5 Grand Avenue HOV entrance ramp ○ SB I-5 to Santa Ana Boulevard exit ramp ○ 17th Street to SB I-5 entrance ramp ○ SB I-5 to 17th Street exit ramp ○ Northbound (NB) I-5 to 17th Street exit ramp ○ SB I-5 to Main Street/Broadway exit ramp ○ Santa Clara Avenue to NB I-5 entrance ramp ○ Westbound (WB) SR-22 to NB I-5 entrance ramp ○ Eastbound (EB) SR-22 to SB I-5 connector ○ SB I-5 to EB SR-22 connector ○ NB I-5 to NB SR-57 connector ○ Main Street to SB I-5 Entrance ramp. • Reconstruction or the new construction of retaining walls, within the State ROW limits and along the proposed edge of shoulder at select locations. • Closure of the HOV barrier gap (between Lincoln Avenue and north of 17th Street) and relocation of the existing HOV concrete barriers on the northbound (NB) side of I-5 between Lincoln Avenue and the Santa Clara Avenue over-crossing entrance ramp. • Relocation of the existing center median concrete barrier at various locations. • Relocation of the existing drainage inlets along the existing concrete barriers. • Design options involve existing structures that may be removed, including Main Street HOV drop exit and entrance ramps and the SB I-5 First Street "horseshoe" exit ramp. • Relocate overhead sign structures to allow freeway widening and install new overhead sign structures that tailor the two HOV build alternatives. • Construct Storm Water Treatment BMPs where feasible within the existing ROW. 	

Type of Project (use Table 1 on instruction sheet)				
Roadway realignment, and Reconfigure existing interchanges				
County	Narrative Location/Route & Postmiles			
Orange	1-5 between SR-55 (post mile 29.1) and SR-57 (post mile 34.0).			
Caltrans Projects – EA# 12-ORA-5-30.26/34.00				
Lead Agency: OCTA, in cooperation with Caltrans-District 12				
Contact Person	Phone#	Fax#	Email: dmak@octa.net	
Dennis Mak, P.E.	(714) 560-5826			
Hot Spot Pollutant of Concern (check one or both) PM2.5 X PM10 X				
Federal Action for which Project-Level PM Conformity is Needed (check appropriate box)				
Categorical Exclusion (NEPA)	<input checked="" type="checkbox"/> EA or Draft EIS	<input type="checkbox"/> FONSI or Final EIS	<input type="checkbox"/> PS&E or Construction	<input type="checkbox"/> Other
Scheduled Date of Federal Action: Jan 2014				
NEPA Delegation – Project Type (check appropriate box)				
<input type="checkbox"/> Exempt	<input type="checkbox"/> Section 6004 – Categorical Exemption	<input checked="" type="checkbox"/> Section 6005 – Non-Categorical Exemption		
Current Programming Dates (as appropriate)				
	PE/Environmental	ENG	ROW	CON
Start	Jan 2011	Jan 2014	n/a (all Caltrans ROW)	2016
End	Jan 2014	Dec 2014	n/a (all Caltrans ROW)	2018
Project Purpose and Need (Summary): (attach additional sheets as necessary)				
The primary purpose of the proposed project is to improve traffic operations and reduce congestion on the I-5 from north of the SR-55 to south of the SR-57 to improve the safe and efficient local and regional movement of people and goods, while minimizing environmental and community impacts. The project is needed to address the following issues:				
<ul style="list-style-type: none"> • Congestion and travel delay in the HOV lanes within the project limits. • Congestion in the SB general purpose lanes between Fourth Street and SR-55. 				
Surrounding Land Use/Traffic Generators (especially effect on diesel traffic)				
The land uses adjacent to the 3.9 mile improvement area consist of the following:				
City of Tustin	City of Santa Ana	City of Orange		
<ul style="list-style-type: none"> • High Density Residential • Medium Density Residential • Mobile Home Park • Professional Office • Public/Institutional 	<ul style="list-style-type: none"> • Medium Density Residential • Low Density Residential • Urban Neighborhood • Professional & Admin. Office • District Center • Open Space • General Commercial • Industrial 	<ul style="list-style-type: none"> • Medium Density Residential • Low Density Residential • Low Medium Residential • General Commercial Max. 		

<p>Opening Year (2018): HOV Build and No Build:</p> <p>LOS, AADT, % and # trucks, truck AADT of proposed facility LOS = (see Table 4-2 No Build; Tables 4-8, 4-9, 4-16, 4-17 Build) AADT = 183,000 to 190,000 (SB); 160,000 to 175,000 (NB) Truck AADT = 9,500 to 10,500 (SB); 9,000 (NB) Truck % = 5.4 % (SB and NB)</p>
<p>RTP Horizon Year / Design Year(2040): HOV Build and No Build:</p> <p>LOS, AADT, % and # trucks, truck AADT of proposed facility LOS = (see Table 4-23 No Build; Tables 4-29, 4-30, 4-37, 4-38 Build) AADT = 191,000 to 216,000 (SB); 181,000 to 199,000 (NB) Truck AADT = 10,500 to 12,000 (SB); 10,500 to 11,000 (NB) Truck % = 5.7 % (SB); 5.3 % (NB)</p>
<p>Opening Year(2018): If facility is an interchange(s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT</p> <p>See Tables 1, 2, 3, and 4</p> <p>RTP Horizon Year / Design Year: If facility is an interchange (s) or intersection(s), Build and No Build cross-street AADT, % and # trucks, truck AADT</p> <p>See Tables 1, 2, 3, and 4</p>
<p>Describe potential traffic redistribution effects of congestion relief (<i>impact on other facilities</i>)</p> <p>Provision of any of the HOV Lane Alternatives, 2A, 2B, 5A, and 5B, eliminates capacity constraints, thereby attracting additional HOV users to the study segment. The additional HOV users would increase density of the HOV lanes, but would cause only one location to fail. Several HOV locations would have demand for more than 1,600 vehicles per lane, which exceeds Caltrans’ preferences. Since the mainline volumes are not substantially affected by the project, there would be only minor changes in queues and weaving along the I-5. In addition, there would be minor changes to local intersection volumes due to increases in HOV volumes. Overall, HOV Lane Alternatives 2A/2B and 5A/5B would be almost identical operationally. HOV Lane Alternatives 2B and 5B would result in additional rerouting of vehicles on local streets and slight worsening in mainline operations and localized intersections due to the elimination of the Main Street direct HOV ramps. However, these changes would not impact any of the study area intersections, as evidenced by the intersection level of service analysis.</p> <p>Ramp Alternatives A and B would improve the weave density with Ramp Alternative A performing slightly better due to the longer weaving distance available with this alternative. However, the magnitude of improvements is limited due to the overall over capacity conditions on the I-5 mainline. Reconfiguring and relocating the First Street southbound on-ramp (and the associated changes to the Fourth Street northbound off-ramp) would cause changes in the local circulation patterns, both on the mainline and surface streets. As such, both alternatives would cause a minor diversion of vehicles to SR-55; however, these would not be substantial enough to affect roadway and freeway conditions. In addition to the diversion of vehicles to the SR-55, the local streets circulation patterns would further be disrupted by the redistribution required for the ramp reconfigurations. As shown in the intersection level of service analysis under Ramp Alternative A and B, none of the key ramp locations would be impacted due to the rerouting of vehicles due to the closure of the I-5 southbound on-ramp at First Street or any other configuration changes. Evaluation of queuing at ramp locations also identified that adequate storage is provided to accommodate anticipated queues (AECOM Project Traffic Report 2012)</p>



