

### **3.1.6 Traffic and Transportation/Pedestrian and Bicycle Facilities**

This section addresses the potential effects to traffic and circulation associated with construction of the proposed project and compares the relative benefits of each alternative. The traffic and circulation analysis is based on the results of the Traffic Study (May 2011), the Ramp Closure Study (RCS) (June 2011), and the Draft Transportation Management Plan (TMP) (August 2011), and the Supplemental Traffic Study Report Long Beach Area (June 2013) (Supplemental Traffic Study). The Traffic Study evaluates the existing and future traffic flow conditions within the traffic study area within Orange County (defined below in Section 3.1.6.2, Affected Environment). The Supplemental Traffic Study provides the evaluation of the traffic study area within Los Angeles County (defined below in Section 3.1.6.2, Affected Environment). Section 3.1.6.2, Affected Environment, is subdivided into two subsections that present the information for the Orange County and Los Angeles County portions of the traffic study area, respectively. Under the Permanent Impacts subsection of Section 3.1.6.3, Environmental Consequences, the permanent impacts in Orange County and Los Angeles County are presented under separate headings.

The Traffic Study and Supplemental Traffic Study evaluations include, demand, capacity, and LOS for the mainline freeway segments and ramp-freeway junctions, weaving areas, ramp/arterial street intersections, and arterial/arterial street intersections affecting interchange operations. LOS analysis was conducted for the AM and PM peak hours based on the Highway Capacity Manual (HCM) 2000, which states:

Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions. (HCM page 2-2)

The HCM does not provide a method to measure LOS for intersections without a stop sign or traffic signal, such as where a freeway entrance ramp merges into or diverges from an arterial street. A volume-to-capacity (v/c) ratio analysis is provided for such locations. A v/c ratio is a comparison of an amount of traffic on a road with the capacity of that road. A v/c ratio is expressed as a decimal, with values less than 1.00 indicating that volume is less than capacity and values more than 1.00 indicating that volume exceeds capacity. As values approach 1.00,

congestion becomes more severe, with values more than 1.00 indicating severe congestion. Because much of I-405 within the project area operates and is expected in the future to operate at LOS F conditions, v/c ratios are provided as an indicator of the severity of congestion. For future conditions, the v/c ratio is the demand-to-capacity ratio, where the demand volume is used.

Analysis of vehicle queues (i.e., lines of stopped vehicles waiting to proceed) was conducted for AM and PM peak hours at four types of locations for the reasons described below:

1. Left- and right-turn pockets were analyzed to determine if the pockets were of adequate length to contain the anticipated queues.
2. Queuing analysis was conducted for all lanes between closely spaced intersections to determine if traffic would back up from one intersection across an upstream intersection.
3. Anticipated vehicle queuing for AM and PM peak hours at every freeway off-ramp was analyzed to determine if queues might back up onto the freeway mainline.
4. Vehicle storage at freeway on-ramp meters was evaluated to determine if there is adequate storage on the ramp. The evaluation utilized the Caltrans Ramp Meter Design Manual method with a range of potential metering rates.

The analyses were conducted for the following scenarios:

Existing (CEQA Baseline) Traffic Conditions – Year 2009

Opening Year No Build Traffic Conditions – Year 2020

Opening Year Alternative 1 Traffic Conditions – Year 2020

Opening Year Alternative 2 Traffic Conditions – Year 2020

Opening Year Alternative 3 Traffic Conditions – Year 2020

Design Year No Build Traffic Conditions – Year 2040

Design Year Alternative 1 Traffic Conditions – Year 2040

Design Year Alternative 2 Traffic Conditions – Year 2040

Design Year Alternative 3 Traffic Conditions – Year 2040

### **3.1.6.1 Regulatory Setting**

Caltrans, as assigned by FHWA, directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of federal-aid highway projects (see 23 CFR 652). It further directs that the special needs of the elderly and the disabled must be considered in all federal-aid projects that include pedestrian facilities. When current or anticipated

pedestrian and/or bicycle traffic presents a potential conflict with motor vehicle traffic, every effort must be made to minimize the detrimental effects on all highway users who share the facility.

In July 1999, the U.S. Department of Transportation (USDOT) issued an Accessibility Policy Statement pledging a fully accessible multimodal transportation system. Accessibility in federally assisted programs is governed by USDOT regulations (49 CFR Part 27) implementing Section 504 of the Rehabilitation Act (29 U.S.C. 794). FHWA has enacted regulations for implementation of the 1990 Americans with Disabilities Act (ADA), including a commitment to build transportation facilities that provide equal access for all persons. These regulations require application of the ADA requirements to federal-aid projects, including Transportation Enhancement Activities.

### **3.1.6.2 Affected Environment**

The existing lane configurations, traffic volumes, LOS, and other operational characteristics within the traffic study area are presented in this subsection. This section is divided into two subsections: Orange County and Los Angeles County.

#### ***Orange County***

##### **Traffic Study Area**

The traffic study area within Orange County, shown in Figure 3.1.6-1, focuses on traffic operations of both the I-405 corridor and the freeway ramps at their intersections with arterials, and other signalized arterial intersections that are in the immediate vicinity and have a direct bearing on freeway interchange traffic operations. The proposed project covers a distance of approximately 16 miles along I-405 between SR-73 and I-605. Within the traffic study area in Orange County, 14 freeway segments have been analyzed. These are shown in Figure 3.1.6-1 and include:

1. Bristol Street to Fairview Road
2. Fairview Road to Harbor Boulevard/Hyland Avenue
3. Harbor Boulevard/Hyland Avenue to Euclid Street/Ellis Avenue
4. Euclid Street/Ellis Avenue to Brookhurst Street/Talbert Avenue
5. Brookhurst Street/Talbert Avenue to Magnolia Street/Warner Avenue
6. Magnolia Street/Warner Avenue to Beach Boulevard/Edinger Avenue
7. Beach Boulevard/Edinger Avenue to Goldenwest Street/Bolsa Avenue
8. Goldenwest Street/Bolsa Avenue to Springdale Street/Westminster Avenue
9. Springdale Street/Westminster Avenue to Bolsa Chica Road/Valley View Street
10. Bolsa Chica Road/Valley View Street to Seal Beach Boulevard

11. Seal Beach Boulevard to I-605
12. I-605 – Katella Avenue to San Gabriel River
13. SR-73 – Bear Street to I-405
14. I-605 – I-405 to Katella Avenue

Within the traffic study area in Orange County, the following local interchange areas have been analyzed:

1. Bristol Street Interchange
2. Fairview Road Interchange (includes South Coast Drive)
3. Harbor Boulevard and Hyland Avenue Interchange (includes Susan Street)
4. Euclid Street and Ellis Avenue Interchange
5. Brookhurst Street and Talbert Avenue Interchange
6. Magnolia Street and Warner Avenue Interchange
7. Beach Boulevard and Edinger Avenue Interchange
8. Golden West Street and Bolsa Avenue Interchange
9. Springdale Avenue and Westminster Avenue Interchange
10. Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange
11. Seal Beach Boulevard Interchange (includes Old Ranch Parkway at Westbound SR-22)
12. Bear Street/SR-73 Interchange
13. Katella Avenue/I-605 Interchange

Additionally, traffic operations at the I-405/I-605/SR-22, I-405/SR-22 East, and I-405/SR-73 system interchanges were also evaluated. A list of study intersections, grouped by freeway interchange area, is shown in Table 3.1.6-1. Intersections identified for evaluation include those controlled with traffic signals, as well as stop-controlled or uncontrolled intersections within the study area in Orange County.

To simplify the comparison of future conditions and alternatives, I-405 within the area of proposed widening was divided into three segments (referred to as “study segments” hereafter): SR-73 to Brookhurst Street, Brookhurst Street to SR-22 East, and SR-22 East to I-605. This segmentation is generally based on the similarity of lane cross section by segment. The segment from SR-73 to Brookhurst Street is characterized by lane drops and adds. The segment from Brookhurst Street to SR-22 East has a consistent number of lanes in each of the existing and alternative conditions. The segment from SR-22 East to I-605 also has a consistent number of lanes in each condition.

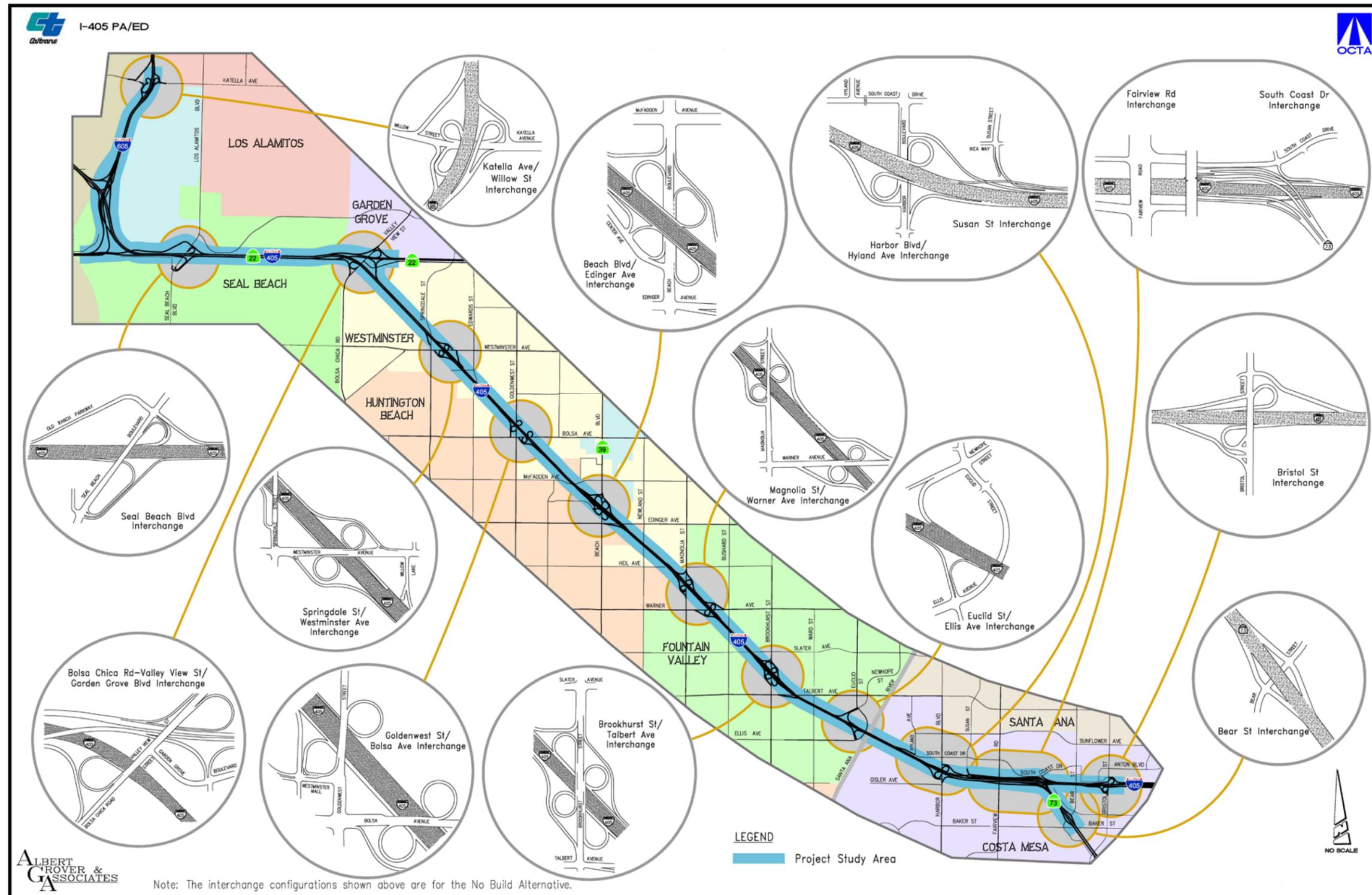


Figure 3.1.6-1: Traffic Study Area within Orange County

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Table 3.1.6-1: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009									Year 2020										Year 2040												
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry				Adverse Effect	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry				Adverse Effect				
				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						
				V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C		Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)		LOS	V/C	Avg Delay (sec)	LOS
Bristol Street	I-405 NB off-ramp/ South Coast Drive	Bristol Street	Sig	0.45	16.4	B	0.73	30.4	C	0.59	19.7	B	0.86	37.1	D	0.59	18.8	B	0.90	38.7	D	N	0.70	24.4	C	0.96	44.2	D	0.71	21.9	C	0.98	46.0	D	N
	I-405 NB On-Ramp (from NB Bristol Street)	Bristol Street	None	0.08	--	--	0.21	--	--	0.10	--	--	0.22	--	--	0.10	--	--	0.22	--	--	--	0.10	--	--	0.23	--	--	0.10	--	--	0.23	--	--	--
	I-405 NB On-Ramp (from SB Bristol Street)	Bristol Street	None	0.20	--	--	0.15	--	--	0.23	--	--	0.16	--	--	0.23	--	--	0.16	--	--	--	0.25	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--
Fairview Road and South Coast Drive	I-405 SB ramps	Bristol Street	Sig	0.61	15.8	B	0.80	14.8	B	0.63	16.6	B	0.95	19.2	B	0.63	15.5	B	0.96	19.3	B	N	0.68	16.3	B	<b>1.03</b>	<b>27.6</b>	<b>F*</b>	0.67	17.2	B	<b>1.05</b>	<b>32.0</b>	<b>F*</b>	N
	I-405 NB ramps	Fairview Road	Sig	0.93	28.4	C	0.93	24.1	C	<b>1.06</b>	<b>44.0</b>	<b>F*</b>	<b>1.02</b>	<b>35.1</b>	<b>F*</b>	<b>1.07</b>	<b>44.5</b>	<b>F*</b>	<b>1.02</b>	<b>32.9</b>	<b>F*</b>	N	<b>1.14</b>	<b>55.5</b>	<b>F*</b>	<b>1.06</b>	<b>41.8</b>	<b>F*</b>	<b>1.15</b>	<b>56.6</b>	<b>F*</b>	<b>1.08</b>	<b>45.8</b>	<b>F*</b>	N
	I-405 SB ramps	Fairview Road	Sig	0.79	16.0	B	0.72	17.6	B	0.91	20.5	C	0.76	19.7	B	0.92	20.1	C	0.77	18.5	B	N	0.97	24.8	C	0.79	19.7	B	0.99	25.7	C	0.81	20.1	C	N
Harbor Boulevard and Hyland Avenue	South Coast Drive	I-405 NB off-ramp	Sig	0.19	21.0	C	0.35	24.9	C	0.23	21.6	C	0.39	26.3	C	0.24	21.8	C	0.40	27.1	C	N	0.25	22.0	C	0.41	28.3	C	0.27	22.4	C	0.43	30.8	C	N
	I-405 NB on-ramp/ South Coast Drive	Hyland Avenue	Sig	0.26	8.7	A	0.58	8.0	A	0.42	7.8	A	0.64	9.3	A	0.42	7.8	A	0.64	9.3	A	N	0.57	9.5	A	0.72	12.0	B	0.52	7.9	A	0.67	10.1	B	N
	I-405 SB On-Ramp (from SB Harbor Boulevard)	Harbor Boulevard	None	0.60	--	--	0.65	--	--	0.65	--	--	0.69	--	--	0.65	--	--	0.69	--	--	--	0.67	--	--	0.72	--	--	0.67	--	--	0.72	--	--	--
	I-405 NB off-ramp	Harbor Boulevard	Sig	0.55	19.7	B	0.75	28.3	C	0.61	20.3	C	0.78	28.6	C	0.61	19.5	B	0.78	28.5	C	N	0.63	20.6	C	0.81	29.4	C	0.65	20.2	C	0.81	29.4	C	N
	I-405 NB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.31	--	--	0.38	--	--	0.33	--	--	0.40	--	--	0.33	--	--	0.40	--	--	--	0.35	--	--	0.42	--	--	0.35	--	--	0.42	--	--	--
	I-405 SB off-ramp	Harbor Boulevard	Sig	0.58	18.3	B	0.71	18.1	B	0.63	18.6	B	0.77	19.5	B	0.63	18.4	B	0.77	19.4	B	N	0.65	18.9	B	0.81	20.9	C	0.67	18.9	B	0.80	20.8	C	N
	I-405 SB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.42	--	--	0.23	--	--	0.45	--	--	0.25	--	--	0.45	--	--	0.25	--	--	--	0.46	--	--	0.26	--	--	0.46	--	--	0.26	--	--	--
Euclid Street and Ellis Avenue	Gisler Avenue	Harbor Boulevard	Sig	0.71	26.8	C	0.87	31.8	C	0.77	30.4	C	0.90	33.6	C	0.80	30.6	C	0.89	33.1	C	N	0.80	32.2	C	0.97	40.3	D	0.82	32.8	C	0.96	39.3	D	N
	Ikea Way	Susan Street/ I-405 NB off-ramp	Sig	0.26	2.9	A	0.33	8.0	A	0.31	6.2	A	0.36	8.5	A	0.32	6.4	A	0.36	8.4	A	N	0.35	7.7	A	0.38	8.8	A	0.35	8.0	A	0.37	8.6	A	N
	I-405 NB ramps/ Newhope Street	Euclid Street	Sig	0.48	33.0	C	0.64	37.8	D	0.59	31.3	C	0.82	43.7	D	0.56	30.7	C	0.83	43.9	D	N	0.66	34.2	C	0.91	50.9	D	0.65	31.1	C	0.94	52.1	D	N
Brookhurst Street and Talbert Avenue	Ellis Avenue/Euclid Street	I-405 SB ramps	Sig	0.94	46.3	D	0.98	51.2	D	<b>1.14</b>	<b>82.2</b>	<b>F</b>	<b>1.30</b>	<b>141.7</b>	<b>F</b>	<b>1.14</b>	<b>80.7</b>	<b>F</b>	<b>1.31</b>	<b>128.0</b>	<b>F</b>	N	<b>1.37</b>	<b>158.7</b>	<b>F</b>	<b>1.51</b>	<b>186.3</b>	<b>F</b>	<b>1.37</b>	<b>155.7</b>	<b>F</b>	<b>1.52</b>	<b>195.6</b>	<b>F</b>	N
	Slater Avenue	Brookhurst Street	Sig	0.93	46.5	D	0.81	38.3	D	<b>1.03</b>	<b>57.4</b>	<b>F*</b>	<b>0.91</b>	<b>47.0</b>	<b>D</b>	<b>1.01</b>	<b>60.3</b>	<b>F*</b>	0.92	44.9	D	N	<b>1.05</b>	<b>67.8</b>	<b>F*</b>	<b>0.97</b>	<b>57.6</b>	<b>E</b>	<b>1.17</b>	<b>78.8</b>	<b>F*</b>	<b>1.01</b>	<b>64.5</b>	<b>F*</b>	Y
	I-405 NB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.08	--	--	0.11	--	--	0.12	--	--	0.11	--	--	0.12	--	--	--	0.14	--	--	0.14	--	--	0.14	--	--	0.14	--	--	--
	I-405 NB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.32	--	--	0.41	--	--	0.39	--	--	0.62	--	--	0.39	--	--	0.62	--	--	--	0.43	--	--	0.76	--	--	0.43	--	--	0.76	--	--	--
	I-405 NB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.36	--	--	0.29	--	--	0.42	--	--	0.31	--	--	0.42	--	--	0.31	--	--	--	0.45	--	--	0.32	--	--	0.45	--	--	0.32	--	--	--
	I-405 NB On-Ramp (from NB Brookhurst Street)	Brookhurst Street	None	0.42	--	--	0.43	--	--	0.52	--	--	0.57	--	--	0.52	--	--	0.57	--	--	--	0.58	--	--	0.67	--	--	0.58	--	--	0.67	--	--	--
	I-405 SB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.83	--	--	0.45	--	--	0.88	--	--	0.48	--	--	0.88	--	--	0.48	--	--	--	0.92	--	--	0.50	--	--	0.92	--	--	0.50	--	--	--
	I-405 SB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.13	--	--	0.06	--	--	0.14	--	--	0.06	--	--	0.14	--	--	--	0.07	--	--	0.14	--	--	0.07	--	--	0.14	--	--	--
	I-405 SB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.45	--	--	0.45	--	--	0.48	--	--	0.50	--	--	0.48	--	--	0.50	--	--	--	0.50	--	--	0.53	--	--	0.50	--	--	0.53	--	--	--
	Talbert Avenue	Brookhurst Street	Sig	0.95	47.3	D	0.90	47.8	D	<b>1.24</b>	<b>92.8</b>	<b>F</b>	<b>0.99</b>	<b>58.2</b>	<b>E</b>	<b>1.24</b>	<b>92.7</b>	<b>F</b>	<b>1.01</b>	<b>62.2</b>	<b>F*</b>	N	<b>1.40</b>	<b>123.5</b>	<b>F</b>	<b>1.05</b>	<b>70.7</b>	<b>F*</b>	<b>1.42</b>	<b>128.7</b>	<b>F</b>	<b>1.12</b>	<b>85.3</b>	<b>F</b>	Y
Talbert Avenue	I-405 SB On-Ramp (from EB Talbert Avenue)	None	0.69	--	--	0.46	--	--	0.74	--	--	0.50	--	--	0.74	--	--	0.50	--	--	--	0.77	--	--	0.52	--	--	0.77	--	--	0.52	--	--	--	

**Table 3.1.6-1: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for the Build Alternatives – Locations in Orange County**

Interchange Location	Intersection Location		Traffic Control	Year 2009									Year 2020										Year 2040												
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect	No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						Adverse Effect
				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			
				V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	
Magnolia Street and Warner Avenue	Heil Avenue	Magnolia Street	Sig	0.75	22.3	C	0.51	16.1	B	0.82	25.2	C	0.63	18.5	B	0.83	25.5	C	0.65	18.9	B	N	0.87	28.7	C	0.71	20.3	C	0.89	32.1	C	0.78	22.4	C	N
	I-405 NB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.07	--	--	0.05	--	--	0.09	--	--	0.05	--	--	0.09	--	--	0.05	--	--	--	0.09	--	--	0.05	--	--	0.09	--	--	0.05	--	--	--
	I-405 NB Off-Ramp (to NB Magnolia Street)	Magnolia Street	None	0.13	--	--	0.34	--	--	0.16	--	--	0.45	--	--	0.16	--	--	0.45	--	--	--	0.17	--	--	0.52	--	--	0.17	--	--	0.52	--	--	--
	I-405 NB On-Ramp (from NB Magnolia Street)	Magnolia Street	None	0.37	--	--	0.26	--	--	0.40	--	--	0.28	--	--	0.40	--	--	0.28	--	--	--	0.42	--	--	0.30	--	--	0.42	--	--	0.30	--	--	--
	I-405 SB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.66	--	--	0.23	--	--	0.71	--	--	0.24	--	--	0.71	--	--	0.24	--	--	--	0.73	--	--	0.25	--	--	0.73	--	--	0.25	--	--	--
	I-405 SB off-ramp (to NB and SB Magnolia Street)	Magnolia Street	Sig	0.88	23.1	C	0.77	18.0	B	0.97	36.7	D	0.83	16.7	B	0.99	38.7	D	0.83	16.4	B	N	<b>1.02</b>	<b>37.8</b>	<b>F*</b>	0.88	20.2	C	0.85	11.7	B	0.80	20.7	C	N*
	Warner Avenue	Magnolia Street	Sig	0.91	44.8	D	0.94	47.6	D	0.98	53.1	D	<b>1.01</b>	<b>53.8</b>	<b>F*</b>	0.99	53.3	D	<b>1.02</b>	<b>55.4</b>	<b>F*</b>	N	<b>1.00</b>	<b>62.6</b>	<b>F*</b>	<b>1.07</b>	<b>63.0</b>	<b>F*</b>	<b>1.03</b>	<b>62.5</b>	<b>F*</b>	<b>1.12</b>	<b>75.4</b>	<b>F*</b>	Y
	I-405 SB On-Ramp (from EB Warner Avenue)	Warner Avenue	None	0.45	--	--	0.23	--	--	0.46	--	--	0.24	--	--	0.46	--	--	0.24	--	--	--	0.47	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--
	I-405 SB Off-Ramp (to EB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.36	--	--	0.35	--	--	0.38	--	--	0.35	--	--	0.38	--	--	--	0.46	--	--	0.40	--	--	0.46	--	--	0.40	--	--	--
	I-405 NB Off-Ramp (to WB Warner Avenue)	Warner Avenue	None	0.32	--	--	0.42	--	--	0.34	--	--	0.52	--	--	0.34	--	--	0.52	--	--	--	0.35	--	--	0.59	--	--	0.35	--	--	0.59	--	--	--
I-405 NB On-Ramp (from WB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.27	--	--	0.18	--	--	0.29	--	--	0.18	--	--	0.29	--	--	--	0.19	--	--	0.50	--	--	0.19	--	--	0.50	--	--	--	
Beach Boulevard and Edinger Avenue	McFadden Avenue	Beach Boulevard	Sig	0.94	46.3	D	<b>0.97</b>	<b>60.9</b>	<b>E</b>	<b>1.03</b>	<b>72.5</b>	<b>F*</b>	<b>1.05</b>	<b>74.7</b>	<b>F*</b>	<b>1.03</b>	<b>68.3</b>	<b>F*</b>	<b>1.06</b>	<b>76.8</b>	<b>F*</b>	N	<b>1.11</b>	<b>81.8</b>	<b>F</b>	<b>1.13</b>	<b>86.6</b>	<b>F</b>	<b>1.15</b>	<b>94.5</b>	<b>F</b>	<b>1.14</b>	<b>92.3</b>	<b>F</b>	Y
	I-405 NB On-Ramp (from SB Beach Boulevard)	Beach Boulevard	None	0.18	--	--	0.17	--	--	0.19	--	--	0.18	--	--	0.19	--	--	0.18	--	--	--	0.20	--	--	0.19	--	--	0.20	--	--	0.19	--	--	--
	I-405 NB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.56	--	--	0.60	--	--	0.58	--	--	0.64	--	--	0.58	--	--	0.64	--	--	--	0.59	--	--	0.67	--	--	0.59	--	--	0.67	--	--	--
	I-405 NB Off-Ramp (to SB Beach Boulevard)	Beach Boulevard	None	0.46	--	--	0.47	--	--	0.49	--	--	0.62	--	--	0.49	--	--	0.62	--	--	--	0.51	--	--	0.72	--	--	0.51	--	--	0.72	--	--	--
	I-405 NB On-Ramp (from NB Beach Boulevard)	Beach Boulevard	None	0.51	--	--	0.61	--	--	0.55	--	--	0.67	--	--	0.55	--	--	0.67	--	--	--	0.58	--	--	0.71	--	--	0.58	--	--	0.71	--	--	--
	Center Avenue	Beach Boulevard	Sig	0.72	18.2	B	0.83	17.6	B	0.82	11.5	B	0.93	27.2	C	0.85	20.3	C	0.97	28.7	C	N	0.92	19.5	B	<b>1.00</b>	<b>37.8</b>	<b>F*</b>	0.95	19.8	B	<b>1.04</b>	<b>44.7</b>	<b>F*</b>	Y
	Center Avenue (Huntington Beach Mall)	I-405 SB ramps	Sig	0.43	15.3	B	0.77	22.9	C	0.58	16.9	B	0.86	28.1	C	0.58	16.8	B	0.86	28.2	C	N	0.65	17.5	B	0.92	36.4	D	0.66	17.5	B	0.92	36.7	D	N
	I-405 SB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.03	--	--	0.10	--	--	0.03	--	--	0.11	--	--	0.03	--	--	0.11	--	--	--	0.03	--	--	0.11	--	--	0.03	--	--	0.11	--	--	--
	Edinger Avenue	Beach Boulevard	Sig	<b>0.94</b>	<b>55.1</b>	<b>E</b>	<b>0.99</b>	<b>59.1</b>	<b>E</b>	<b>1.06</b>	<b>60.6</b>	<b>F*</b>	<b>1.05</b>	<b>66.6</b>	<b>F*</b>	<b>1.08</b>	<b>62.8</b>	<b>F*</b>	<b>1.08</b>	<b>70.8</b>	<b>F*</b>	Y	<b>1.15</b>	<b>78.9</b>	<b>F*</b>	<b>1.11</b>	<b>79.4</b>	<b>F*</b>	<b>1.21</b>	<b>86.8</b>	<b>F</b>	<b>1.18</b>	<b>89.0</b>	<b>F</b>	Y
	Edinger Avenue	I-405 SB On-Ramp	None	0.60	--	--	0.50	--	--	0.67	--	--	0.52	--	--	0.67	--	--	0.52	--	--	--	0.71	--	--	0.54	--	--	0.71	--	--	0.54	--	--	--
Goldenwest Street and Bolsa Avenue	I-405 NB On-Ramp (from NB Goldenwest Street)	Goldenwest Street	None	0.50	--	--	0.53	--	--	0.55	--	--	0.59	--	--	0.55	--	--	0.59	--	--	--	0.58	--	--	0.63	--	--	0.58	--	--	0.63	--	--	--
	Westminster Mall	I-405 SB ramps	Sig	0.31	6.5	A	0.37	8.9	A	0.36	6.9	A	0.40	9.9	A	0.36	7.0	A	0.40	9.7	A	N	0.39	6.8	A	0.42	10.4	B	0.39	7.8	A	0.43	10.4	B	N
	Westminster Mall	Goldenwest Street	Sig	0.65	9.3	A	0.61	10.5	B	0.71	10.5	B	0.69	12.1	B	0.72	10.7	B	0.67	12.0	B	N	0.76	11.7	B	0.75	13.2	B	0.81	13.2	B	0.79	12.8	B	N
	Bolsa Avenue	Goldenwest Street	Sig	0.68	36.0	D	0.95	49.4	D	0.76	36.8	D	<b>1.00</b>	<b>61.8</b>	<b>F*</b>	0.75	37.2	D	<b>0.99</b>	<b>60.2</b>	<b>E</b>	N	0.80	38.2	D	<b>1.04</b>	<b>72.0</b>	<b>F*</b>	0.84	39.7	D	<b>1.13</b>	<b>85.6</b>	<b>F</b>	Y
	I-405 SB On-Ramp (from EB Bolsa Avenue)	Bolsa Avenue	None	0.22	--	--	0.49	--	--	0.23	--	--	0.51	--	--	0.23	--	--	0.51	--	--	--	0.23	--	--	0.52	--	--	0.12	--	--	0.26	--	--	--
	I-405 SB Off-Ramp (to EB Bolsa Avenue)	Bolsa Avenue	Stop	0.35	10.7	B	0.15	10.3	B	0.38	11.0	B	0.17	10.5	B	0.38	11.0	B	0.17	10.5	B	N	0.40	11.3	B	0.18	10.7	B	0.41	11.7	B	0.18	10.7	B	N
I-405 NB Off-Ramp (to WB Bolsa Avenue)	Bolsa Avenue	None	0.53	--	--	0.47	--	--	0.58	--	--	0.51	--	--	0.58	--	--	0.51	--	--	--	0.61	--	--	0.54	--	--	0.61	--	--	0.54	--	--	--	