Source: ESRI 2011

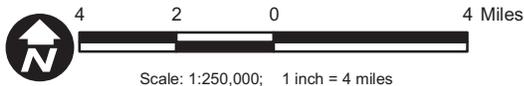


Figure 1
Regional Map



Figure 2
Vicinity Map

ORANGE COUNTY RTP PROJECTS

ORANGE COUNTY RTP PROJECTS								
CATEGORY	RTP ID	ROUTE #	ROUTE NAME	FROM	TO	DESCRIPTION	PROJECT COMPLETION BY*	PROJECT COST (\$1,000'S)
ARTERIAL	2A0703	0	M1 ROADWAY PROJECTS	COUNTYWIDE		COMPLETION OF MEASURE M ROADWAY PROJECTS	ONGOING	\$37,118
ARTERIAL	2A0704	0	REGIONAL CAPACITY PROGRAM	COUNTYWIDE		COMPLETE MPAH, IMPROVE ARTERIAL CAPACITY	ONGOING	\$1,124,497
ARTERIAL	2A0705	0	SIGNAL SYNCHRONIZATION PROGRAM	COUNTYWIDE		SYNCHRONIZE SIGNALS ACROSS JURISDICTIONS AND SMART STREETS	ONGOING	\$823,265
ARTERIAL	2A0706	0	IRVINE CENTER DRIVE	AT I-405		WIDEN OVERCROSSING	2025	\$11,176
AUXILIARY	2M01108	5	I-5 SB	LA PAZ ROAD	OSO PARKWAY	EXTEND AUXILIARY LANE THROUGH INTERCHANGE	2030	\$5,322
AUXILIARY	2M01110	5	I-5 SB	ALICIA PARKWAY	LA PAZ ROAD	EXTEND AUXILIARY LANE THROUGH INTERCHANGE	2030	\$19,510
AUXILIARY	2M0704	55	SR-55 NB	DYER	EDINGER	ADD AUXILIARY LANE	2030	\$146,633
AUXILIARY	2M01125	91	SR-91 WB	NB SR-55	WB SR-91 AT TUSTIN	ADD 1 AUX LANE WESTBOUND	2014	\$115,394
AUXILIARY	2M04130	405	I-405 SB	SR-133	IRVINE CENTER DRIVE	ADD 2ND AUXILIARY LANE	2020	\$10,892
AUXILIARY	2M04131	405	I-405 NB	JEFFREY	CULVER	ADD AUXILIARY LANE	2020	\$13,927
GRADE SEPARATION	2GL04	0	GRADE SEPARATION	LOSSAN/BNSF		CONSTRUCT GRADE SEPARATIONS AT SELECT LOCATIONS ALONG THE LOSSAN AND BNSF CORRIDORS	ONGOING	\$718,976
HOV	2H01143	5	I-5	COAST HIGHWAY	PICO	ADD 1 HOV LANE EACH DIRECTION	2018	\$202,680
HOV	2H0702	5	I-5	BARRANCA PARKWAY		BARRANCA PARKWAY HOV INTERCHANGE IMPROVEMENT - ADD SB HOV ON-RAMP AND NB HOV OFF-RAMP	2021	\$24,966
HOV	2H0703	5	I-5	SR-55	SR-57	ADD 1 HOV LANE EACH DIRECTION	2035	\$600,929
HOV	2H0705	57	SR-57	CERRITOS		HOV DROP RAMP	2035	\$277,056
HOV	2H0706	73	SR-73	I-405		HOV CONNECTOR	2035	\$664,935
HOV	2H0707	73	SR-73	I-405	MACARTHUR	ADD 1 HOV LANE EACH DIRECTION	2035	\$236,421
HOV	2H01148	405	I-405	AT VON KARMAN		HOV DROP RAMP	2020	\$139,275
HOV	2H0701	405	I-405	BEAR		HOV DROP RAMP	2020	\$133,918
IC/RAMPS	2M01107	5	I-5	SR-55		RECONFIGURE INTERCHANGE TO REDUCE WEAVING - INTERIM PROJECT	2035	\$811,254

COUNTY - COMPREHENSIVE MODELING LISTING

CO	SYS*	HEAD AGENCY	RTP/RTIP ID	RTE	BEG PM	END PM	PROJECT / ROUTE NAME	FROM	TO	PROJECT DESCRIPTION	ADDITIONAL PROJECT DETAILS, IF AVAILABLE	NETWORK YEAR / PROJECT COMPLETION BY														
												2008 RTP	NO BUILD	2008	2009	2010	2012	2014	2016	2018	2020	2023	2030	2035		
OR	S	ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA020112	5	15.1	16.3	I-5	AT OSO PARKWAY EXIT LANE AND NORTHBOUND ON RAMP		I-5 SOUTHBOUND AT OSO PARKWAY EXIT LANE AND INTERCHANGE IMPROVEMENTS. WIDEN FROM 1 TO 2 LANES AND ADD AN EXIT/STORAGE LANE PLUS SIGHT DISTANCE IMPROVEMENT TO NORTHBOUND ON RAMP LANE PLUS SIGHT DISTANCE IMPROV. TO NB OFF RAMP.	WIDEN FROM 1 TO 2 LANES AND ADD AN EXIT/STORAGE LANE PLUS SIGHT DISTANCE IMPROVEMENT TO NORTHBOUND ON RAMP	✓	✓													
OR	S	CALTRANS	2M01108	5	15.2	16.5	I-5 SB	La Paz Road	Oso Parkway	EXTEND AUXILIARY LANE THROUGH INTERCHANGE	Existing Configuration: aux drops at La Paz and resumes south of La Paz	✓	✓												✓	
OR	S	LAGUNA HILLS	ORA000122	5	16.5	16.5	I-5	LA PAZ INTERCHANGE		I-5 @ LA PAZ INTERCHANGE IMPROVEMENTS. EXPAND LA PAZ RD. FROM 4 TO 6 LANES TOTAL. (99-LHILL-GMA-1125)	ON RAMP EXTENSION LANES	✓														
OR	S	CALTRANS	2M01109	5	16.5	0.0	I-5	La Paz Road		RE-CONSTRUCT INTERCHANGE TO INCREASE STORAGE CAPACITY OF RAMPS	Existing Configuration: 1 to 2 lane on-ramps, 1 to 3 lane SB off-ramp, 1 to 4 lane NB off-ramp															✓
OR	S	CALTRANS	2M01110	5	16.5	17.5	I-5 SB	Albia Parkway	La Paz Road	EXTEND AUXILIARY LANE THROUGH INTERCHANGE	Existing Config: aux drops at Alicia, and resumes south of Alicia															✓
OR	S	ORANGE COUNTY TRANS AUTHORITY (OCTA)	2M0718	5	17.0	0.0	I-5	Marguerite Parkway		ADD NEW INTERCHANGE AT MARGUERITE PARKWAY (SADDLEBACK CC CONNECTION)	Existing Config: No interchange															✓
OR	S	CALTRANS	2M0717	5	18.0	0.0	I-5	El Toro Road (Los Alisos)		ADD RAMPS AT LOS ALISOS OR AVE. DE LA CARLOTA	Existing Config: No ramps between El Toro & Alicia															✓
OR	S	CALTRANS	2H0702	5	22.7	0.0	I-5	Barranca Parkway		I-5 @ BARRANCA. ADD SB HOV ON-RAMP AND NB HOV OFF-RAMP	Existing Config: NB HOV on-ramp and SB HOV off-ramp															✓
OR	S	CALTRANS	2M0731	5	23.1	30.3	I-5	SR-133		ADD 1 MF LANE EACH DIRECTION	Existing Config: 5 lanes each direction															✓
OR	S	ORANGE COUNTY TRANS AUTHORITY (OCTA)	ORA020108	5	26.9	26.9	I-5	CULVER DRIVE	SR-55 SOUTH SOUND OFF RAMP	I-5 AT CULVER DRIVE S/B OFFRAMP WIDENING FROM ONE TO TWO LANES	WIDENING FROM 1 TO 2 LANES	✓	✓													✓
OR	S	CALTRANS	ORA120369	5	27.5	28.1	I-5	JAMBOREE INTERCHANGE		I-5 @ JAMBOREE - CONSTRUCT AUX LN ON I-5 SB; WIDEN SB OFF-RAMP FROM 1 TO 2 LANES; AND WIDENING JAMBOREE RD EB UNDERCROSSING TO CREATE A TURN LANE TO NB ON-RAMP	CONSTRUCT AUXILIARY LANE AND WIDEN OFF-RAMP FROM 1 TO 2 LANES	✓	✓												✓	
OR	S	CALTRANS	2M01107	5	30.3	0.0	I-5	SR-55		RECONFIGURE INTERCHANGE TO REDUCE WEAVING - INTERIM PROJECT	Existing Configuration: 2 lanes on all MF connectors; 1 lane HOV for NB 55/5 & SB 5/55															✓
OR	S	CALTRANS	2H0703	5	30.3	34.0	I-5	SR-55		ADD 1 HOV LANE EACH DIRECTION	1 to 2 HOV Lanes															✓
OR	S	CALTRANS	ORA000100	5	34.0	43.5	I-5	GENE ALTRY HOV TRANSITWAY	SR-57	GENE ALTRY WAY WEST @ I-5 (I-5 HOV TRANSITWAY TO HASTER) ADD OVERCROSSING ON I-5	ADD OVERCROSSING ON I-5 SOUTH MANCHESTER - EXTEND GENE ALTRY WAY WEST FROM I-5 TO HASTER.	✓	✓													✓
OR	S	CALTRANS	2M0732	5	34.0	42.1	I-5	SR-57	SR-91	MANCHESTER AND EXTEND GENE ALTRY WAY WEST FROM I-5 TO HASTER (3 LANES IN EA DIR.)	Existing Config: 4 to 6 lanes each direction															✓

4.1.2 HOV LANE PERFORMANCE

Freeway HOV volumes are shown in Figure 9, and the HOV analysis results are summarized in Table 4-2. Forecast weekday AM and PM peak-hour HOV volumes by direction and measures of effectiveness are included in Table 4-2. As shown, all HOV lane segments are projected to operate at satisfactory LOS during both peak hours in Opening Year (2018) No Build conditions. However, there are 2 HOV lane segments during the weekday AM peak hour and 6 HOV lane segments during the weekday PM peak hour that operate over the Caltrans’ desire of 1,600 vph (note that 1 of the 2 weekday AM peak hour locations and 2 of the 6 weekday PM peak hour locations are outside the project limits).

As noted previously, there is a severe bottleneck where the HOV lane from I-5 southbound connects with the HOV lane from SR-57 southbound, with a capacity limit of 1,550 vph. North of this bottleneck, there is substantial congestion on both the I-5 southbound and SR-57 SB HOV lanes, which would be worsened under Opening Year (2018) Conditions. During both weekday AM and PM peak hours, there would be an unmet demand of about 800 and 910 vehicles, respectively. However, since this bottleneck restricts downstream volumes, analysis locations to the south tend to operate under capacity.

Similarly, there is a bottleneck where the HOV lane from I-5 northbound merges with the HOV lane from SR-55 northbound, with a capacity limit of 1,900 vph (also identified through a review of Caltrans PeMS data) – note that this merge is located to the north of the Grand Avenue HOV direct exit ramp. At this location, there would be an unmet demand of about 40 vehicles in the weekday PM peak hour, resulting in minor delays to traffic flows along the I-5 HOV lane. However, since this bottleneck restricts downstream volumes, analysis locations to the north tend to operate under capacity. HOV lane calculations can be seen in Appendix D.

Table 4-2: Freeway HOV LOS Summary – Opening Year (2018) Conditions – No Build

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Vol.	Density ¹	LOS	Vol.	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	1,594	24.5	C	1,842	28.3	D
I-5 s/o Chapman on-ramp	SB	1	1,096	16.9	B	938	14.4	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	1	1,550	23.8	C	1,550	23.8	C
I-5 n/o 17th/Penn off-ramp	SB	1	1,406	21.6	C	1,485	22.8	C
I-5 n/o Santa Ana off-ramp	SB	1	1,746	26.9	D	1,765	27.2	D
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	2,026	15.6	B	2,005	15.4	B
I-5 s/o SR-55 HOV exit	SB	1	1,257	19.3	C	1,387	21.3	C
SR-55 s/o HOV exit	SB	1	1,790	27.5	D	1,365	21.0	C
SR-55 s/o HOV entrance	NB	1	952	14.6	B	1,649	25.4	C
I-5 s/o SR-55 HOV ramp merge (south	NB	2	1,665	12.8	B	2,205	17.0	B

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Vol.	Density ¹	LOS	Vol.	Density ¹	LOS
of Grand HOV off)								
I-5 s/o 17th off-ramp	NB	1	1,350	20.8	C	1,900	29.2	D
I-5 s/o Main/Broadway off-ramp	NB	1	965	14.8	B	1,649	25.4	C
I-5 s/o SR-57 HOV exit (north of Main HOV on)	NB	1	1,020	15.7	B	1,964	30.2	D
I-5 s/o Chapman off-ramp	NB	1	200	3.1	A	1,029	15.8	B
SR-57 south of Chapman off-ramp	NB	1	485	7.5	A	735	11.3	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/lane)

4.1.3 WEAVING PERFORMANCE

Under Opening Year (2018) conditions, the weaving section on the I-5 Freeway northbound between the Main Street on-ramp and the SR-22 exit would operate at LOS F during both the weekday AM and PM peak hours, as shown in Table 4-3, with an increase in density over Existing conditions due to the general increase in volumes in the area. Weaving calculations can be seen in Appendix E.

Table 4-3: Weaving LOS Summary – Opening Year (2018) Conditions – No Build

Location		Weave Distance	AM Peak Hour		PM Peak Hour	
			Density ¹	LOS	Density ¹	LOS
Main On to SR 57 Off	NB	1,650	47.0	F	48.7	F

Source: AECOM, 2012.

Notes: **Bolding** indicates weaving segment operating at unacceptable LOS.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/lane)

4.1.4 INTERSECTION OPERATIONS

A level of service analysis was conducted to evaluate Opening Year (2018) No Build intersection operating conditions during the weekday AM and PM peak hours. Table 4-4 summarizes the Opening Year (2018) No Build level of service at the study area intersections. Traffic volumes for Opening Year (2018) are included in Appendix B. Level of service calculation worksheets are included in Appendix F.

As shown in Table 4-4, all study area intersections would operate acceptably (LOS D or better) under Opening Year (2018) No Build conditions, with the exception of the following locations:

- Grand Avenue/First Street: LOS E in the AM and PM peak hour
- I-5 SB Ramps/Santa Ana Boulevard: LOS E in the PM peak hour
- SR-55 SB Ramps/Fourth Street: LOS F in the AM peak hour

**Table 4-8: HOV LOS Summary – Opening Year (2018) Conditions - HOV Lane
Alternative 2A**

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	1,765	27.2	D	1,905	29.3	D
I-5 s/o Chapman on-ramp	SB	1	1,195	18.4	C	990	15.2	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	2,620	20.2	C	2,575	19.8	C
I-5 n/o 17th/Penn off-ramp	SB	2	2,440	18.8	C	2,495	19.2	C
I-5 n/o Santa Ana off-ramp	SB	2	2,780	21.4	C	2,775	21.3	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,060	23.5	C	3,015	23.2	C
I-5 s/o SR-55 HOV exit	SB	1	2,075	31.9	D	2,320	35.7	E
SR-55 s/o HOV exit	SB	1	1,790	27.5	D	1,365	21.0	C
SR-55 s/o HOV entrance	NB	1	995	15.3	B	1,750	26.9	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	1,795	13.8	B	2,475	19.0	C
I-5 s/o 17th off-ramp	NB	2	1,480	11.4	B	2,210	17.0	B
I-5 s/o Main/Broadway off-ramp	NB	2	1,095	8.4	A	1,925	14.8	B
I-5 s/o SR-57 HOV exit (North of Main HOV on)	NB	2	1,160	8.9	A	2,280	17.5	B
I-5 s/o Chapman off-ramp	NB	1	340	5.2	A	1,250	19.2	C
SR-57 south of Chapman off-ramp	NB	1	485	7.5	A	735	11.3	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

**Table 4-9: HOV LOS Summary – Opening Year (2018) Conditions - HOV Lane
Alternative 2B**

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	1,675	25.8	C	1,865	28.7	D
I-5 s/o Chapman on-ramp	SB	1	1,015	15.6	B	910	14.0	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	2,440	18.8	C	2,495	19.2	C
I-5 n/o 17th/Penn off-ramp	SB	2	2,440	18.8	C	2,495	19.2	C
I-5 n/o Santa Ana off-ramp	SB	2	2,780	21.4	C	2,775	21.3	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,060	23.5	C	3,015	23.2	C
I-5 s/o SR-55 HOV exit	SB	1	2,075	31.9	D	2,320	35.7	E
SR-55 s/o HOV exit	SB	1	1,790	27.5	D	1,365	21.0	C
SR-55 s/o HOV entrance	NB	1	995	15.3	B	1,750	26.9	D

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	1,795	13.8	B	2,475	19.0	C
I-5 s/o 17th off-ramp	NB	2	1,480	11.4	B	2,210	17.0	B
I-5 s/o Main/Broadway off-ramp	NB	2	1,095	8.4	A	1,925	14.8	B
I-5 s/o SR-57 HOV exit (North of Main HOV on)	NB	2	1,150	8.8	A	2,240	17.2	B
I-5 s/o Chapman off-ramp	NB	1	351	5.4	A	1,302	20.0	C
SR-57 south of Chapman off-ramp	NB	1	485	7.5	A	735	11.3	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

4.2.3 WEAVING PERFORMANCE

With HOV Lane Alternative 2A, conditions at the I-5 Freeway weaving segment would be the same as with No Build, as there would be no change to freeway mainline or Main Street on-ramp volumes with Alternative 2A, as illustrated in Table 4-10. Weaving calculations can be seen in Appendix E.