Table 3.1.6-1: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009									Year 2020									Year 2040													
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry						No Build Traffic on No Build Geometry						Build Traffic on No Build Geometry							
				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				
				V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)
Springdale Street and Westminster Avenue	I-405 SB off-ramp	Springdale Street	Stop*	0.47	28.1	D	<b>0.60</b>	<b>36.1</b>	E	<b>0.67</b>	<b>47.9</b>	E	<b>0.69</b>	<b>45.9</b>	E	<b>0.66</b>	<b>46.6</b>	E	<b>0.67</b>	<b>42.9</b>	E	N	<b>0.83</b>	<b>76.2</b>	F	<b>0.85</b>	<b>75.8</b>	F	<b>0.85</b>	<b>80.9</b>	F	<b>0.85</b>	<b>76.3</b>	F	N
	Westminster Avenue	Springdale Street	Sig	0.76	39.9	D	0.79	40.1	D	0.83	42.0	D	0.89	44.9	D	0.82	41.5	D	0.89	46.0	D	N	0.84	44.1	D	<b>0.98</b>	<b>60.7</b>	E	0.89	46.3	D	<b>0.97</b>	<b>57.2</b>	E	N
	I-405 SB On-Ramp	Westminster Avenue	None	0.24	--	--	0.30	--	--	0.26	--	--	0.32	--	--	0.26	--	--	0.32	--	--	--	0.27	--	--	0.34	--	--	0.27	--	--	0.34	--	--	--
	I-405 SB Off-Ramp (to EB Westminster Avenue)	Westminster Avenue	None	0.16	--	--	0.15	--	--	0.18	--	--	0.16	--	--	0.18	--	--	0.16	--	--	--	0.19	--	--	0.16	--	--	0.19	--	--	0.16	--	--	--
	I-405 NB Off-Ramp (to WB Westminster Avenue)	Westminster Avenue	None	0.40	--	--	0.38	--	--	0.43	--	--	0.43	--	--	0.43	--	--	0.43	--	--	--	0.44	--	--	0.47	--	--	0.44	--	--	0.47	--	--	--
	I-405 NB On-Ramp	Westminster Avenue	None	0.30	--	--	0.28	--	--	0.32	--	--	0.30	--	--	0.32	--	--	0.30	--	--	--	0.34	--	--	0.32	--	--	0.34	--	--	0.32	--	--	--
	Westminster Avenue	Willow Lane	Sig	0.50	14.1	B	0.53	12.6	B	0.58	14.6	B	0.65	14.7	B	0.61	14.7	B	0.65	14.1	B	N	0.61	15.4	B	0.72	19.2	B	0.69	17.7	B	0.78	20.6	C	N
Bolsa Chica Road/ Valley View Street/ Garden Grove Boulevard	Garden Grove Boulevard	I-405 NB off-ramp/ SR-22 EB ramps	Sig	0.84	47.3	D	0.93	54.7	D	<b>0.89</b>	<b>55.8</b>	E	<b>0.99</b>	<b>67.6</b>	E	<b>0.90</b>	<b>56.1</b>	E	<b>0.99</b>	<b>62.3</b>	E	N	<b>0.94</b>	<b>60.4</b>	E	<b>1.03</b>	<b>75.8</b>	F*	0.91	48.7	D	0.94	47.6	D	N*
	Garden Grove Boulevard	Bolsa Chica Road/ Valley View Street	Sig	0.92	23.7	C	<b>1.06</b>	<b>40.7</b>	F*	0.91	23.3	C	<b>1.00</b>	<b>39.1</b>	F*	0.92	24.5	C	<b>1.03</b>	<b>40.1</b>	F*	Y	0.99	32.2	C	<b>1.06</b>	<b>57.0</b>	F*	0.99	32.4	C	<b>1.10</b>	<b>65.8</b>	F*	Y
	I-405 SB On-Ramp (from SB Bolsa Chica Road)	Bolsa Chica Road	None	0.49	--	--	0.61	--	--	0.63	--	--	0.76	--	--	0.63	--	--	0.76	--	--	--	0.72	--	--	0.86	--	--	0.72	--	--	0.86	--	--	--
	I-405 SB Off-Ramp (to SB Bolsa Chica Road)	Bolsa Chica Road	None	0.55	--	--	0.45	--	--	0.78	--	--	0.65	--	--	0.78	--	--	0.65	--	--	--	0.93	--	--	0.78	--	--	0.93	--	--	0.78	--	--	--
Seal Beach Boulevard	I-405 NB ramps/ Old Ranch Parkway	Seal Beach Boulevard	Sig	0.88	36.0	D	0.92	38.7	D	0.74	27.6	C	0.88	33.3	C	0.74	27.5	C	0.93	34.7	C	N	0.82	31.6	C	0.93	40.8	D	0.90	46.5	D	<b>0.94</b>	<b>58.8</b>	E	N
	I-405 SB ramps/ Beverly Manor Road	Seal Beach Boulevard	Sig	0.95	46.4	D	<b>1.01</b>	<b>55.2</b>	F*	<b>1.04</b>	<b>57.1</b>	F*	<b>1.12</b>	<b>63.1</b>	F*	<b>1.04</b>	<b>55.9</b>	F*	<b>1.12</b>	<b>62.6</b>	F*	N	<b>1.10</b>	<b>66.5</b>	F*	<b>1.21</b>	<b>81.0</b>	F	1.13	67.5	F*	<b>1.29</b>	<b>96.7</b>	F*	N
	Old Ranch Pkwy	SR-22 WB On-Ramp	None	0.30	--	--	0.22	--	--	0.32	--	--	0.24	--	--	0.32	--	--	0.24	--	--	--	0.34	--	--	0.25	--	--	0.34	--	--	0.25	--	--	N
Bear Street at SR-73	SR-73 NB ramps	Bear Street	Sig	0.50	13.6	B	0.47	12.8	B	0.55	14.1	B	0.53	13.3	B	0.55	16.1	B	0.52	15.0	B	N	0.59	14.7	B	0.56	13.8	B	0.59	14.5	B	0.56	13.8	B	N
	SR-73 SB ramps	Bear Street	Sig	0.43	13.1	B	0.51	13.5	B	0.48	13.3	B	0.55	14.3	B	0.49	14.4	B	0.58	16.1	B	N	0.52	13.6	B	0.63	15.9	B	0.53	13.7	B	0.67	16.7	B	N
Katella Avenue/ Willow Street at I-605	Katella Avenue	I-605 NB on-ramp	Sig	0.64	1.7	A	0.65	3.7	A	0.69	2.5	A	0.73	5.1	A	0.69	2.6	A	0.73	5.0	A	--	0.75	3.2	A	0.80	6.6	A	0.75	3.2	A	0.79	6.4	A	N
	Katella Avenue	I-605 NB Off-Ramp (to EB Katella Avenue)	None	0.76	--	--	0.49	--	--	0.81	--	--	0.52	--	--	0.81	--	--	0.52	--	--	--	0.84	--	--	0.55	--	--	0.84	--	--	0.55	--	--	--
	Katella Avenue	I-605 NB Off-Ramp (to WB Katella Avenue)	None	0.03	--	--	0.05	--	--	0.05	--	--	0.07	--	--	0.05	--	--	0.07	--	--	--	0.06	--	--	0.08	--	--	0.06	--	--	0.08	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from WB Katella Avenue)	None	0.36	--	--	0.44	--	--	0.38	--	--	0.47	--	--	0.38	--	--	0.47	--	--	--	0.40	--	--	0.49	--	--	0.40	--	--	0.49	--	--	--
	Katella Avenue	I-605 SB Off-Ramp (to EB Katella Avenue)	None	0.80	--	--	0.72	--	--	0.86	--	--	0.76	--	--	0.86	--	--	0.76	--	--	--	0.89	--	--	0.79	--	--	0.89	--	--	0.79	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from EB Katella Avenue)	None	0.04	--	--	0.03	--	--	0.11	--	--	0.08	--	--	0.11	--	--	0.08	--	--	--	0.15	--	--	0.11	--	--	0.15	--	--	0.11	--	--	--
	Willow Street	I-605 SB Off-Ramp (to WB Willow Street)	None	0.36	--	--	0.36	--	--	0.39	--	--	0.42	--	--	0.39	--	--	0.42	--	--	--	0.41	--	--	0.46	--	--	0.41	--	--	0.46	--	--	--

Notes:  
 1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio  
 2. F\* = Due to excessive v/c ratio (over 1.0), the intersection is expected to operate at LOS F.  
 3. \* = LOS is based on the stop-controlled off-ramp movement (left turn or right turn) with the highest delay.  
 4. Rows are bold when an intersection is forecast to operate at LOS E or F under no-build or project conditions.  
 5. Shaded cells indicate an adverse effect.  
 6. -- = LOS and average delay are not calculated from intersections without traffic control. The adverse effect determination applies only to controlled intersections.  
 7. "Build" refers to all three build alternatives, Alternatives 1, 2, and 3. There is very small variation among the forecast peak hour traffic volumes at the freeway interchanges. The highest of the three alternative forecasts was used for the Build condition, representing a worst-case condition.

Source: Albert Grover & Associates 2011.

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### **Existing (Year 2009) Lane Configuration**

Existing (year 2009) lane schematics for the I-405 mainline and all interchange ramps within the traffic study area in Orange County are illustrated in Figure 3.1.6-2.

I-405 Mainline. Within the study area in Orange County, I-405 is a controlled-access freeway generally oriented in a northwest-southeast direction. There is one HOV lane in each direction; a second HOV lane in each direction is currently under construction from SR-22 East to I-605. The HOV lanes are generally separated from the GP lanes via a striped buffer (1 to 4 ft wide).

The number of GP lanes varies by segment:

From SR-73 to Brookhurst Street, there are five to seven GP lanes in each direction, with seven at SR-73 and five at Brookhurst Street;

From Brookhurst Street to SR-22 East, there are four GP lanes in each direction;

From SR-22 East to I-605, there are six GP lanes in each direction east of SR-22 West/ 7<sup>th</sup> Street and five GP lanes west of SR-22 West/7<sup>th</sup> Street to I-605.

Figures 3.1.6-3 and 3.1.6-4 schematically show the number of mainline lanes on I-405 between SR-73 and I-605 in the northbound and southbound directions, respectively.

The existing lane width varies between 11 ft and 12 ft. The outside shoulder generally has the standard width of 10 ft, while the inside shoulder is only 2 to 3 ft wide through a large portion of the corridor. There is no pedestrian or bicycle access to I-405.

Bristol Street Interchange. The I-405/Bristol Street interchange is a partial-cloverleaf interchange, and the Bristol Street/ I-405 northbound off-ramp/South Coast Plaza and Bristol Street/I-405 southbound ramps intersections are signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the two signalized ramp intersections, Bristol Street is an eight-lane roadway.

Fairview Road Interchange (includes South Coast Drive). The I-405/Fairview Road interchange is a diamond interchange, and both ramp intersections are signalized. The I-405 northbound off-ramp at South Coast Drive (South Coast Drive off-ramp) is located south of the Fairview Road interchange and is also a signalized intersection. Between the two ramp intersections on Fairview Road, Fairview Road is a 10-lane roadway, including turning lanes.

Harbor Boulevard and Hyland Avenue Interchange (includes Susan Street). The I-405/Harbor Boulevard interchange is a partial-cloverleaf interchange with one tangent (relatively straight and without a loop) ramp located on Hyland Avenue. The intersections of Hyland Avenue/I-405

northbound on-ramp/South Coast Drive, Harbor Boulevard/I-405 northbound off-ramp, and Harbor Boulevard/I-405 southbound off-ramp are signalized intersections. The I-405 northbound off-ramp at Susan Street (Susan Street off-ramp) is located south of the Harbor Boulevard interchange and is also a signalized intersection. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the two ramp intersections with Harbor Boulevard, Harbor Boulevard is an eight-lane roadway.

Euclid Street and Ellis Avenue Interchange. The I-405/Euclid Street interchange is a two-quadrant cloverleaf. The I-405 northbound ramps at Euclid Street/Newhope Street is an eight-phase signalized intersection. The I-405 southbound ramps at the Euclid Street/Ellis Avenue intersection are currently signalized and also serve as an access to the OCSD facility located south of Ellis Avenue in Fountain Valley. Between the two ramp intersections, Euclid Street/Ellis Avenue is a five- to six-lane roadway.

Brookhurst Street and Talbert Avenue Interchange. The I-405/Brookhurst Street interchange is a full-cloverleaf interchange with one tangent ramp located on Talbert Avenue. None of the ramp intersections are signalized. The two City-controlled study intersections of Brookhurst Street/Slater Avenue and Brookhurst Street/Talbert Avenue are signalized. Between Talbert Avenue/Slater Avenue, Brookhurst Street has six through lanes.

Magnolia Street and Warner Avenue Interchange. The I-405/Magnolia Street interchange is currently a modified full-cloverleaf interchange with ramps located on Magnolia Street and Warner Avenue. Only the I-405 southbound off-ramp at Magnolia Street is signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. The two City-controlled study intersections of Magnolia Street/Heil Avenue and Magnolia Street/Warner Avenue are signalized. In between the two ramp intersections with Magnolia Street, Magnolia Street is a four-lane roadway. Warner Avenue has six through lanes in the interchange.

Beach Boulevard and Edinger Avenue Interchange. The I-405/Beach Boulevard interchange is a full-cloverleaf interchange with one tangent ramp located on Edinger Avenue and the southbound on-/off-ramps for southbound Beach Boulevard located on Center Avenue. The intersections of I-405 southbound ramps/Center Avenue and Beach Boulevard/Center Avenue are signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. While Beach Boulevard is an eight-lane facility approaching the I-405 interchange, it provides three through lanes and an auxiliary lane in each direction within the body of the interchange.

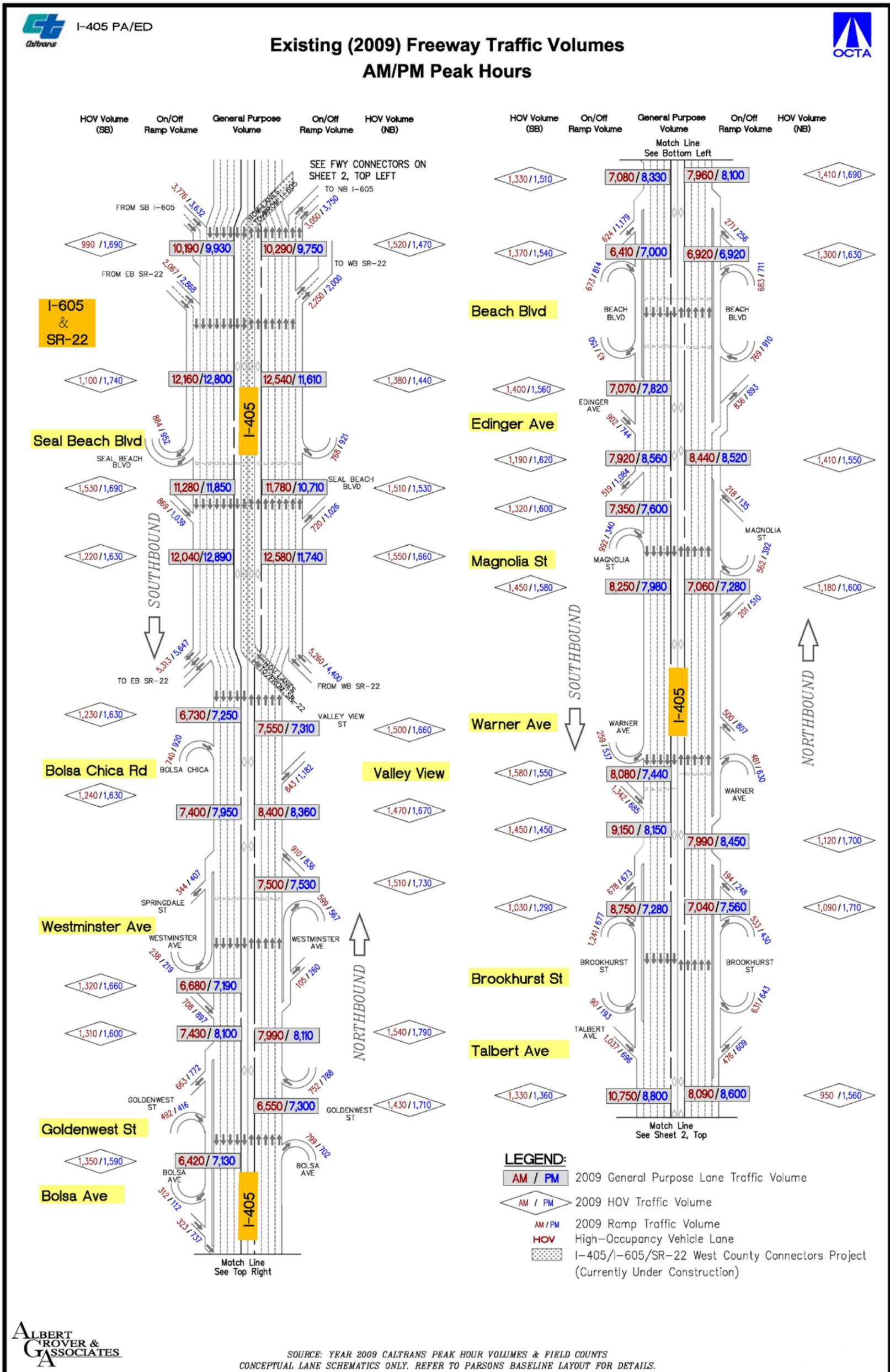


Figure 3.1.6-2: Existing (2009) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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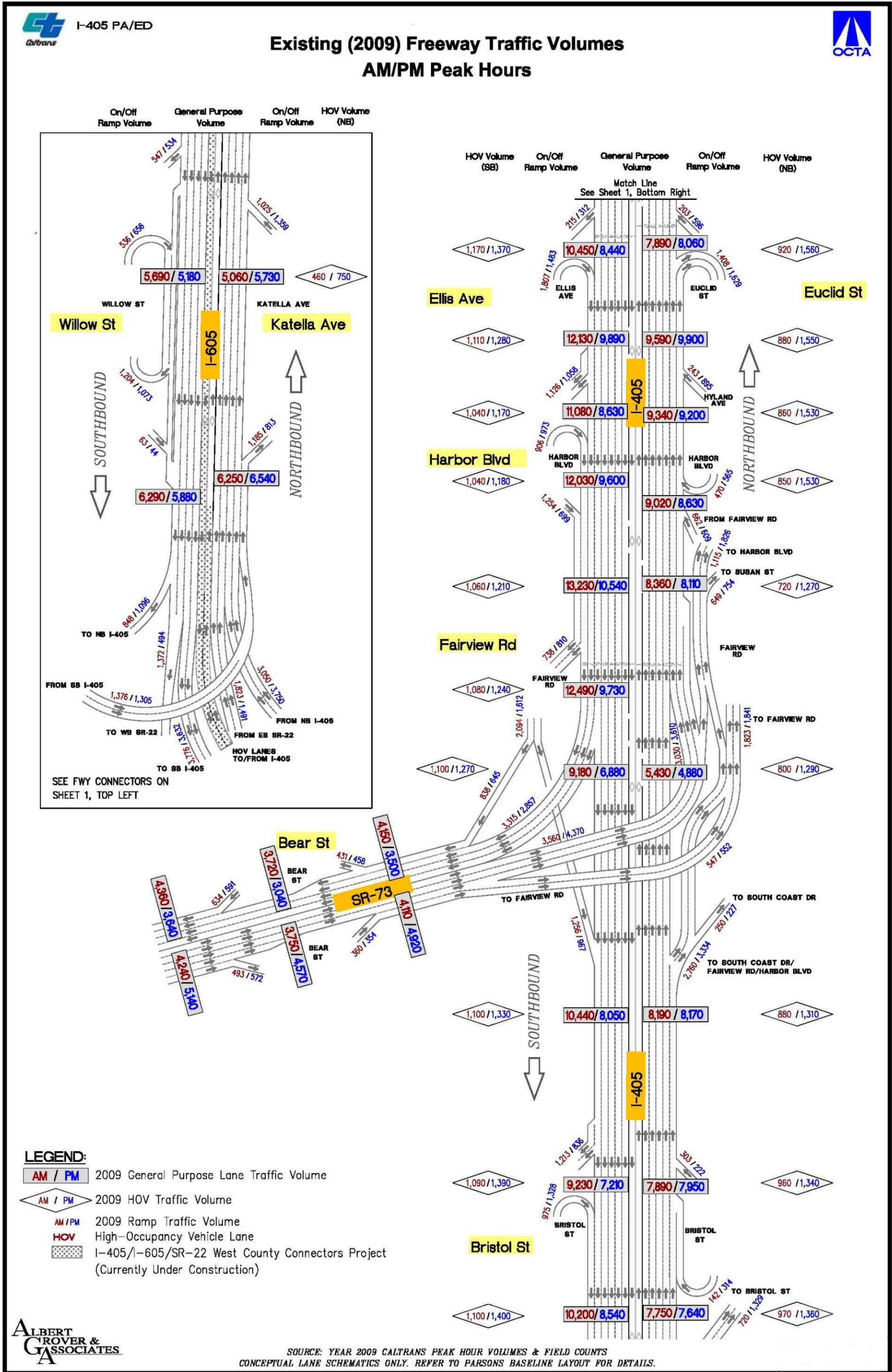
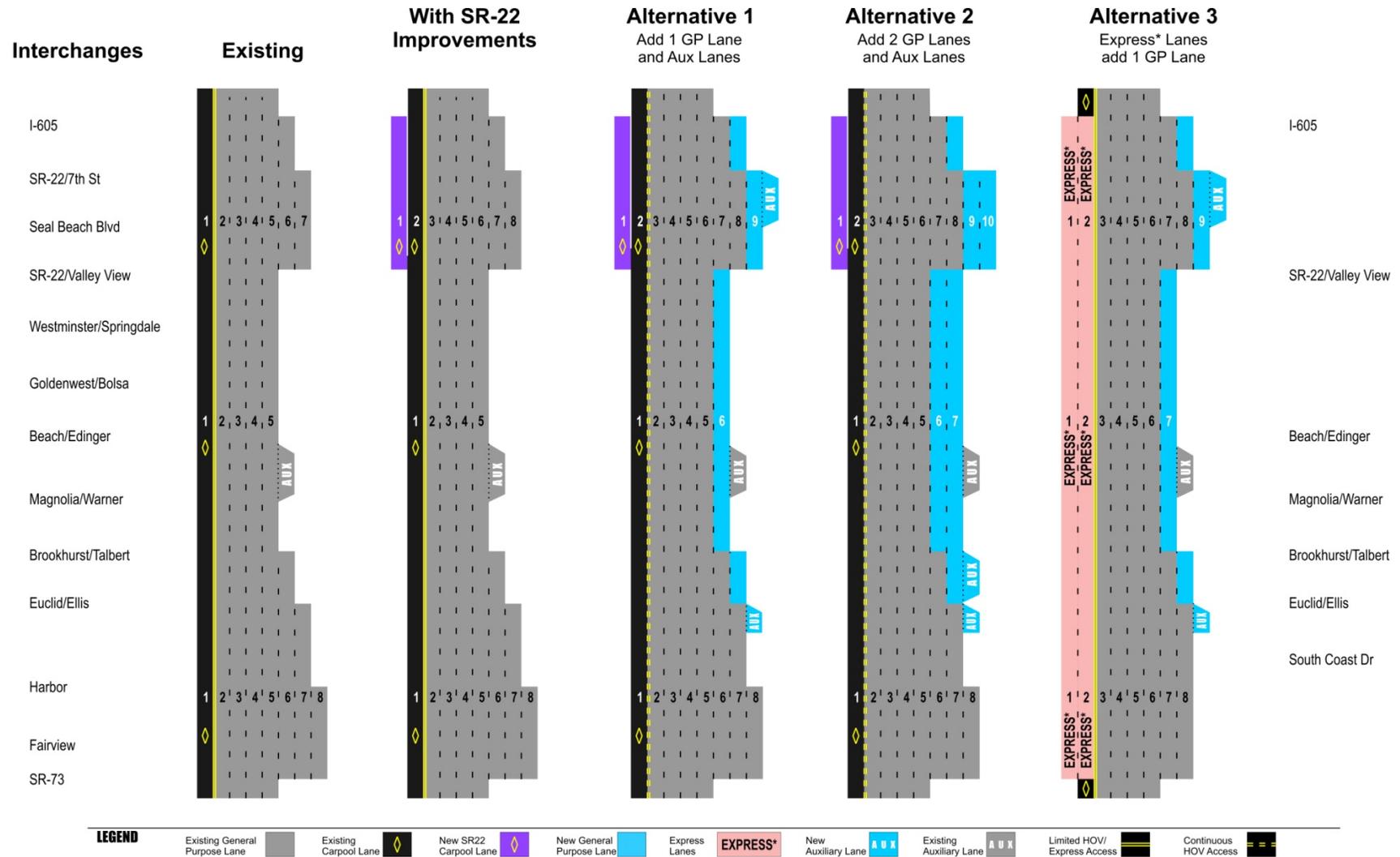


Figure 3.1.6-2: Existing (2009) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
(page 2 of 2)

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**Figure 3.1.6-3: I-405 Northbound Lane Schematic**

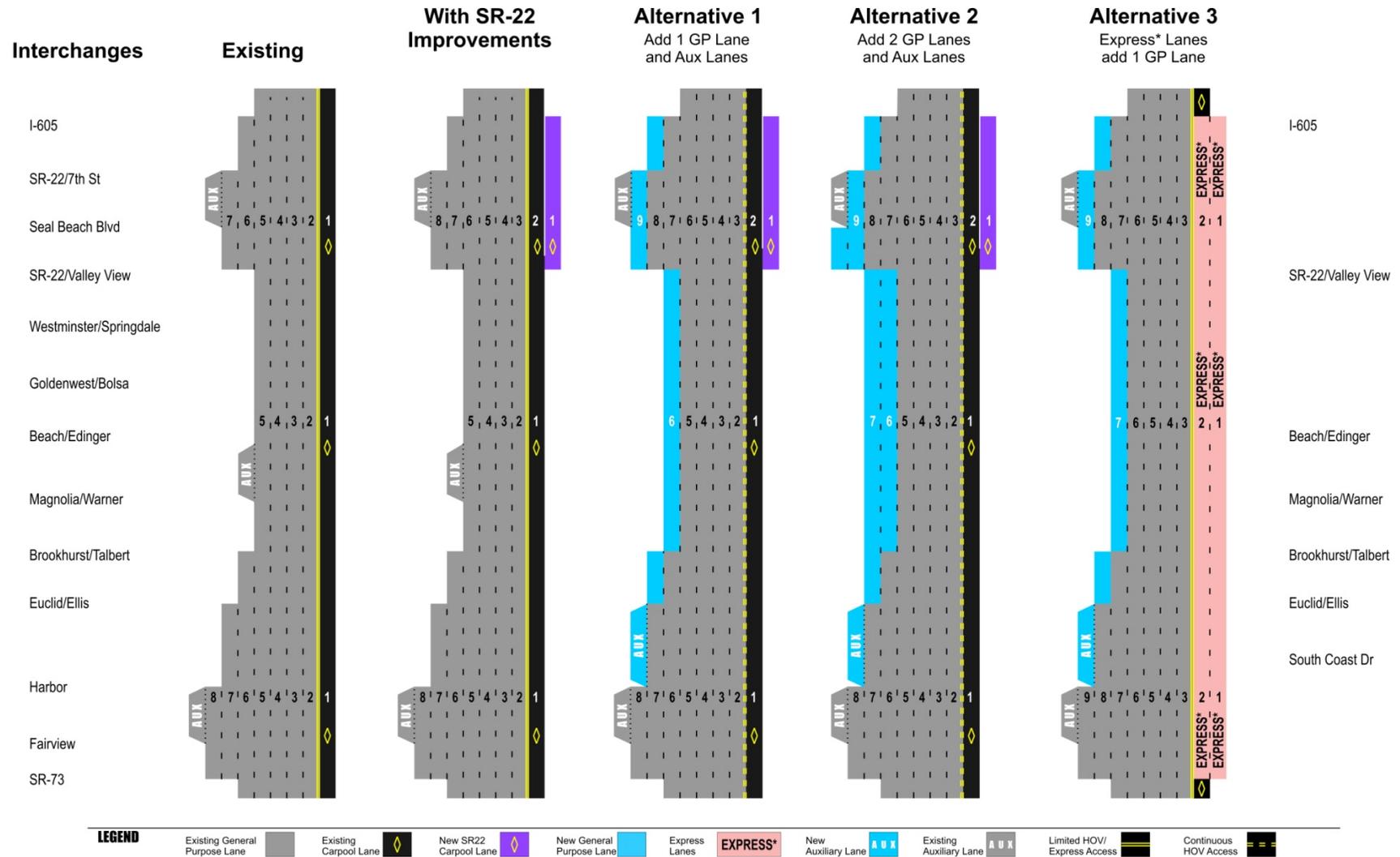


Figure 3.1.6-4: I-405 Southbound Lane Schematic

Goldenwest Street and Bolsa Avenue Interchange. The I-405 interchange at Goldenwest Street and Bolsa Avenue provides movements in both directions along I-405 and both directions of the two arterials, except that there is no provision for movements from Goldenwest Street southbound to northbound I-405, from Bolsa Avenue westbound to southbound I-405, and from I-405 northbound to Bolsa Avenue eastbound. Under existing conditions, the intersections of Goldenwest Street/Bolsa Avenue, Goldenwest Street/ Westminster Mall Road, and I-405 southbound ramps/Westminster Mall Road are signalized. All other study intersections are not signalized and are continuous right-turn lanes, with the exception of the I-405 southbound (loop) off-ramp at eastbound Bolsa Avenue, which is stop controlled. Within the interchange, northbound Goldenwest Street has three through lanes; southbound it narrows from three lanes to two lanes as it approaches the interchange and widens back to three through lanes south of Westminster Mall Road. Within the interchange, eastbound Bolsa Avenue has two through lanes; westbound it approaches the interchange with two lanes widening to three lanes where the loop ramp from northbound I-405 adds a westbound lane that is maintained continuously to the west.

Springdale Street and Westminster Avenue Interchange. The I-405/Westminster Avenue interchange is a partial-cloverleaf interchange with one tangent ramp located on Springdale Street. Under existing conditions, only the City-controlled intersections of Westminster Avenue/Springdale Street and Westminster Avenue/Willow Lane are signalized. All ramp arterial intersections are unsignalized, with the Springdale Street/I-405 southbound off-ramp intersection controlled by a stop sign and all others uncontrolled. Within the interchange, Springdale Street/Westminster Avenue both have two through lanes in each direction.

Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange. The I-405 interchange at Bolsa Chica Road, Valley View Street, and Garden Grove Boulevard is a complex interchange overlapping with the SR-22 interchange at Bolsa Chica Road, Valley View Street, and Garden Grove Boulevard. The I-405 interchange accommodates all movements between I-405 and the arterial roadways except for Bolsa Chica Road northbound to southbound I-405. The interchange also accommodates movements from I-405 northbound to eastbound SR-22 and from SR-22 westbound to southbound I-405 via freeway ramps and local arterial streets. Under existing conditions, the intersections of I-405 northbound off-ramp/SR-22 eastbound ramps at Garden Grove Boulevard and Bolsa Chica Road/Valley View Street at Garden Grove Boulevard are signalized. All other study intersections are unsignalized. Garden Grove Boulevard has two through lanes in each direction in the vicinity of the interchange. Northbound Bolsa Chica Road/Valley View Street narrows from three to two through lanes south of the interchange and then widens back to three through lanes at Garden Grove Boulevard; southbound Bolsa Chica Road/Valley View Street drops its #3 through lane into the westbound SR-22/I-405 northbound

entrance ramp, and continues with two through lanes until the eastbound SR-22/I-405 southbound exit ramp adds a third southbound through lane that is maintained continuously to the south.

Seal Beach Boulevard Interchange (includes Old Ranch Parkway at Westbound SR-22). The I-405/Seal Beach Boulevard interchange is a two-quadrant cloverleaf with an additional tangent ramp from Old Ranch Road to westbound SR-22. Under existing conditions, the intersections of I-405 northbound ramps/Seal Beach Boulevard and I-405 southbound ramps/Seal Beach Boulevard are signalized. Seal Beach Boulevard, within the body of the interchange, has two through lanes in each direction; the SR-22 WCC Project, will provide three through lanes in each direction.

Bear Street/SR-73 Interchange. The SR-73/Bear Street interchange is a diamond interchange, and both ramp intersections are signalized. Between the ramp intersections, Bear Street has two through lanes in each direction, plus turning lanes.

Katella Avenue/I-605 Interchange. The I-605/Katella Avenue/Willow Street interchange is a modified partial-cloverleaf interchange, and the Katella Avenue/I-605 northbound on-ramp is the only signalized intersection. All other ramp/arterial intersections are not signalized and provide continuous right turns. Within the body of the interchange, Katella Avenue/Willow Street has two through lanes in each direction.

### **Existing (Year 2009) Traffic Conditions**

Existing traffic data for the traffic study area within Orange County are for the year 2009. Traffic data and the results of operational analysis are presented below for Existing 2009 for both the freeway mainline and the interchange areas.