Table 4-10: Weaving LOS Summary – Opening Year (2018) Conditions – HOV Lane Alternative 2A

Location		Weave Distance	AM Peak Hour		PM Peak Hour	
			Density ¹	LOS	Density ¹	LOS
Main On to SR 57 Off	NB	1,650	47.0	F	48.7	F

Source: AECOM, 2012.

Notes: **Bolding** indicates weaving segment operating at unacceptable LOS.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

However, since Alternative 2B would eliminate the Main Street direct HOV on-ramp, there would be an increase in volumes along both the freeway mainline and at the Main Street general-purpose on-ramp. As a result, weaving conditions under Alternative 2B would be slightly worse during both the weekday AM and PM peak hours, as shown in Table 4-11.

Table 4-11: Weaving LOS Summary – Opening Year (2018) Conditions – HOV Lane Alternative 2B

Location		Weave Distance	AM Peak Hour		PM Peak Hour	
			Density ¹	LOS	Density ¹	LOS
Main On to SR 57 Off	NB	1,650	47.2	F	49.7	F

Source: AECOM, 2012.

Notes: **Bolding** indicates weaving segment operating at unacceptable LOS.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

4.3.2 HOV LANE PERFORMANCE

HOV lane analysis results for the HOV Lane Alternatives 5A and 5B are summarized in Table 4-16 and Table 4-17. With the addition of the second HOV lane between SR-55 and SR-57, the number of vehicles able to use the HOV lanes would increase due to the elimination of the northbound and southbound bottleneck locations (the lane reductions at the I-5 southbound / SR-57 southbound connection and at the I-5 northbound / SR-55 northbound connection would be eliminated). For both alternatives, operating conditions improve above No Build at locations where the second lane was added. All other locations generally experience an increase in density and worse LOS due to the general increase HOV lane volumes. For both HOV Lane Alternatives, one location is forecast to operate unsatisfactorily at LOS E during the weekday PM peak hour in Opening Year (2018) conditions: southbound I-5 south of the SR-55 HOV exit. However, this location is outside the project limits. In addition, there would be 3 HOV lane segment during the weekday AM peak hour and 3 HOV lane segments during the weekday PM peak hour that operate over the Caltrans' desire of 1,600 vph (note all 4 locations are outside the project limits). HOV lane calculations can be seen in Appendix D.

Table 4-16: HOV LOS Summary – Opening Year (2018) Conditions - HOV Lane Alternative 5A

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	1,765	27.2	D	1,905	29.3	D
I-5 s/o Chapman on-ramp	SB	1	1,195	18.4	C	990	15.2	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	2,620	20.2	C	2,575	19.8	C
I-5 n/o 17th/Penn off-ramp	SB	2	2,440	18.8	C	2,495	19.2	C
I-5 n/o Santa Ana off-ramp	SB	2	2,780	21.4	C	2,775	21.3	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,060	23.5	C	3,015	23.2	C
I-5 s/o SR-55 HOV exit	SB	1	2,075	31.9	D	2,320	35.7	E
SR-55 s/o HOV exit	SB	1	1,790	27.5	D	1,365	21.0	C
SR-55 s/o HOV entrance	NB	1	995	15.3	B	1,750	26.9	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	1,795	13.8	B	2,475	19.0	C
I-5 s/o 17th off-ramp	NB	2	1,480	11.4	B	2,210	17.0	B
I-5 s/o Main/Broadway off-ramp	NB	2	1,095	8.4	A	1,925	14.8	B
I-5 s/o SR-57 HOV exit (North of Main HOV on)	NB	2	1,160	8.9	A	2,280	17.5	B
I-5 s/o Chapman off-ramp	NB	1	340	5.2	A	1,250	19.2	C
SR-57 south of Chapman off-ramp	NB	1	485	7.5	A	735	11.3	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

Table 4-17: HOV LOS Summary – Opening Year (2018) Conditions - HOV Lane Alternative 5B

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	1,675	25.8	C	1,865	28.7	D
I-5 s/o Chapman on-ramp	SB	1	1,015	15.6	B	910	14.0	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	2,440	18.8	C	2,495	19.2	C
I-5 n/o 17th/Penn off-ramp	SB	2	2,440	18.8	C	2,495	19.2	C
I-5 n/o Santa Ana off-ramp	SB	2	2,780	21.4	C	2,775	21.3	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,060	23.5	C	3,015	23.2	C
I-5 s/o SR-55 HOV exit	SB	1	2,075	31.9	D	2,320	35.7	E
SR-55 s/o HOV exit	SB	1	1,790	27.5	D	1,365	21.0	C
SR-55 s/o HOV entrance	NB	1	995	15.3	B	1,750	26.9	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	1,795	13.8	B	2,475	19.0	C
I-5 s/o 17th off-ramp	NB	2	1,480	11.4	B	2,210	17.0	B
I-5 s/o Main/Broadway off-ramp	NB	2	1,095	8.4	A	1,925	14.8	B
I-5 s/o SR-57 HOV exit (North of Main HOV on)	NB	2	1,150	8.8	A	2,240	17.2	B
I-5 s/o Chapman off-ramp	NB	1	351	5.4	A	1,302	20.0	C
SR-57 south of Chapman off-ramp	NB	1	485	7.5	A	735	11.3	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

4.3.3 WEAVING PERFORMANCE

With HOV Lane Alternative 5A, conditions at the I-5 Freeway weaving segment would be the same as with No Build, as there would be no change to freeway mainline or Main Street on-ramp volumes with Alternative 2A, as shown in Table 4-18. Weaving calculations can be seen in Appendix E.

Table 4-18: Weaving LOS Summary – Opening Year (2018) Conditions – HOV Lane Alternative 5A

Location		Weave Distance	AM Peak Hour		PM Peak Hour	
			Density ¹	LOS	Density ¹	LOS
Main On to SR 57 Off	NB	1,650	47.0	F	48.7	F

Source: AECOM, 2012.

Notes: **Bolding** indicates weaving segment operating at unacceptable LOS.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

4.4.2 HOV LANE PERFORMANCE

Freeway HOV analysis results are summarized in Table 4-23. Forecast AM and PM peak-hour HOV volumes by direction and measures of effectiveness are included in Table 4-23. As shown, all HOV lane segments are projected to operate at satisfactory LOS during both peak hours in Future Year (2040) No Build conditions. However, there are 3 HOV lane segments during the weekday AM peak hour and 7 HOV lane segments during the weekday PM peak hour that operate over the Caltrans’ desire of 1,600 vph (note that 2 of the 3 weekday AM peak hour locations and 2 of the 7 weekday PM peak hour locations are outside the project limits).

As noted previously, there is a severe bottleneck where the HOV lane from I-5 southbound connects with the HOV lane from SR-57 southbound, with a capacity limit of 1,550 vph. North of this bottleneck, there is substantial congestion on both the I-5 southbound and SR-57 SB HOV lanes, which would be worsened under Future Year (2040) Conditions. During the weekday AM and PM peak hours, there would be an unmet demand of about 935 and 1,035 vehicles, respectively. However, since this bottleneck restricts downstream volumes, analysis locations to the south tend to operate under capacity.