#### **Freeway Mainline**

Existing (year 2009) traffic volumes for the mainline freeway were obtained from Caltrans Performance Monitoring System (PeMS) data and Caltrans-published traffic volumes data available on the Caltrans Web site. Existing (year 2009) AM and PM peak-hour traffic volumes for the I-405 mainline and all interchange ramps within the project limits are illustrated in Figure 3.1.6-2.

The existing (year 2009) average daily traffic (ADT) along the I-405 mainline freeway ranges from **257,000 vehicles per day (vpd) to 370,000 vpd**. Existing ADT volumes in the three study segments are included in Table 3.1.6-2. Existing daily vehicle miles of travel (VMT) in the study corridor is **4,063,000**, as shown in Table 3.1.6-3.

V/C Ratio and LOS. Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of the existing year (2009) in the GP lanes of the northbound and southbound freeway. Under existing conditions, the freeway mainline operates at LOS F in the AM peak hour in the southbound direction and LOS D to F in the northbound direction. In the PM peak hour, the freeway mainline LOS is F in the northbound direction and D to F in the southbound direction. The range of v/c ratios in the freeway's GP lanes during the AM peak hour is **0.89 to 1.24** and **0.93 to 1.16** during the PM peak hour. A more-detailed link-by-link presentation of the existing freeway mainline LOS under 2009 traffic conditions for GP and HOV lanes is included in Appendix L1 (Table O-2). The LOS and v/c data reported in Table 3.1.6-4 is for the worst-case interchange-to-interchange link within each study segment.

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of the existing year (2009) in the HOV (carpool) lanes. The HOV lanes operate at LOS B to D in the northbound direction and LOS D in the southbound direction during the AM peak hour; they operate at LOS F in the northbound direction and LOS D to F in the southbound direction during the PM peak hour. A more-detailed link-by-link presentation of the existing freeway mainline LOS under 2009 traffic conditions for GP and HOV lanes is included in Appendix L1 (Table O-2). The range of v/c ratios in the HOV lanes during the AM peak hour is **0.58 to 0.94** and **0.82 to 1.08** during the PM peak hour.

Peak-Period Performance. Table 3.1.6-6 shows existing speeds along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-6 also shows the average speed across both lane types. Existing speeds in the GP lanes during peak hours range from **22 to 54 mph**. Existing speeds in the HOV lanes during peak hours range from **43 to 62 mph**. For both lane types combined, average speeds weighted for the volumes using each lane type range from **28 to 56 mph**.

Corridor Travel Time. Table 3.1.6-7 shows existing corridor travel time along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-7 also shows the average travel time across both lane types. Existing travel time in the GP lanes during peak hours ranges from **15 to 37 minutes**. Existing travel time in the HOV lanes during peak hours ranges from **13 to 19 minutes**. For both lane types combined, average travel time weighted for the volumes using each lane type ranges from **15 to 30 minutes**.

**Table 3.1.6-2: I-405 Mainline Average Daily Traffic in the Area of Proposed Improvements**

Segment	2009	2020				2040			
		No Build	Alt 1	Alt 2	Alt 3	No Build	Alt 1	Alt 2	Alt 3
SR-73 to Brookhurst Street	307,000	373,000	373,600	374,200	380,200	417,000	418,000	419,000	429,000
Brookhurst Street to SR-22 East	257,000	297,200	303,200	309,200	311,600	324,000	334,000	344,000	348,000
SR-22 East to I-605	370,000	441,400	447,400	453,400	449,800	489,000	499,000	509,000	503,000

Source: Albert Grover & Associates 2011.

**Table 3.1.6-3: I-405 Mainline Estimated Daily Vehicle Miles of Travel in the Area of Proposed Improvements**

Segment	2009	2020				2040			
		No Build	Alt 1	Alt 2	Alt 3	No Build	Alt 1	Alt 2	Alt 3
SR-73 to Brookhurst Street	1,053,000	1,279,000	1,281,000	1,284,000	1,304,000	1,430,000	1,434,000	1,437,000	1,471,000
Brookhurst Street to SR-22 East	1,796,000	2,077,000	2,119,000	2,161,000	2,178,000	2,265,000	2,335,000	2,405,000	2,433,000
SR-22 East to I-605	1,214,000	1,448,000	1,467,000	1,487,000	1,475,000	1,604,000	1,637,000	1,670,000	1,650,000
TOTAL	4,063,000	4,804,000	4,867,000	4,932,000	4,957,000	5,299,000	5,406,000	5,512,000	5,554,000

Source: Albert Grover & Associates 2011.

**Table 3.1.6-4: I-405 Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2020 – Locations in Orange County**

Segment	NB or SB	Existing 2009						No Build – 2020						Alternative 1 – 2020						Alternative 2 – 2020						Alternative 3 - 2020						
		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			
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den
SR-73 to Brookhurst Street	NB	27.1	D	0.89	*	F	0.93	38.4	F	1.14	*	F	1.29	34.4	F	1.07	*	F	1.21	34.4	F	1.07	*	F	1.21	30.2	D	0.99	37.8	F	1.13	
	SB	43.9	F	1.16	29.6	D	0.95	*	F	1.48	42.2	F	1.18	*	F	1.40	38.3	F	1.13	*	F	1.40	38.3	F	1.13	*	F	1.34	33.7	F	1.06	
Brookhurst Street to SR-22 East	NB	*	F	1.14	42.9	F	1.15	*	F	1.42	*	F	1.53	42.6	F	1.19	*	F	1.27	31.4	F	1.02	35.3	F	1.09	37.4	F	1.12	43.6	F	1.20	
	SB	*	F	1.24	42	F	1.16	*	F	1.61	*	F	1.43	*	F	1.34	43	F	1.19	39.2	F	1.15	31.6	F	1.02	*	F	1.26	36.7	F	1.11	
SR-22 East to I-605	NB	*	F	1.13	*	F	1.06	*	F	1.31	*	F	1.30	39	F	1.14	38.7	F	1.14	31.9	F	1.03	31.7	F	1.03	42.7	F	1.19	42.2	F	1.18	
	SB	*	F	1.10	*	F	1.16	*	F	1.31	*	F	1.30	39.4	F	1.15	38.3	F	1.13	39.4	F	1.15	38.3	F	1.13	43.4	F	1.20	41.6	F	1.18	

NB – Northbound; SB – Southbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; \* - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2020 than in 2009.  
Source: Albert Grover & Associates 2011.

**Table 3.1.6-5: I-405 Mainline HOV/Express Lane LOS and Volume-to-Capacity Ratio for Year 2020 – Locations in Orange County**

Segment	NB or SB	Existing 2009 HOV Lanes						No Build HOV Lanes – 2020						Alternative 1 HOV Lanes – 2020						Alternative 2 HOV Lanes - 2020						Alternative 3 Express Lanes - 2020						
		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			
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den
SR-73 to Brookhurst Street	NB	15.6	B	0.58	46.4	F	0.93	38.4	F	1.14	*	F	1.29	34.4	F	1.07	*	F	1.21	34.4	F	1.07	*	F	1.21	22.3	C	0.78	24.6	C	0.86	
	SB	27.8	D	0.81	27.8	D	0.82	42.2	F	1.48	42.2	F	1.18	*	F	1.40	38.3	F	1.13	38.3	F	1.40	38.3	F	1.13	24.6	C	0.86	22.3	C	0.78	
Brookhurst Street to SR-22 East	NB	28.2	D	0.85	30.9	F	1.08	*	F	1.42	*	F	1.53	42.6	F	1.19	*	F	1.27	31.4	F	1.02	35.3	F	1.09	22.3	C	0.78	24.6	C	0.86	
	SB	25.4	D	0.88	36	E	0.99	*	F	1.61	*	F	1.43	*	F	1.34	43	F	1.19	29.4	F	1.15	31.6	F	1.02	24.6	C	0.86	22.7	C	0.80	
SR-22 East to I-605	NB	27.7	D	0.94	32.5	F	1.01	*	F	1.29	*	F	1.16	39	F	1.07	38.7	F	1.07	31.9	D	0.96	31.7	D	0.96	26.2	D	0.92	26.2	D	0.92	
	SB	52.7	D	0.67	52.7	F	1.05	*	F	1.17	44.4	F	1.20	38.3	F	1.08	38.3	F	1.07	38.3	F	1.08	38.3	F	1.07	26.2	D	0.92	26.2	D	0.92	

NB – Northbound; SB – Southbound; HOV – High-Occupancy Vehicle; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; \* - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2020 than in 2009.

Source: Albert Grover & Associates 2011.

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**Table 3.1.6-6: Speed Index Summary – Year 2040 in the Area of Proposed Improvements**

Period	Condition	Lane Type			
		GP	HOV	Express	Average
<b>Northbound I-405</b>					
AM	Existing 2009	46	62	--	50
	No Build – 2040	7	8	--	7
	Alternative 1 – 2040	22	24	--	22
	Alternative 2 – 2040	40	43	--	40
	Alternative 3 – 2040	35	--	65	41
PM	Existing 2009	33	43	--	35
	No Build – 2040	6	7	--	6
	Alternative 1 – 2040	15	15	--	15
	Alternative 2 – 2040	29	31	--	29
	Alternative 3 – 2040	29	--	65	36
<b>Southbound I-405</b>					
AM	Existing 2009	22	50	--	28
	No Build – 2040	5	6	--	5
	Alternative 1 – 2040	9	10	--	9
	Alternative 2 – 2040	16	17	--	16
	Alternative 3 – 2040	18	--	65	28
PM	Existing 2009	54	62	--	56
	No Build – 2040	8	9	--	8
	Alternative 1 – 2040	25	27	--	25
	Alternative 2 – 2040	42	44	--	42
	Alternative 3 – 2040	38	--	65	44
-- Lane type does not exist in the alternative.					

Source: Albert Grover & Associates 2011.

**Table 3.1.6-7: Corridor Travel Time in the Area of Proposed Improvements**

Period	Condition	SR-73 to I-605 Travel Time in Minutes			
		GP	HOV	Express	Average
<b>Northbound I-405</b>					
AM	Existing 2009	18	13	--	17
	No Build – 2040	114	101	--	111
	Alternative 1 – 2040	37	34	--	36
	Alternative 2 – 2040	21	19	--	20
	Alternative 3 – 2040	23	--	13	20
PM	Existing 2009	25	19	--	24
	No Build – 2040	133	121	--	130
	Alternative 1 – 2040	57	54	--	56
	Alternative 2 – 2040	28	27	--	28
	Alternative 3 – 2040	29	--	13	23
<b>Southbound I-405</b>					
AM	Existing 2009	37	17	--	30
	No Build – 2040	163	147	--	160
	Alternative 1 – 2040	89	85	--	88
	Alternative 2 – 2040	52	50	--	51
	Alternative 3 – 2040	45	--	13	30
PM	Existing 2009 – 2040	15	13	--	15
	No Build – 2040	107	95	--	105
	Alternative 1 – 2040	33	30	--	32
	Alternative 2 – 2040	20	19	--	19
	Alternative 3 – 2040	22	--	13	19
-- Lane type does not exist in the alternative.					

Source: Parsons.

Vehicle Hours of Delay. Table 3.1.6-8 presents the daily and annual vehicle hours of delay (VHD) occurring on the freeway on weekdays. VHD is based on the number of additional hours of vehicle travel required within the corridor due to speeds lower than 65 mph on weekdays during peak periods when congestion reduces speeds and increases corridor travel times. Under the existing condition (2009), there are approximately **19,000 daily and 4 million annual VHD** on the freeway.

**Table 3.1.6-8: Vehicle Hours of Delay  
Existing and Years 2020 and 2040 on Weekdays  
in the Area of Proposed Improvements**

Year	Alternative	Daily	Annual
2009	Existing	19,083	4,198,209
2020	No Build	102,984	22,656,558
	Alternative 1	27,435	6,035,662
	Alternative 2	11,824	2,601,251
	Alternative 3	9,958	2,190,791
2040	No Build	413,278	90,921,066
	Alternative 1	146,936	32,326,005
	Alternative 2	65,677	14,449,036
	Alternative 3	57,178	12,579,091

Source: Parsons.

Traffic Accident Data. Traffic accident data for I-405 and interchange ramps for the area of the proposed widening were obtained from Caltrans TASAS Table B for a 3-year period between January 1, 2006, and December 31, 2008. During this 3-year period, there were 2,352 accidents on northbound I-405 and 2,115 accidents on southbound I-405 between Bristol Street PM 9.51 and the Orange/Los Angeles county line PM 24.18, including 1,067 injury accidents and 14 accidents involving fatalities. Actual accident rates in both directions of the entire 14.9 miles of I-405 are lower than the statewide average for similar facilities. The total accident rate was 0.94 accidents per million vehicle miles (mvm) in the northbound direction of I-405 and 0.85 accidents per mvm in the southbound direction, while the statewide average is 1.16 accidents per mvm.

Freeway Connector Volumes. Table 3.1.6-9 provides the existing branch connector volumes on ramps between freeways within the study area in Orange County. Branch connectors are the ramps connecting one freeway to another. The branch connectors at SR-73 have three lanes in each direction. The branch connectors at SR-22 East have three lanes in the eastbound direction and two lanes in the westbound direction. The branch connectors at the SR-22 West (7<sup>th</sup> Street) and I-605 have two lanes in each direction. Branch connectors operate with v/c ratios ranging from **0.53 to 1.17** under existing conditions.

**Arterials, Intersections, and Interchanges**

To establish existing (year 2009) traffic conditions for arterial and interchange study locations in Orange County, AM and PM peak-hour turning movement counts were collected. Additionally,

24-hour daily traffic counts were collected on arterials crossing the freeway in both interchange and non-interchange areas. Existing arterial ADT volumes for arterial interchanges and non-interchange overcrossings are summarized in Table 3.1.6-10.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for existing conditions is provided in Table 3.1.6-1 for all study intersections in Orange County. The study intersections are currently operating at LOS D or better, except for five intersections that are operating at LOS E or F during either the AM or PM peak hour or both.

Table 3.1.6-1 shows that the study intersections are currently operating under capacity (v/c less than 1.00) during peak hours, except for two intersections that are currently operating over-capacity during the PM peak hour.

A comparison of existing vehicle queuing (higher of AM or PM peak-hour 95<sup>th</sup> percentile queues) with available storage (in feet) was conducted at all arterial interchange study intersections and is summarized in Table 3.1.6-11. The table shows that 91 percent of off-ramps with traffic control at their arterial intersections have adequate turning lane storage under existing conditions. Table 3.1.6-11 also shows that 89 percent of arterials have adequate turning lane storage at ramp intersections and 67 percent of turning lanes at arterial/arterial intersections have adequate storage.

Ramp meter queuing at on-ramps was observed in the field. The interchange of I-405/Brookhurst Street is currently congested during the peak hours due to inadequate capacity on the freeway ramps. During the a.m. peak hour, the constrained capacity of the single lane at the ramp meter along the on-ramp from southbound Brookhurst Street to southbound I-405 results in queues of vehicles on Brookhurst Street waiting to get onto I-405. Similarly, eastbound Talbert Avenue to southbound I-405 is also experiencing queues of vehicles waiting to get on I-405, which is negatively affecting the operations at the Brookhurst Street/Talbert Avenue intersection.

The interchange of I-405/Magnolia Street is heavily congested during the a.m. peak hour. The southbound Magnolia Street traffic to southbound I-405 often queues to north of Heil Avenue, primarily due to constrained capacity of the single lane at the ramp meter along the on-ramp. Often the four-lane Magnolia Street bridge overcrossing is reduced to two travel lanes for the north-south traffic as the curb lanes are stacked with vehicles waiting to get onto I-405. In addition, northbound Magnolia Street narrows from three through lanes to two through lanes just south of the I-405 interchange.

Table 3.1.6-9: 2020 Branch Connector Volumes and Volume-to-Capacity Ratios – Locations in Orange County

Branch Connector	Existing 2009				No Build – 2020				Alternative 1 – 2020				Alternative 2 – 2020				Alternative 3 - 2020			
	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	
	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB GP On from NB SR-73	3,030	0.56	3,610	0.67	3,411	0.63	4,598	0.85	3,411	0.63	4,598	0.85	3,411	0.63	4,598	0.85	2,311	0.64	3,198	0.89
NB Express On from NB SR-73	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		1,100	0.73	1,400	0.93
NB On from WB SR-22	5,260	1.17	4,400	0.98	5,236	1.16	4,601	1.02	5,236	1.16	4,601	1.02	5,236	1.16	4,601	1.02	6,064	1.35	5,706	1.27
NB HOV/Express* On from WB SR-22	N/A		N/A		1,528	1.02	1,805	1.20	1,528	1.02	1,805	1.20	1,528	1.02	1,805	1.20	700	0.47	700	0.47
NB Off to WB SR-22	2,250	0.63	2,000	0.56	2,665	0.74	2,937	0.82	2,665	0.74	2,937	0.82	2,665	0.74	2,937	0.82	2,665	0.74	2,937	0.82
NB Off to NB I-605	3050	0.85	3,750	1.04	2,933	0.81	4,122	1.15	2,933	0.81	4,122	1.15	2,933	0.81	4,122	1.15	2,729	0.76	4,333	1.20
NB HOV/Express* Off to NB I-605	N/A		N/A		1,296	0.86	1,711	1.14	1,296	0.86	1,711	1.14	1,296	0.86	1,711	1.14	1,500	1.00	1,500	1.00
SB GP On from SB I-605	3,776	1.05	3,632	1.01	4,227	1.17	3,549	0.99	4,227	1.17	3,549	0.99	4,227	1.17	3,549	0.99	3,890	1.08	3,030	0.84
SB HOV/Express* On from SB I-605	N/A		N/A		1,163	0.78	981	0.65	1,163	0.78	981	0.65	1,163	0.78	981	0.65	1,500	1.00	1,500	1.00
SB On from EB SR-22	2,067	0.57	2,868	0.80	2,682	0.75	3,017	0.84	2,682	0.75	3,017	0.84	2,682	0.75	3,017	0.84	2,682	0.75	3,017	0.84
SB Off to EB SR-22	5,313	0.98	5,647	1.05	4,615	0.85	4,600	0.85	4,582	0.85	4,555	0.84	4,582	0.85	4,555	0.84	5,221	0.97	5,494	1.02
SB HOV/Express* Off to EB SR-22	N/A		N/A		1,339	0.89	1,639	1.09	1,339	0.89	1,639	1.09	1,339	0.89	1,639	1.09	700	0.47	700	0.47
SB GP Off to SB SR-73	3,315	0.61	2,857	0.53	4,767	0.88	3,616	0.67	4,767	0.88	3,616	0.67	4,767	0.88	3,616	0.67	3,367	0.94	2,416	0.67
SB Express Off to SB SR-73	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		1,400	0.93	1,200	0.80

HOV – High-Occupancy Vehicle; LOS – Level of Service; V/C – Volume-to-Capacity Ratio based on branch connector capacity of 1,800 per lane for GP branch connector lanes and 1,500 per lane for Express Lane direct connectors, which have a single lane in each direction. N/A – Connector does not exist under the alternative.

\*For the no-build condition and Alternatives 1 and 2, the connector in this row is managed as an HOV facility. For Alternative 3, the connector in this row is managed as an Express Facility.

Source: Albert Grover & Associates 2011.

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**Table 3.1.6-10: Existing (2009)  
Arterial and Freeway Crossings Average Daily Traffic Volumes  
in the Area of Proposed Improvements**

Arterial	Segment Limits	2009 ADT
<b>Bristol Street Interchange at I-405</b>		
Bristol Street	Anton Boulevard to I-405 northbound off-ramp	60,420
	I-405 northbound off-ramp to I-405 southbound ramps	54,910
	I-405 southbound ramps - Paularino Avenue	34,160
<b>Fairview Road Interchange at I-405</b>		
Fairview Road	MacArthur Boulevard to South Coast Drive	40,480
	South Coast Drive to I-405 southbound ramps	51,780
	I-405 southbound ramps to Baker Street	46,660
	Harbor Boulevard and Hyland Avenue interchange at I-405	9,990
<b>South Coast Drive I-405 Northbound On-Ramp to Harbor Boulevard</b>		
South Coast Drive	South Coast Drive to I-405 northbound ramps	56,550
Harbor Boulevard	I-405 northbound ramps to I-405 southbound ramps	44,470
	I-405 southbound ramps to Gisler Avenue	69,580
<b>Euclid Street/Ellis Avenue Interchange at I-405</b>		
Euclid Street/ Ellis Avenue	Talbert Avenue to I-405 northbound ramps/Newhope Street	20,630
	I-405 northbound ramps/Newhope Street to I-405 southbound ramps	28,960
	I-405 southbound ramps to Ward Street	29,140
<b>Brookhurst Street and Talbert Avenue Interchange at I-405</b>		
Brookhurst Street	Slater Avenue to I-405 northbound ramps	52,140
	I-405 northbound ramps to I-405 southbound ramps	55,100
	I-405 southbound ramps to Talbert Avenue	51,760
Talbert Avenue	Bushard Street to Brookhurst Street	27,140
	Brookhurst Street to Ward Street	19,870
<b>Magnolia Street and Warner Avenue Interchange at I-405</b>		
Magnolia Street	Heil Avenue to I-405 northbound on-ramp	37,740
	I-405 northbound on-ramp to I-405 southbound ramps	34,450
	I-405 southbound ramps to Warner Avenue	33,950
Warner Avenue	Magnolia Street to I-405 southbound ramps	44,170
	I-405 southbound ramps to I-405 northbound ramps	38,570
	I-405 northbound ramps to Bushard Street	35,880
<b>Beach Boulevard and Edinger Avenue Interchange at I-405</b>		
Beach Boulevard	McFadden Avenue to I-405 northbound ramps	66,330
	I-405 northbound ramps to I-405 southbound ramps	75,100
	I-405 southbound ramps to Edinger Avenue	73,240
Edinger Avenue	Beach Boulevard to I-405 southbound on-ramp	31,120
	I-405 southbound on-ramp to Newland Street	20,370

**Table 3.1.6-10: Existing (2009)  
Arterial and Freeway Crossings Average Daily Traffic Volumes  
in the Area of Proposed Improvements**

Arterial	Segment Limits	2009 ADT
<b>Goldenwest Street and Bolsa Avenue Interchange at I-405</b>		
Goldenwest Street	Sowell Avenue to I-405 northbound on-ramp	28,130
	I-405 northbound on-ramp to I-405 southbound ramps	40,570
Bolsa Avenue	Goldenwest Street to I-405 southbound ramps	41,670
	I-405 northbound ramps to Hoover Street	21,130
<b>Springdale Street and Westminster Avenue Interchange at I-405</b>		
Springdale Street	Meinhardt Road/Navajo Road to I-405 southbound off-ramp	18,980
	I-405 southbound off-ramp to Westminster Avenue	25,310
Westminster Avenue	Springdale Street to I-405 southbound ramps	41,180
	I-405 northbound ramps to Edwards Street	30,400
<b>Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange at I-405</b>		
Garden Grove Boulevard	Valley View Street to I-405 northbound off-ramp/SR-22 eastbound ramps	32,310
Valley View Street	Cerulean Avenue to SR-22 westbound & I-405 northbound ramps	55,610
	SR-22 westbound and I-405 northbound ramps to Garden Grove Boulevard	64,140
Bolsa Chica Road	Garden Grove Boulevard to I-405 southbound ramps	49,950
	I-405 southbound ramps to Old Bolsa Chica Road	47,810
<b>Seal Beach Boulevard Interchange at I-405</b>		
Seal Beach Boulevard	Lampson Avenue to I-405 northbound ramps	46,970
	I-405 northbound ramps to I-405 southbound ramps	44,500
	I-405 southbound ramps to Westminster Avenue	31,950
<b>Bear Street Interchange at SR-73</b>		
Bear Street	Yukon Avenue/Paularino Avenue to SR-73 northbound ramps	15,700
	SR-73 northbound ramps to SR-73 southbound ramps	21,810
	SR-73 southbound ramps to Baker Street	28,650
<b>Katella Avenue Interchange at I-605</b>		
Katella Avenue	West of I-605 southbound off-ramps to I-605 southbound ramps	20,330
	I-605 southbound ramps to I-605 northbound ramps	40,090
	I-605 northbound ramps to Los Alamitos Boulevard	59,070
<b>Freeway Crossings</b>		
Ward Street		9,680
Slater Avenue		16,220
Bushard Street		13,980
Newland Street		16,170
McFadden Avenue		16,720
Edwards Street		16,680

Source: Albert Grover & Associates, 2011.

**Table 3.1.6-11: Number of Locations with Adequate Vehicle Storage<sup>1</sup> in 2009 and 2040 – Locations in Orange County**

Location	2009 Existing			2040 No Build			2040 Build including Mitigations		
	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage
Off-Ramp at Arterials	30	33	91	26	33	79	41	41	100 <sup>2</sup>
Arterials at Ramps	40	45	89	33	45	73	44	51	86
Arterial/Arterial Intersections	47	70	67	35	70	50	56	70	80
On-Ramps at Ramp Meters	N/A	N/A	N/A	27	37	73	36	38	95 <sup>3</sup>

<sup>1</sup> Storage is considered adequate if it will contain the 95<sup>th</sup> percentile queue.

<sup>2</sup> Under the build condition with mitigations, there are no locations where off-ramp queues are expected to back onto the freeway mainline.

<sup>3</sup> Under the build condition with mitigations, there are two on-ramps forecast to have 95<sup>th</sup> percentile queues that exceed the available storage. Both occur under the no-build condition, so neither is caused by the proposed project. Both are outside the limits of interchange improvements where the only proposed improvements are signing and striping of the freeway transition areas associated with the Express Lanes in Alternative 3.

Source: Albert Grover & Associates, 2011.

The interchange of I-405/Beach Boulevard is currently congested during the peak hours due to inadequate capacity on the freeway ramps. During the p.m. peak hour, the constrained capacity of the single lane at the ramp meter along the on-ramp from northbound Beach Boulevard to northbound I-405 results in queues of vehicles on Beach Boulevard waiting to get onto I-405. Similarly, eastbound Edinger Avenue to southbound I-405 also has long queues of vehicles waiting to get on I-405 during the a.m. peak hour, which negatively affects the operations at the Beach Boulevard/Edinger Avenue intersection.

### **Pedestrian and Bicycle Facilities**

Under existing conditions, there are continuous pedestrian sidewalks and crosswalks along at least one side of most arterials within the limits of the proposed freeway widening and a pedestrian overcrossing at Heil Avenue. Continuous pedestrian facilities (i.e. pedestrian sidewalk and crosswalks) do not currently exist on arterials within the limits of the proposed freeway widening at the following locations:

West side of Harbor Boulevard;  
East side of Euclid Street;  
East side of Ward Street;  
North side of Talbert Avenue;  
West side of Brookhurst Street;  
North side of Warner Avenue;  
East side of Magnolia Street;  
East side of Newland Street;  
Both sides of Edinger Avenue;  
South side of McFadden Avenue;  
North side of Bolsa Avenue;  
West side of Goldenwest Street;  
West side of Edwards Street;  
North side of Westminster Avenue;  
West side of Springdale Street;  
Both sides of Bolsa Chica Road; and  
Both sides of Seal Beach Boulevard.

Within the proposed limits of freeway widening, there are two existing Class 1 bikeways, one along the east bank of the Santa Ana River that crosses the freeway beneath the I-405 Santa Ana

River Bridge and the other along the San Gabriel River. Class 1 bikeways are facilities that are devoted to the exclusive use of bikes and do not share their roadway with motor vehicles.

There are six Class 2 bikeways within the proposed limits of freeway widening at the following locations:

Fairview Road;  
Ward Street;  
Slater Avenue;  
Bushard Street;  
Edwards Street; and  
Seal Beach Boulevard.

Class 2 bikeways share roadways with motorized vehicles, are generally located on roadway shoulders, and are designated by signage and striped bike lanes in areas where bicyclists are directed to avoid shoulders. Class 3 bikeways share travel lanes with motor vehicles and/or pedestrians.

### ***Los Angeles County***

#### **Traffic Study Area**

The traffic study area within Los Angeles County includes:

I-405 from I-605 to Lakewood Boulevard;  
I-605 from Katella Avenue to Carson Street; and  
SR-22/7<sup>th</sup> Street from I-405 to Park Avenue.

The study area in Los Angeles County includes all of the interchanges along I-405 and I-605 within the limits noted above, including arterial/ramp intersections and arterial/arterial intersections in the immediate vicinity of the interchanges. Figure 3.1.6-5 shows the traffic study area within Los Angeles County.

Within the traffic study area in Los Angeles County, 12 freeway segments have been analyzed. These are shown in Figure 3.1.6-5 and include:

1. I-405 between Lakewood Boulevard/Willow Street and Temple Avenue
2. I-405 between Bellflower Boulevard and Lakewood Boulevard/Willow Street
3. I-405 between Woodruff Avenue and Bellflower Boulevard

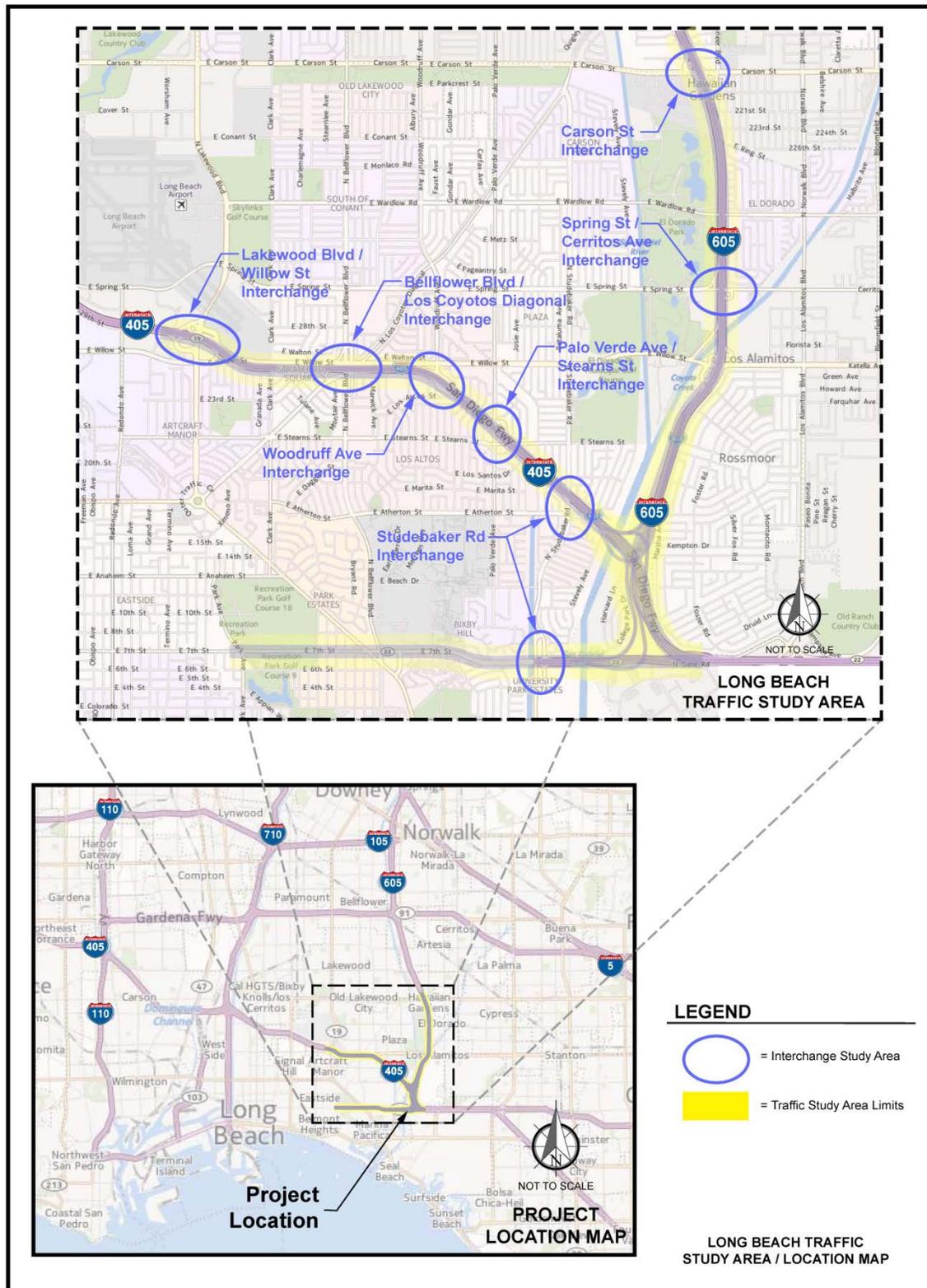


Figure 3.1.6-5: Study Area within Los Angeles County

4. I-405 between Palo Verde Avenue/Stearns Street and Woodruff Avenue
5. I-405 between Studebaker Road and Palo Verde Avenue/Stearns Street
6. I-405 between I-605 and Studebaker Road
7. I-405 between SR-22/7<sup>th</sup> Street and I-605
8. I-605 between Spring Street/Cerritos Avenue and Carson Street
9. I-605 between Willow Street/Katella Avenue and Spring Street/Cerritos Avenue
10. I-605 between I-405/I-605 and Willow Street/Katella Avenue
11. SR-22/7<sup>th</sup> Street between Pepper Tree Lane and Studebaker Road
12. SR-22/7<sup>th</sup> Street between Studebaker Road and I-405/I-605

To simplify the comparison of future conditions and alternatives, the freeways in Los Angeles County were divided into four segments (referred to as “study segments” hereafter): I-405 from Studebaker Road to I-605, I-405 from Studebaker Road to Lakewood Boulevard, I-605 from I-405 to Carson Street, and SR-22/7<sup>th</sup> Street from Studebaker Road to I-405/I-605 Interchange. This segmentation is generally based on the similarity of lane cross section by segment.