Similarly, there is a bottleneck where the HOV lane from I-5 northbound merges with the HOV lane from SR-55 northbound, with a capacity limit of 1,900 vph. At this location, there would be an unmet demand of about 240 vehicles in the weekday PM peak hour, resulting in noticeable delays to traffic flows along the I-5 HOV lane. However, since this bottleneck restricts downstream volumes, analysis locations to the north tend to operate under capacity. HOV lane calculations can be seen in Appendix D.

Table 4-23: HOV LOS Summary – Future Year (2040) Conditions – No Build

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	1,616	24.9	C	1,917	29.5	D
I-5 s/o Chapman on-ramp	SB	1	1,209	18.6	C	1,048	16.1	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	1	1,550	23.8	C	1,550	23.8	C
I-5 n/o 17th/Penn off-ramp	SB	1	1,406	21.6	C	1,485	22.8	C
I-5 n/o Santa Ana off-ramp	SB	1	1,746	26.9	D	1,765	27.2	D
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	2,061	15.9	B	2,020	15.5	B
I-5 s/o SR-55 HOV exit	SB	1	1,292	19.9	C	1,402	21.6	C
SR-55 s/o HOV exit	SB	1	2,115	32.5	D	1,715	26.4	D
SR-55 s/o HOV entrance	NB	1	1,125	17.3	B	1,738	26.7	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	1,835	14.1	B	2,465	19.0	C
I-5 s/o 17th off-ramp	NB	1	1,500	23.1	C	1,900	29.2	D
I-5 s/o Main/Broadway off-ramp	NB	1	1,050	16.2	B	1,649	25.4	C
I-5 s/o SR-57 HOV exit (north of Main HOV on)	NB	1	1,105	17.0	B	1,964	30.2	D

**Table 4-29: HOV LOS Summary – Future Year (2040) Conditions - HOV Lane
Alternative 2A**

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	2,315	35.6	E	2,160	33.2	D
I-5 s/o Chapman on-ramp	SB	1	1,610	24.8	C	1,255	19.3	C
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	3,585	27.6	D	3,095	23.8	C
I-5 n/o 17th/Penn off-ramp	SB	2	3,295	25.3	C	2,960	22.8	C
I-5 n/o Santa Ana off-ramp	SB	2	3,635	28.0	D	3,240	24.9	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,950	30.4	D	3,495	26.9	D
I-5 s/o SR-55 HOV exit	SB	1	2,295	35.3	E	2,570	39.5	E
SR-55 s/o HOV exit	SB	1	2,115	32.5	D	1,715	26.4	D
SR-55 s/o HOV entrance	NB	1	1,290	19.8	C	2,145	33.0	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	2,335	18.0	B	3,565	27.4	D
I-5 s/o 17th off-ramp	NB	2	2,000	15.4	B	3,240	24.9	C
I-5 s/o Main/Broadway off-ramp	NB	2	1,550	11.9	B	2,860	22.0	C
I-5 s/o SR-57 HOV exit (north of Main HOV on)	NB	2	1,655	12.7	B	3,345	25.7	C
I-5 s/o Chapman off-ramp	NB	1	575	8.8	A	1,990	30.6	D
SR-57 south of Chapman off-ramp	NB	1	745	11.5	B	1,025	15.8	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/lane)

Table 4-30: HOV LOS Summary – Future Year (2040) Conditions - HOV Lane Alternative 2B

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	2,170	33.4	D	2,092	32.2	D
I-5 s/o Chapman on-ramp	SB	1	1,320	20.3	C	1,120	17.2	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	3,295	25.3	C	2,960	22.8	C
I-5 n/o 17th/Penn off-ramp	SB	2	3,295	25.3	C	2,960	22.8	C
I-5 n/o Santa Ana off-ramp	SB	2	3,635	28.0	D	3,240	24.9	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,950	30.4	D	3,495	26.9	D
I-5 s/o SR-55 HOV exit	SB	1	2,295	35.3	E	2,570	39.5	E
SR-55 s/o HOV exit	SB	1	2,115	32.5	D	1,715	26.4	D
SR-55 s/o HOV entrance	NB	1	1,290	19.8	C	2,145	33.0	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	2,335	18.0	B	3,565	27.4	D
I-5 s/o 17th off-ramp	NB	2	2,000	15.4	B	3,240	24.9	C
I-5 s/o Main/Broadway off-ramp	NB	2	1,550	11.9	B	2,860	22.0	C
I-5 s/o SR-57 HOV exit (North of Main HOV on)	NB	2	1,550	11.9	B	2,860	22.0	C
I-5 s/o Chapman off-ramp	NB	1	506	7.8	A	1,633	25.1	C
SR-57 south of Chapman off-ramp	NB	1	745	11.5	B	1,025	15.8	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

4.5.3 WEAVING PERFORMANCE

With HOV Lane Alternative 2A, conditions at the I-5 Freeway weaving segment would be the same as with No Build, as there would be no change to freeway mainline or Main Street on-ramp volumes with Alternative 2A, as shown in Table 4-31. Weaving calculations can be seen in Appendix E.

Table 4-31: Weaving LOS Summary – Future Year (2040) Conditions – HOV Lane Alternative 2A

Location		Weave Distance	AM Peak Hour		PM Peak Hour	
			Density ¹	LOS	Density ¹	LOS
Main On to SR 57 Off	NB	1,650	51.0	F	54.6	F

Source: AECOM, 2012.

Notes: **Bolding** indicates weaving segment operating at unacceptable LOS.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

However, since Alternative 2B would eliminate the Main Street direct HOV on-ramp, there would be an increase in volumes along both the freeway mainline and at the Main Street general-purpose on-ramp, as shown in Table 4-32. As a result, weaving conditions under Alternative 2B would be slightly worse during both the weekday AM and PM peak hours.

**Table 4-37: HOV LOS Summary – Future Year (2040) Conditions - HOV Lane
Alternative 5A**

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	2,315	35.6	E	2,160	33.2	D
I-5 s/o Chapman on-ramp	SB	1	1,610	24.8	C	1,255	19.3	C
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	3,585	27.6	D	3,095	23.8	C
I-5 n/o 17th/Penn off-ramp	SB	2	3,295	25.3	C	2,960	22.8	C
I-5 n/o Santa Ana off-ramp	SB	2	3,635	28.0	D	3,240	24.9	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,950	30.4	D	3,495	26.9	D
I-5 s/o SR-55 HOV exit	SB	1	2,295	35.3	E	2,570	39.5	E
SR-55 s/o HOV exit	SB	1	2,115	32.5	D	1,715	26.4	D
SR-55 s/o HOV entrance	NB	1	1,290	19.8	C	2,145	33.0	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	2,335	18.0	B	3,565	27.4	D
I-5 s/o 17th off-ramp	NB	2	2,000	15.4	B	3,240	24.9	C
I-5 s/o Main/Broadway off-ramp	NB	2	1,550	11.9	B	2,860	22.0	C
I-5 s/o SR-57 HOV exit (north of Main HOV on)	NB	2	1,655	12.7	B	3,345	25.7	C
I-5 s/o Chapman off-ramp	NB	1	575	8.8	A	1,990	30.6	D
SR-57 south of Chapman off-ramp	NB	1	745	11.5	B	1,025	15.8	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/lane)

Table 4-38: HOV LOS Summary – Future Year (2040) Conditions - HOV Lane Alternative 5B

Location		# of Lanes	AM Peak Hour			PM Peak Hour		
			Volume	Density ¹	LOS	Volume	Density ¹	LOS
SR-57 s/o Chapman on-ramp	SB	1	2,170	33.4	D	2,092	32.2	D
I-5 s/o Chapman on-ramp	SB	1	1,320	20.3	C	1,120	17.2	B
I-5 s/o SR-57 HOV ramp merge (N of Main HOV off)	SB	2	3,295	25.3	C	2,960	22.8	C
I-5 n/o 17th/Penn off-ramp	SB	2	3,295	25.3	C	2,960	22.8	C
I-5 n/o Santa Ana off-ramp	SB	2	3,635	28.0	D	3,240	24.9	C
I-5 n/o SR-55 HOV exit (S of Grand HOV on)	SB	2	3,950	30.4	D	3,495	26.9	D
I-5 s/o SR-55 HOV exit	SB	1	2,295	35.3	E	2,570	39.5	E
SR-55 s/o HOV exit	SB	1	2,115	32.5	D	1,715	26.4	D
SR-55 s/o HOV entrance	NB	1	1,290	19.8	C	2,145	33.0	D
I-5 s/o SR-55 HOV ramp merge (south of Grand HOV off)	NB	2	2,335	18.0	B	3,565	27.4	D
I-5 s/o 17th off-ramp	NB	2	2,000	15.4	B	3,240	24.9	C
I-5 s/o Main/Broadway off-ramp	NB	2	1,550	11.9	B	2,860	22.0	C
I-5 s/o SR-57 HOV exit (North of Main HOV on)	NB	2	1,550	11.9	B	2,860	22.0	C
I-5 s/o Chapman off-ramp	NB	1	506	7.8	A	1,633	25.1	C
SR-57 south of Chapman off-ramp	NB	1	745	11.5	B	1,025	15.8	B

Source: AECOM, 2012.

Notes: **Bolding** indicates HOV segment operating at unacceptable LOS. **Bold italics** indicate locations where the HOV lane has greater than 1,600 vpl.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

4.6.3 WEAVING PERFORMANCE

With HOV Lane Alternative 5A, conditions at the I-5 Freeway weaving segment would be the same as with No Build, as there would be no change to freeway mainline or Main Street on-ramp volumes with Alternative 5A, as illustrated in Table 3-39. Weaving calculations can be seen in Appendix E.

Table 4-39: Weaving LOS Summary – Future Year (2040) Conditions – HOV Lane Alternative 5A

Location		Weave Distance	AM Peak Hour		PM Peak Hour	
			Density ¹	LOS	Density ¹	LOS
Main On to SR 57 Off	NB	1,650	51.0	F	54.6	F

Source: AECOM, 2012.

Notes: **Bolding** indicates weaving segment operating at unacceptable LOS.

⁽¹⁾ Density is shown in passenger cars / miles / lane (pc/mi/ln)

However, since Alternative 5B would eliminate the Main Street direct HOV on-ramp, there would be an increase in volumes along both the freeway mainline and at the Main Street general-purpose on-ramp. As a result, weaving conditions under Alternative 5B would be slightly worse during both the weekday AM and PM peak hours, as shown in Table 4-40.

Table 1: I-5 from SR-55 and SR-57 HOV Improvements Level of Service Summary

ID	Intersection	Control	Existing Conditions				2018 No Build Conditions				2040 No Build Conditions			
			AM Peak Hour Delay ¹	LOS	PM Peak Hour Delay ¹	LOS	AM Peak Hour Delay ¹	LOS	PM Peak Hour Delay ¹	LOS	AM Peak Hour Delay ¹	LOS	PM Peak Hour Delay ¹	LOS
1	Main / La Veta	SIGNAL	20.1	C	27.1	C	20.0	B	26.4	C	19.8	B	25.5	C
2	Main / Memory	SIGNAL	17.1	B	21.7	C	17.1	B	21.4	C	16.9	B	21.1	C
3	Main / Edgewood / I-5	SIGNAL	42.6	D	49.0	D	40.3	D	48.5	D	36.9	D	45.9	D
4	Broadway / Santa Clara	SIGNAL	32.7	C	27.2	C	30.6	C	28.2	C	28.8	C	32.6	C
5	Main / Santa Clara / I-5	SIGNAL	45.3	D	52.3	D	42.8	D	51.6	D	39.8	D	53.0	D
6	Main / 17th	SIGNAL	43.8	D	52.4	D	42.6	D	49.5	D	44.6	D	49.8	D
7	Penn / 17th	SIGNAL	20.7	C	33.3	C	23.3	C	37.0	D	26.0	C	40.6	D
8	Santiago / 17th	SIGNAL	32.8	C	36.3	D	32.6	C	35.5	D	33.0	C	36.4	D
9	Penn / I-5 SB Ramp	SIGNAL	24.3	C	23.1	C	24.4	C	23.1	C	25.1	C	23.1	C
10	Main / 4th	SIGNAL	11.3	B	12.0	B	11.3	B	12.0	B	11.3	B	12.0	B
11	Grand / 4th	SIGNAL	33.6	C	42.2	D	33.4	C	42.2	D	34.0	C	43.7	D
12	I-5 SB Ramp / 4th	SIGNAL	11.6	B	15.2	B	11.4	B	15.1	B	11.2	B	15.1	B
13	I-5 NB Ramp / 4th	SIGNAL	8.9	A	18.2	B	8.9	A	18.1	B	9.0	A	18.5	B
14	Cabrillo / 4th	SIGNAL	27.7	C	31.7	C	28.2	C	32.4	C	29.4	C	35.4	D
15	Tustin / 4th	SIGNAL	29.9	C	38.2	D	31.5	C	41.5	D	42.0	D	44.5	D
16	Main / 1st	SIGNAL	40.9	D	37.0	D	41.0	D	36.9	D	45.0	D	40.7	D
17	Grand / 1st	SIGNAL	36.1	D	40.7	D	36.0	D	40.9	D	37.2	D	47.6	D
18	I-5 SB Ramp / 1st	SIGNAL	8.3	A	10.4	B	8.2	A	10.2	B	8.4	A	10.4	B
19	Cabrillo / 1st	SIGNAL	25.7	C	25.8	C	25.8	C	26.1	C	26.6	C	27.7	C
20	Tustin / 1st	SIGNAL	15.5	B	16.5	B	15.9	B	16.7	B	17.8	B	17.3	B
21	I-5 Ramp / Santa Ana	SIGNAL	19.9	B	51.4	D	19.7	B	57.7	E	20.6	C	62.1	E
22	Grand / Santa Ana	SIGNAL	27.6	C	35.1	D	27.6	C	35.2	D	27.4	C	36.5	D
23	Mabury / Palm	UN SIGNAL	0.0	A										
24	Mabury / Elk / 1st	SIGNAL	28.6	C	39.5	D	27.8	C	39.4	D	28.8	C	43.3	D
25	Lyon / 1st	SIGNAL	19.2	B	17.5	B	19.3	B	18.0	B	19.6	B	18.8	B
26	Cabrillo / State Fund	SIGNAL	4.2	A	5.9	A	4.5	A	6.0	A	4.5	A	5.9	A
27	Cabrillo / Xerox Center	SIGNAL	4.4	A	8.1	A	4.4	A	7.1	A	4.3	A	7.0	A
28	Golden Circle / 4th	SIGNAL	7.9	A	10.2	B	8.2	A	10.1	B	8.0	A	10.3	B
29	Golden Circle / 1st	SIGNAL	7.5	A	7.5	A	7.5	A	7.7	A	7.6	A	7.9	A
30	SR-55 SB Ramps / 4th	SIGNAL	82.4	F	19.9	B	118.3	F	20.2	C	150.4	F	24.2	C
31	SR-55 NB Ramps / 4th	SIGNAL	19.1	B	36.8	D	17.8	B	36.6	D	15.9	B	48.4	D

Source: AECOM, 2012

Notes:

Bolding indicates intersection operating at unacceptable LOS.

⁽¹⁾ Delay is shown in seconds per vehicle. For signalized locations, delay reported is average delay of all approaches. For unsignalized, the LOS of the worst approach is reported, per HCM Methodology.