Within the traffic study area in Los Angeles County, the following local interchanges have been analyzed:

1. Carson Street Interchange at I-605
2. Spring Street/Cerritos Avenue Interchange at I-605
3. Lakewood Boulevard and Willow Street Interchange at I-405
4. Bellflower Boulevard and Los Coyotes Diagonal Interchange at I-405
5. Woodruff Avenue Interchange at I-405
6. Palo Verde Avenue and Stearns Street Interchange at I-405
7. Studebaker Road Interchange at I-405
8. Studebaker Road Interchange at SR-22/7<sup>th</sup> Street
9. 7<sup>th</sup> Street between Park Avenue and East Campus Drive (includes Pacific Coast Highway at Bellflower Boulevard)

A list of study intersections, grouped by freeway interchange area, is shown in Table 3.1.6-12. Intersections identified for evaluation include those controlled with traffic signals, as well as stop-controlled or uncontrolled intersections within the study area in Los Angeles County.

### **Existing (Year 2009) Lane Configuration**

Existing (year 2009) traffic control and lane geometrics for the freeway mainline and intersections within the study area in Los Angeles County are illustrated in Figures 3.1.6-6 and 3.1.6-7, respectively.

I-405 Mainline. Within the study area in Los Angeles County, I-405 is a controlled-access freeway oriented in a northwest-southeast direction with four GP lanes in each direction. There is one HOV lane in each direction. The HOV lanes are generally separated from the GP lanes with a striped buffer (1 to 4 ft wide).

I-605 Mainline. Within the study area in Los Angeles County, I-605 is a controlled-access freeway oriented in a northeast-southwest direction with four GP lanes in each direction. There is one HOV lane in the northbound direction. The HOV lane is generally separated from the GP lanes with a striped buffer (1 to 4 ft wide).

SR-22/7<sup>th</sup> Street Mainline. SR-22/7<sup>th</sup> Street consists of two GP lanes in each direction from Studebaker Road to the I-405/I-605 interchange and is oriented in an east-west direction. There are three GP lanes in each direction west of Studebaker Road.

Carson Street Interchange at I-605. The I-605/Carson Street interchange is a partial cloverleaf interchange with two loop on-ramps in the northwest and southeast quadrants. The intersections of Carson Street/I-605 northbound off-ramp, Carson Street/I-605 southbound off-ramp, and Carson Street/Pioneer Boulevard are currently signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the two signalized ramp intersections, Carson Street consists of three to four lanes in each direction.

Spring Street/Cerritos Avenue Interchange at I-605. The I-605/Spring Street/Cerritos Avenue interchange is a partial interchange with a northbound loop on-ramp in the southeast quadrant and a southbound tangent off-ramp in the northwest quadrant. The I-605 northbound and southbound ramp intersections with Spring Street/Cerritos Avenue are currently signalized. Between the two ramp intersections, Spring Street/Cerritos Avenue consists of two to three lanes in each direction.

Lakewood Boulevard/Willow Street Interchange at I-405. The I-405/Lakewood Boulevard/Willow Street interchange is a cloverleaf interchange with a tangent on-ramp located on Willow Street. The intersection of Lakewood Boulevard/Willow Street is signalized. All other ramp/arterial intersections are not signalized and provide continuous right turns. Between the ramp intersections along Lakewood Boulevard, Lakewood Boulevard is an eight-lane roadway.

Table 3.1.6-12: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 1 Adverse Effect	Year 2040						No Build-Alternative 1 Adverse Effect												
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 1 Traffic on No Build Geometry			No Build Traffic on No Build Geometry				Alternative 1 Traffic on No Build Geometry																		
					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	AM Peak Hour		PM Peak Hour													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS						
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.56	18.7	B	0.67	20.1	C	N	0.62	22.4	C	0.73	24.5	C	0.61	18.8	B	0.73	20.8	C	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.38	--	--	N	0.24	--	--	0.36	--	--	0.26	--	--	0.41	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.35	--	--	0.36	--	--	N	0.35	--	--	0.36	--	--	0.38	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.59	20.3	C	0.76	16.6	B	N	0.63	23.6	C	0.82	23.2	C	0.63	21.8	C	0.82	18.4	B	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.30	--	--	0.35	--	--	N	0.33	--	--	0.37	--	--	0.33	--	--	0.37	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	N	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--
4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.79	30.7	C	0.87	31.6	C	N	0.86	35.1	D	0.92	43.9	D	0.87	34.7	C	0.90	41.4	D	N	
Spring Street/Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.0	B	0.64	10.3	B	N	0.74	15.4	B	0.71	12.0	B	0.73	15.2	B	0.70	11.4	B	N
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.73	9.3	A	0.78	8.1	A	N	0.82	11.6	B	0.86	9.8	A	0.79	10.3	B	0.85	9.5	A	N
Lakewood Boulevard/Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.43	--	--	0.41	--	--	N	0.41	--	--	0.41	--	--	0.47	--	--	0.44	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.22	--	--	N	0.41	--	--	0.25	--	--	0.41	--	--	0.24	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.26	--	--	0.22	--	--	N	0.25	--	--	0.23	--	--	0.28	--	--	0.24	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.53	--	--	0.41	--	--	N	0.57	--	--	0.44	--	--	0.57	--	--	0.44	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.25	--	--	N	0.24	--	--	0.27	--	--	0.25	--	--	0.27	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.41	--	--	0.46	--	--	N	0.46	--	--	0.52	--	--	0.44	--	--	0.50	--	--	--
9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	<b>0.92</b>	<b>66.2</b>	<b>E</b>	0.75	31.2	C	0.89	43.0	D	0.74	28.9	C	0.96	46.5	D	N	0.81	33.6	C	0.93	48.4	D	0.79	33.1	C	0.93	48.7	D	N	
	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	N	0.37	--	--	0.50	--	--	0.36	--	--	0.48	--	--	--	
	Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.28	--	--	0.41	--	--	N	0.31	--	--	0.44	--	--	0.31	--	--	0.44	--	--	--	
Bellflower Boulevard/Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.51	10.4	B	0.53	10.9	B	N	0.55	11.6	B	0.58	11.3	B	0.55	11.3	B	0.58	11.3	B	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.37	--	--	N	0.57	--	--	0.40	--	--	0.55	--	--	0.40	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.29	--	--	0.19	--	--	N	0.33	--	--	0.20	--	--	0.32	--	--	0.20	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	<b>0.84</b>	<b>81.2</b>	<b>F</b>	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	1.00	50.1	D	1.00	51.2	D	N	<b>1.09</b>	<b>67.3</b>	<b>E</b>	<b>1.09</b>	<b>70.6</b>	<b>E</b>	<b>1.09</b>	<b>68.2</b>	<b>E</b>	<b>1.10</b>	<b>68.1</b>	<b>E</b>	N
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	<b>0.97</b>	<b>72.8</b>	<b>E</b>	0.65	26.4	C	1.00	42.1	D	0.64	27.5	C	1.06	44.6	D	N	0.70	26.9	C	<b>1.13</b>	<b>56.8</b>	<b>E</b>	0.70	28.1	C	<b>1.15</b>	<b>59.4</b>	<b>E</b>	Y
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.12	--	--	N	0.07	--	--	0.13	--	--	0.08	--	--	0.13	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.29	--	--	N	0.13	--	--	0.34	--	--	0.13	--	--	0.32	--	--	--
15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.3	B	0.47	14.0	B	N	0.56	10.6	B	0.51	16.8	B	0.56	10.8	B	0.51	14.7	B	N	
	Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.25	--	--	0.17	--	--	N	0.18	--	--	0.18	--	--	0.27	--	--	0.18	--	--	--	
16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	<b>0.74</b>	<b>102.8</b>	<b>F</b>	0.78	44.4	D	1.02	35.1	D	0.77	31.7	C	1.04	36.7	D	N	0.87	48.8	D	1.18	45.4	D	0.86	36.4	D	1.20	50.4	D	N	
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	<b>1.07</b>	<b>86.8</b>	<b>F</b>	0.77	30.4	C	<b>1.33</b>	<b>147.9</b>	<b>F</b>	0.87	40.4	D	<b>1.32</b>	<b>146.2</b>	<b>F</b>	0.88	40.9	D	N	<b>1.44</b>	<b>180.5</b>	<b>F</b>	0.94	51.5	D	<b>1.43</b>	<b>179.2</b>	<b>F</b>	0.94	53.1	D	N
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.39	--	--	0.20	--	--	N	0.42	--	--	0.20	--	--	0.43	--	--	0.22	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.21	--	--	N	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.45	--	--	N	0.56	--	--	0.51	--	--	0.55	--	--	0.49	--	--	--
I-405 SB Direct On-Ramp		Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.23	--	--	N	0.45	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--	
Palo Verde Avenue/Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.78	17.0	B	0.63	12.0	B	N	0.95	21.2	C	0.70	12.6	B	0.96	20.6	C	0.73	13.1	B	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.15	--	--	0.20	--	--	N	0.14	--	--	0.23	--	--	0.17	--	--	0.21	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	<b>0.87</b>	<b>86.6</b>	<b>F</b>	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	12.9	B	0.68	10.2	B	N	0.91	15.9	B	0.72	11.3	B	0.91	15.4	B	0.74	11.2	B	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.86	18.5	B	0.85	21.0	C	N	0.94	22.0	C	0.92	24.4	C	0.94	21.7	C	0.93	25.1	C	N
23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.33	--	--	0.44	--	--	N	0.33	--	--	0.50	--	--	0.35	--	--	0.48	--	--	--	

**Table 3.1.6-12: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 1 – Locations in Los Angeles County**

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009															No Build-Alternative 1 Adverse Effect	Year 2020															No Build-Alternative 1 Adverse Effect
					Existing Traffic					No Build Traffic on No Build Geometry					Alternative 1 Traffic on No Build Geometry						No Build Traffic on No Build Geometry					Alternative 1 Traffic on No Build Geometry										
					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							
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.51	1.2	A	0.50	3.1	A	N	0.55	2.8	A	0.51	4.9	A	0.55	1.4	A	0.54	3.2	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop Sig*	0.15	13.8	B	0.04	10.8	B	<b>0.86</b>	<b>68.4</b>	<b>F</b>	0.34	16.2	C	<b>1.03</b>	<b>113.3</b>	<b>F</b>	0.51	24.8	C	N	<b>1.02</b>	<b>98.3</b>	<b>F</b>	0.33	15.7	C	<b>1.24</b>	<b>170.6</b>	<b>F</b>	0.53	25.2	D	N
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.54	10.3	B	0.79	14.8	B	N	0.60	10.7	B	0.85	15.7	B	0.58	11.1	B	0.86	16.9	B	N
Studebaker Road at SR-22/7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.53	13.0	B	0.76	27.3	C	N	0.50	13.1	B	0.86	30.4	C	0.52	13.5	B	0.82	29.1	C	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	28.9	C	0.96	28.6	C	N	0.99	30.4	C	1.03	37.1	D	1.05	43.5	D	1.06	40.4	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop Sig*	0.39	18.8	C	<b>0.65</b>	<b>59.9</b>	<b>F</b>	0.43	21.3	C	<b>0.61</b>	<b>88.7</b>	<b>F</b>	0.51	24.3	C	<b>0.73</b>	<b>104.8</b>	<b>F</b>	Y	0.51	25.3	D	<b>0.84</b>	<b>152.1</b>	<b>F</b>	0.61	30.2	D	<b>1.00</b>	<b>184.2</b>	<b>F</b>	Y
7th Street	30	7th Street	Pacific Coast Highway	Sig	<b>0.95</b>	<b>92.9</b>	<b>F</b>	<b>1.03</b>	<b>82.6</b>	<b>F</b>	0.94	49.2	D	0.95	35.9	D	0.96	53.2	D	0.96	37.4	D	N	<b>1.02</b>	<b>65.8</b>	<b>E</b>	<b>1.03</b>	<b>58.7</b>	<b>E</b>	<b>1.04</b>	<b>71.5</b>	<b>E</b>	<b>1.04</b>	<b>62.4</b>	<b>E</b>	Y
	31	7th Street	Bellflower Boulevard	Sig	<b>1.01</b>	<b>73.6</b>	<b>E</b>	<b>0.91</b>	<b>90.3</b>	<b>F</b>	<b>1.04</b>	<b>68.9</b>	<b>E</b>	0.98	47.9	D	<b>1.06</b>	<b>71.4</b>	<b>E</b>	0.96	42.8	D	Y	<b>1.13</b>	<b>82.4</b>	<b>F</b>	<b>1.06</b>	<b>63.0</b>	<b>E</b>	<b>1.14</b>	<b>84.9</b>	<b>F</b>	<b>1.04</b>	<b>57.2</b>	<b>E</b>	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.50	36.6	D	0.69	19.5	B	N	0.57	39.1	D	0.82	32.1	C	0.54	36.9	D	0.81	32.0	C	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.74	23.2	C	0.95	25.6	C	N	0.77	25.7	C	1.02	50.8	D	0.80	24.3	C	<b>1.03</b>	<b>55.3</b>	<b>E</b>	N
	34	7th Street	W. Campus Drive	Sig	<b>0.83</b>	<b>112.9</b>	<b>F</b>	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.79	33.2	C	0.82	35.6	D	N	0.85	53.1	D	<b>0.87</b>	<b>58.5</b>	<b>E</b>	<b>0.86</b>	<b>55.3</b>	<b>E</b>	<b>0.89</b>	<b>64.3</b>	<b>E</b>	Y
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.03	38.0	D	0.88	14.9	B	N	<b>1.12</b>	<b>55.8</b>	<b>E</b>	0.96	16.7	B	<b>1.13</b>	<b>58.6</b>	<b>E</b>	0.97	17.2	B	N
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.76	14.4	B	0.83	20	B	N	0.82	17.1	B	0.86	23.7	C	0.82	16.4	B	0.87	24.8	C	N

- Notes:
1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
  2. \* = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
  3. Bold indicates an intersection forecast to operate at LOS E or F.
  4. Shaded cells indicate an adverse effect.
  5. -- = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
  7. For future conditions, the D/C ratio is used instead of the V/C ratio.