Table 2: I-5 from SR-55 and SR-57 HOV Improvements 2018 Level of Service Summary

ID	Intersection	Control	2018 No Build Conditions				2018 Option A Conditions				2018 Option B Conditions				2018 Option 2A/5A Conditions				2018 Option 2B/5B Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
1	Main / La Veta	SIGNAL	20.0	B	26.4	C	20.0	B	26.4	C	20.0	B	26.4	C	19.8	B	26.4	C	19.8	B	26.4	C
2	Main / Memory	SIGNAL	17.1	B	21.4	C	17.0	B	21.1	C	17.0	B	21.4	C	17.1	B	21.3	C	17.1	B	21.3	C
3	Main / Edgewood / I-5	SIGNAL	40.3	D	48.5	D	32.3	C	30.9	C	32.3	C	48.5	D	40.4	D	52.3	D	36.5	D	40.5	D
4	Broadway / Santa Clara	SIGNAL	30.6	C	28.2	C	32.5	C	28.6	C	32.5	C	28.2	C	30.2	C	28.1	C	30.2	C	28.1	C
5	Main / Santa Clara / I-5	SIGNAL	42.8	D	51.6	D	42.0	D	53.3	D	42.0	D	51.6	D	43.0	D	51.2	D	43.0	D	51.2	D
6	Main / 17th	SIGNAL	42.6	D	49.5	D	42.2	D	49.4	D	42.2	D	49.5	D	42.9	D	49.9	D	42.9	D	49.9	D
7	Penn / 17th	SIGNAL	10.8	B	13.6	B	10.9	B	13.9	B	10.9	B	13.6	B	10.8	B	13.6	B	10.8	B	13.6	B
8	Santiago / 17th	SIGNAL	32.6	C	35.5	D	32.6	C	35.5	D	32.6	C	35.5	D	32.6	C	35.5	D	32.6	C	35.5	D
9	Penn / I-5 SB Ramp	SIGNAL	24.4	C	23.1	C	24.5	C	23.2	C	24.5	C	23.1	C	24.4	C	23.1	C	24.4	C	23.1	C
10	Main / 4th	SIGNAL	11.3	B	12.0	B	12.4	B	12.0	B	11.3	B	12.0	B	11.3	B	12.0	B	11.3	B	12.0	B
11	Grand / 4th	SIGNAL	33.4	C	42.2	D	51.3	D	48.6	D	32.7	C	41.3	D	33.4	C	42.2	D	33.4	C	42.2	D
12	I-5 SB Ramp / 4th	SIGNAL	11.4	B	15.1	B	65.3	E	148.7	F	10.7	B	14.6	B	13.0	B	15.3	B	13.0	B	15.3	B
13	I-5 NB Ramp / 4th	SIGNAL	8.9	A	18.1	B	9.8	A	21.1	C	8.8	A	17.8	B	6.7	A	17.1	B	6.7	A	17.1	B
14	Cabrillo / 4th	SIGNAL	28.2	C	32.4	C	28.0	C	33.2	C	28.3	C	33.8	C	28.2	C	32.4	C	28.2	C	32.4	C
15	Tustin / 4th	SIGNAL	31.5	C	41.5	D	32.1	C	46.1	D	31.5	C	41.5	D	31.5	C	41.5	D	31.5	C	41.5	D
16	Main / 1st	SIGNAL	41.0	D	36.9	D	52.2	D	36.9	D	41.0	D	36.9	D	41.0	D	36.9	D	41.0	D	36.9	D
17	Grand / 1st	SIGNAL	36.0	D	40.9	D	58.8	E	83.6	F	36.9	D	47.1	D	36.0	D	40.9	D	36.0	D	40.9	D
18	I-5 SB Ramp / 1st	SIGNAL	8.2	A	10.2	B	Ramp removed				Ramp removed				6.0	A	6.8	A	6.0	A	6.8	A
19	Cabrillo / 1st	SIGNAL	25.8	C	26.1	C	24.9	C	25.4	C	30.7	C	32.4	C	25.8	C	26.1	C	25.8	C	26.1	C
20	Tustin / 1st	SIGNAL	15.9	B	16.7	B	15.9	B	16.9	B	15.9	B	16.7	B	15.9	B	16.7	B	15.9	B	16.7	B
21	I-5 Ramp / Santa Ana	SIGNAL	19.7	B	57.7	E	19.7	B	57.7	E	19.7	B	57.7	E	19.7	B	57.7	E	19.7	B	57.7	E
22	Grand / Santa Ana	SIGNAL	27.6	C	35.2	D	27.6	C	35.2	D	27.6	C	35.2	D	27.6	C	35.2	D	27.6	C	35.2	D
24	Mabury / Elk / 1st	SIGNAL	27.8	C	39.4	D	33.6	C	24.6	C	41.7	D	30.3	C	29.2	C	39.4	D	29.2	C	39.4	D
25	Lyon / 1st	SIGNAL	19.3	B	18.0	B	33.1	C	18.8	B	21.2	C	33.2	C	19.3	B	18.0	B	19.3	B	18.0	B
26	Cabrillo / State Fund	SIGNAL	4.5	A	6.0	A	4.1	A	6.3	A	4.3	A	6.1	A	4.5	A	6.0	A	4.5	A	6.0	A
27	Cabrillo / Xerox Center	SIGNAL	4.4	A	7.1	A	4.3	A	9.0	A	4.5	A	7.3	A	4.4	A	7.1	A	4.4	A	7.1	A
28	Golden Circle / 4th	SIGNAL	8.2	A	10.1	B	8.1	A	10.1	B	8.3	A	10.1	B	8.2	A	10.1	B	8.2	A	10.1	B
29	Golden Circle / 1st	SIGNAL	7.5	A	7.7	A	7.6	A	8.6	A	7.5	A	7.7	A	7.5	A	7.7	A	7.5	A	7.7	A
30	SR-55 SB Ramps / 4th	SIGNAL	118.3	F	20.2	C	128.1	F	20.7	C	120.6	F	20.4	C	118.3	F	20.2	C	118.3	F	20.2	C
31	SR-55 NB Ramps / 4th	SIGNAL	17.8	B	36.6	D	18.4	B	37.7	D	17.8	B	36.6	D	17.8	B	36.6	D	17.8	B	36.6	D

Source: AECOM, 2012

Notes:

Bolding and shading indicates intersection operating at unacceptable LOS.

⁽¹⁾ Delay is shown in seconds per vehicle. For signalized locations, delay reported is average delay of all approaches. For unsignalized, the LOS of the worst approach is reported, per HCM Methodology.

Table 3: I-5 from SR-55 and SR-57 HOV Improvements 2040 Level of Service Summary

ID	Intersection	Control	2040 No build Conditions				2040 Option A Conditions				2040 Option B Conditions				2040 Option 2A/5A Conditions				2040 Option 2B/5B Conditions			
			AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
			Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
1	Main / La Veta	SIGNAL	19.8	B	25.5	C	20.1	C	26.6	C	20.1	C	26.6	C	20.0	C	26.5	C	20.1	C	27.5	C
2	Main / Memory	SIGNAL	16.9	B	21.1	C	17.0	B	21.4	C	17.1	B	21.8	C	17.2	B	21.6	C	17.0	B	21.4	C
3	Main / Edgewood / I-5	SIGNAL	36.9	D	45.9	D	31.9	C	50.7	D	39.7	D	48.9	D	40.3	D	70.1	E	35.9	D	41.0	D
4	Broadway / Santa Clara	SIGNAL	28.8	C	32.6	C	31.1	C	36.2	D	32.0	C	35.6	D	30.2	C	35.2	D	31.3	C	36.2	D
5	Main / Santa Clara / I-5	SIGNAL	39.8	D	53.0	D	42.1	D	63.8	E	43.6	D	62.6	E	41.6	D	60.1	E	50.8	D	76.3	E
6	Main / 17th	SIGNAL	44.6	D	49.8	D	48.8	D	56.4	E	49.5	D	56.5	E	50.8	D	58.2	E	48.8	D	54.5	D
7	Penn / 17th	SIGNAL	10.9	B	13.8	B	11.1	B	14.5	B	11.1	B	14.2	B	11.0	B	14.0	B	11.1	B	14.5	B
8	Santiago / 17th	SIGNAL	33.0	C	36.4	D	34.3	C	39.5	D	34.3	C	39.5	D	34.3	C	39.5	D	34.2	C	39.3	D
9	Penn / I-5 SB Ramp	SIGNAL	25.1	C	23.1	C	25.3	C	23.3	C	25.3	C	23.3	C	25.3	C	23.2	C	25.3	C	23.3	C
10	Main / 4th	SIGNAL	11.3	B	12.0	B	12.6	B	12.1	B	11.5	B	12.1	B	11.5	B	12.1	B	11.5	B	12.1	B
11	Grand / 4th	SIGNAL	34.0	C	43.7	D	59.4	E	52.4	D	34.2	C	45.6	D	34.9	C	46.6	D	34.9	C	46.6	D
12	I-5 SB Ramp / 4th	SIGNAL	11.2	B	15.1	B	80.4	F	159.8	F	10.9	B	14.5	B	13.2	B	15.3	B	13.2	B	15.3	B
13	I-5 NB Ramp / 4th	SIGNAL	9.0	A	18.5	B	10.0	B	22.6	C	8.9	A	18.6	B	8.0	A	17.4	B	8.0	A	17.4	B
14	Cabrillo / 4th	SIGNAL	29.4	C	35.4	D	30.3	C	39.1	D	30.3	C	39.2	D	30.1	C	37.7	D	30.1	C	37.7	D
15	Tustin / 4th	SIGNAL	42.0	D	44.5	D	46.6	D	85.7	F	45.4	D	78.0	E	45.4	D	78.0	E	45.4	D	78.0	E
16	Main / 1st	SIGNAL	45.0	D	40.7	D	59.9	E	44.6	D	49.6	D	44.6	D	49.6	D	44.6	D	49.6	D	44.6	D
17	Grand / 1st	SIGNAL	37.2	D	47.6	D	68.3	E	101.1	F	39.6	D	57.8	E	38.7	D	51.7	D	38.7	D	51.7	D
18	I-5 SB Ramp / 1st	SIGNAL	8.4	A	10.4	B	3.2	A	4.4	A	Ramp removed as part of Opt B				6.3	A	7.4	A	6.3	A	7.4	A
19	Cabrillo / 1st	SIGNAL	26.6	C	27.7	C	25.8	C	27.9	C	35.4	D	34.4	C	27.3	C	28.7	C	27.3	C	28.7	C
20	Tustin / 1st	SIGNAL	17.8	B	17.3	B	18.2	B	17.8	B	18.1	B	17.5	B	18.1	B	17.5	B	18.1	B	17.5	B
21	I-5 Ramp / Santa Ana	SIGNAL	20.6	C	62.1	E	20.9	C	80.6	F	20.9	C	80.6	F	20.9	C	80.6	F	20.9	C	80.6	F
22	Grand / Santa Ana	SIGNAL	27.4	C	36.5	D	27.8	C	37.9	D	27.8	C	37.9	D	27.8	C	37.9	D	27.8	C	37.9	D
23	Mabury / Palm	UNSIGNAL	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
24	Mabury / Elk / 1st	SIGNAL	28.8	C	43.3	D	40.4	D	28.8	C	45.7	D	31.2	C	31.1	C	49.5	D	31.1	C	49.5	D
25	Lyon / 1st	SIGNAL	19.6	B	18.8	B	34.6	C	29.7	C	21.4	C	36.1	C	20.3	C	19.5	B	20.3	C	19.5	B
26	Cabrillo / State Fund	SIGNAL	4.5	A	5.9	A	4.1	A	6.4	A	4.2	A	6.1	A	4.1	A	6.0	A	4.1	A	6.0	A
27	Cabrillo / Xerox Center	SIGNAL	4.3	A	7.0	A	4.2	A	8.2	A	4.4	A	7.3	A	4.3	A	7.1	A	4.3	A	7.1	A
28	Golden Circle / 4th	SIGNAL	8.0	A	10.3	B	8.6	A	11.7	B	8.1	A	11.6	B	8.1	A	11.6	B	8.1	A	11.6	B
29	Golden Circle / 1st	SIGNAL	7.6	A	7.9	A	7.7	A	8.2	A	7.7	A	8.8	A	7.7	A	8.8	A	7.7	A	8.8	A
30	SR-55 SB Ramps / 4th	SIGNAL	150.4	F	24.2	C	157.4	F	26.6	C	157.4	F	26.3	C	157.8	F	26.1	C	157.8	F	26.1	C
31	SR-55 NB Ramps / 4th	SIGNAL	15.9	B	48.4	D	17.5	B	59.0	E	16.9	B	58.7	E	16.9	B	58.7	E	16.9	B	58.7	E

Source: AECOM, 2012

Notes:

Bolding and shading indicates intersection operating at unacceptable LOS.

⁽¹⁾ Delay is shown in seconds per vehicle. For signalized locations, delay reported is average delay of all approaches. For unsignalized, the LOS of the worst approach is reported, per HCM Methodology.

Table 4

Intersections		Existing			2018			2040		
		% Trucks	ADT	Trucks	% Trucks	ADT	Trucks	% Trucks	ADT	Trucks
1	Main / La Veta	0.18%	43,370	80	0.18%	43,740	80	0.18%	44,910	80
2	Main / Memory	0.19%	36,650	70	0.19%	37,030	70	0.18%	38,240	70
3	Main / Edgewood / I-5	0.18%	32,980	60	0.18%	33,280	60	0.18%	34,240	60
4	Broadway / Santa Clara	0.72%	27,920	200	0.71%	28,330	200	0.71%	29,600	210
5	Main / Santa Clara / I-5	0.72%	41,810	300	0.71%	42,410	300	0.72%	44,300	320
6	Main / 17th	0.72%	55,800	400	0.72%	56,610	410	0.71%	59,140	420
7	Penn / 17th	0.71%	38,260	270	0.72%	38,900	280	0.71%	40,900	290
8	Santiago / 17th	0.71%	36,450	260	0.73%	37,080	270	0.72%	39,050	280
9	Penn / I-5 SB Ramp	0.73%	13,670	100	0.72%	13,940	100	0.74%	14,770	110
10	Main / 4th	0.16%	24,490	40	0.16%	24,760	40	0.16%	25,610	40
11	Grand / 4th	0.71%	40,800	290	0.70%	41,420	290	0.71%	43,380	310
12	I-5 SB Ramp / 4th	0.39%	20,400	80	0.39%	20,730	80	0.41%	21,770	90
13	I-5 NB Ramp / 4th	0.27%	26,050	70	0.26%	26,530	70	0.29%	28,050	80
14	Cabrillo / 4th	0.19%	31,600	60	0.18%	32,650	60	0.19%	35,960	70
15	Tustin / 4th	0.07%	40,500	30	0.07%	43,240	30	0.08%	51,870	40
16	Main / 1st	0.21%	47,280	100	0.21%	48,330	100	0.21%	51,610	110
17	Grand / 1st	0.57%	45,970	260	0.57%	47,060	270	0.57%	50,490	290
18	I-5 SB Ramp / 1st	0.20%	30,690	60	0.19%	31,380	60	0.21%	33,530	70
19	Cabrillo / 1st	0.48%	24,920	120	0.46%	25,820	120	0.49%	28,660	140
20	Tustin / 1st	0.60%	20,070	120	0.62%	21,030	130	0.58%	24,040	140
21	I-5 Ramp / Santa Ana	0.70%	24,140	170	0.73%	24,780	180	0.71%	26,800	190
22	Grand / Santa Ana	0.71%	39,710	280	0.72%	40,330	290	0.71%	42,280	300
23	Mabury / Palm	0.21%	4,660	10	0.21%	4,730	10	0.20%	4,960	10
24	Mabury / Elk / 1st	0.17%	34,290	60	0.17%	35,180	60	0.18%	37,990	70
25	Lyon / 1st	0.20%	30,020	60	0.19%	30,950	60	0.21%	33,890	70
26	Cabrillo / State Fund	0.18%	11,240	20	0.17%	11,750	20	0.15%	13,340	20
27	Cabrillo / Xerox Center	0.17%	11,600	20	0.17%	12,060	20	0.15%	13,490	20
28	Golden Circle / 4th	0.17%	23,180	40	0.17%	23,730	40	0.20%	25,470	50
29	Golden Circle / 1st	0.16%	18,450	30	0.16%	19,040	30	0.19%	20,880	40
30	SR-55 SB Ramps / 4th	0.39%	33,460	130	0.40%	34,730	140	0.39%	38,710	150
31	SR-55 NB Ramps / 4th	0.25%	35,300	90	0.27%	36,560	100	0.27%	40,530	110

Source: AECOM, 2012