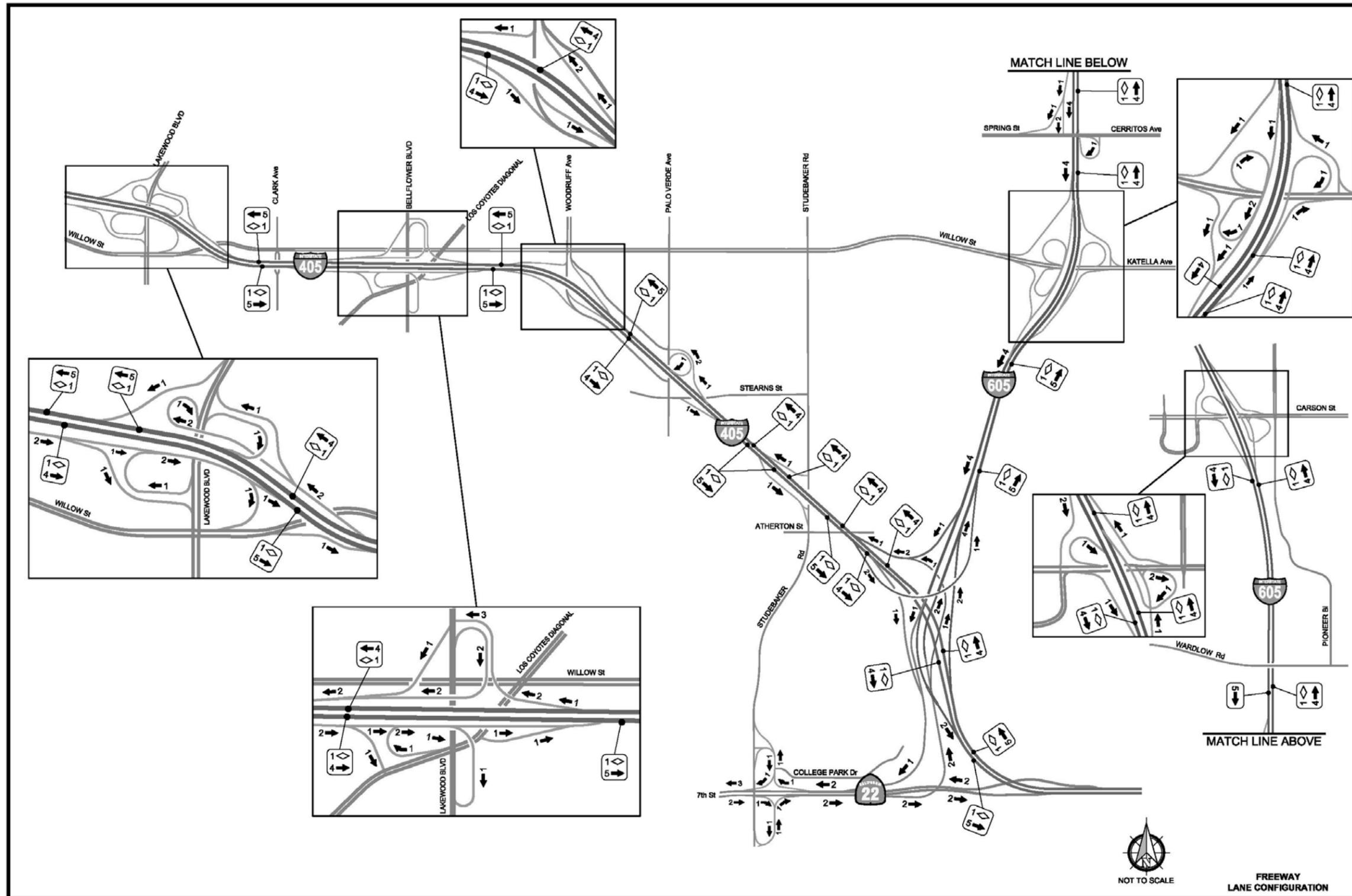


Figure 3.1.6-6: Study Area Freeway Lane Configuration – Locations in Los Angeles County

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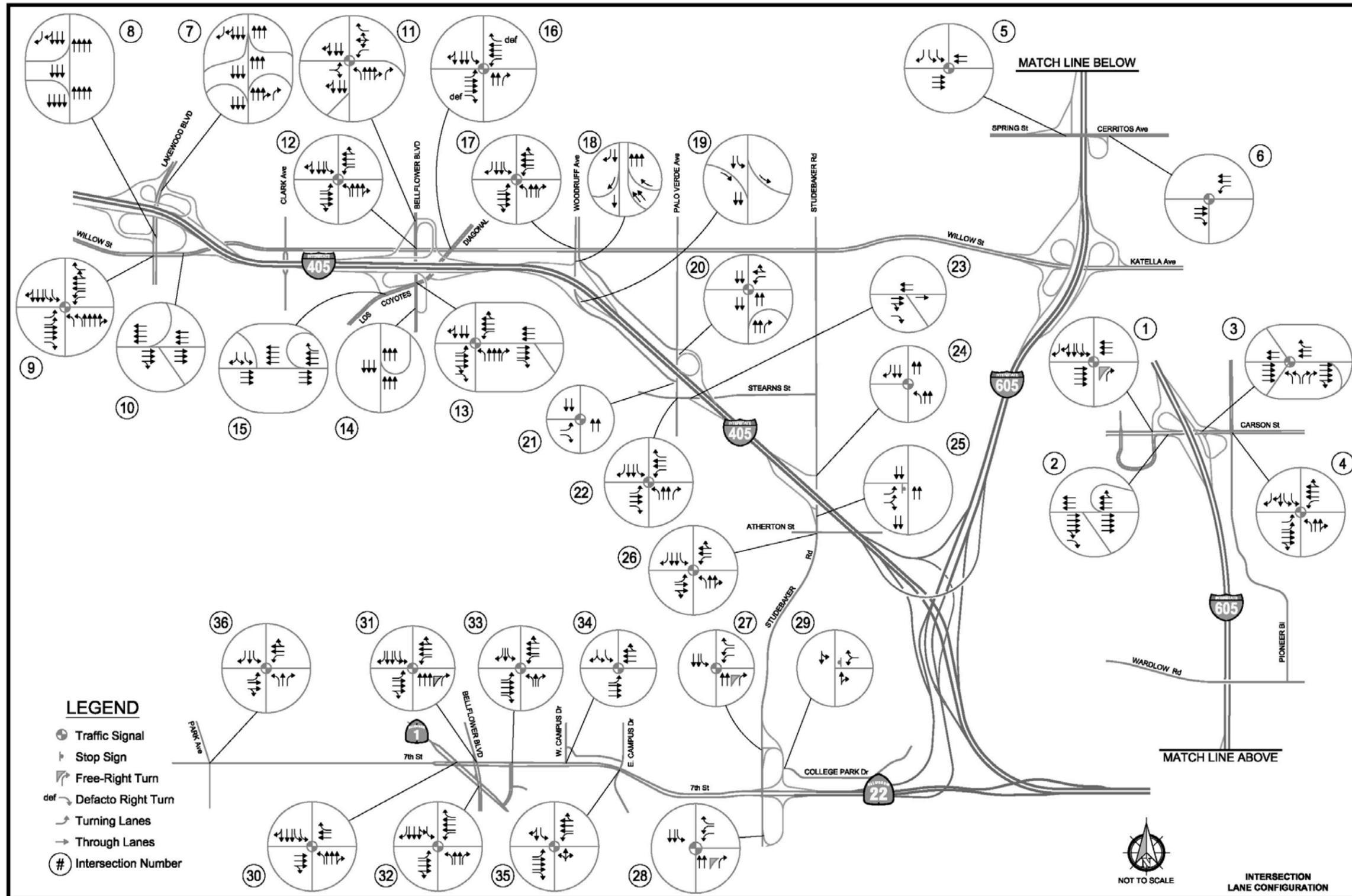


Figure 3.1.6-7: Study Area Intersection Lane Configuration – Locations in Los Angeles County

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Bellflower Boulevard/Los Coyotes Diagonal Interchange at I-405. The I-405/Bellflower Boulevard/Los Coyotes Diagonal interchange is currently a partial cloverleaf interchange with ramps located on Bellflower Boulevard and Los Coyotes Diagonal. The intersections of Bellflower Boulevard/I-405 northbound ramps, Bellflower Boulevard/Willow Street, Bellflower Boulevard/Los Coyotes Diagonal, Los Coyotes Diagonal/I-405 southbound off-ramp, and Los Coyotes Diagonal/Willow Street are currently signalized intersections. All other ramp/arterial intersections are not signalized and provide continuous right turns. Bellflower Boulevard, Willow Street, and Los Coyotes Diagonal within the interchange are six-lane roadways.

Woodruff Avenue Interchange at I-405. The I-405/Woodruff Avenue interchange is a diamond interchange. None of the ramp intersections are signalized. The intersection of Woodruff Avenue and Willow Street is signalized. Woodruff Avenue within the interchange consists of one lane in each direction.

Palo Verde Avenue/Stearns Street Interchange at I-405. The I-405/Palo Verde Avenue/Stearns Street interchange is a partial interchange with two tangent off-ramps, a northbound loop on-ramp, and a tangent on-ramp located on Stearns Street. The I-405 northbound ramp at Palo Verde Avenue, I-405 southbound ramp at Palo Verde Avenue, and Stearns Street at Palo Verde Avenue are currently signalized. In between the two ramp intersections with Palo Verde Avenue, Palo Verde Avenue is a four-lane roadway.

Studebaker Road Interchange at I-405. The I-405/Studebaker Road interchange is a partial interchange with one northbound tangent on-ramp and one southbound tangent ramp. The intersections of I-405 northbound on-ramp/Studebaker Road and Atherton Street/Studebaker Road are currently signalized. The I-405 southbound off-ramp/Studebaker Road intersection is currently stop sign controlled for ramp traffic. All other ramp/arterial intersections are not signalized and provide continuous right turns. In between the two ramp intersections with Studebaker Road, Studebaker Road is a four-lane roadway.

Studebaker Road Interchange at SR-22/7<sup>th</sup> Street. The SR-22/7<sup>th</sup> Street interchange at Studebaker Road consists of two tangent ramps and two loop ramps. The ramp intersections of Studebaker Road/SR-22/7<sup>th</sup> Street westbound and eastbound ramps are currently signalized. In between the two ramp intersections with Studebaker Road, Studebaker Road is a four-lane roadway.

7<sup>th</sup> Street between Pacific Coast Highway and East Campus Drive. 7<sup>th</sup> Street between Pacific Coast Highway and East Campus Drive is currently a six-lane roadway. Pacific Coast Highway, Bellflower Boulevard, Channel Drive, West Campus Drive, and East Campus Drive at their

intersections with 7<sup>th</sup> Street are currently signalized intersections. The intersection of Pacific Coast Highway and Bellflower Boulevard is also currently signalized.

### Existing (Year 2009) Traffic Conditions

Existing traffic data for the traffic study area in Los Angeles County are for the year 2009. Traffic data and the results of operational analysis are presented below for the existing (2009) condition for both the freeway mainline and the interchange areas.

#### Freeway Mainline

Existing (year 2009) traffic volumes for the mainline freeway were obtained from Caltrans PeMS data and Caltrans-published traffic volumes data available on the Caltrans Web site (<http://traffic-counts.dot.ca.gov>). Existing (year 2009) AM and PM peak-hour traffic volumes for the I-405 mainline and all interchange ramps within the study area in Los Angeles County are illustrated in Figure 3.1.6-8.

V/C Ratio and LOS. Table 3.1.6-13 presents the LOS and v/c ratios for peak hours of the existing year (2009) in the GP lanes of the freeway mainline. Under existing conditions, the I-405 mainline between I-605 and Lakewood Boulevard operates at LOS E and F in the AM peak hour in the northbound direction and LOS D and E in the southbound direction. In the PM peak hour, the I-405 freeway mainline is LOS D and E in the northbound direction and LOS D and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.85 to 0.98** and **0.81 to 0.90** during the PM peak hour.

The I-605 mainline operates at LOS C in the AM peak hour in the northbound direction and LOS E in the southbound direction under existing conditions. In the PM peak hour, the I-605 freeway mainline is LOS E in both directions. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.81** in the northbound direction and **1.09** in the southbound direction. During the PM peak hour, the v/c ratios are **0.97** in the northbound direction and **1.00** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline operates at LOS D in the AM peak hour in the eastbound and westbound directions under existing conditions. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is LOS E in the eastbound direction and LOS C in the westbound direction. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **0.86** in the eastbound direction and **1.00** in the westbound direction. During the PM peak hour, the v/c ratios are **1.05** in the eastbound direction and **0.71** in the westbound direction.

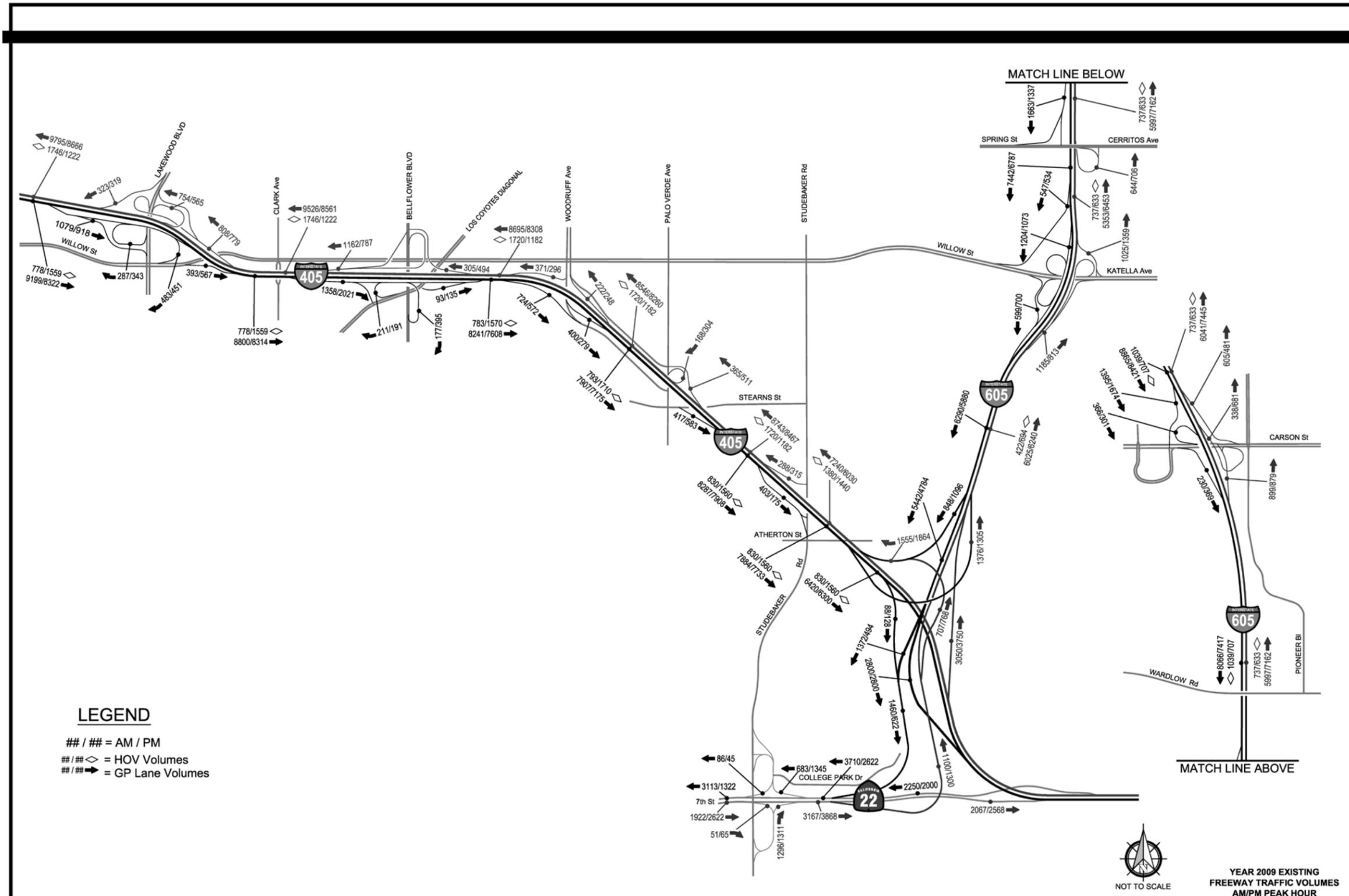


Figure 3.1.6-8: Existing (2009) Freeway Traffic Volumes for AM/PM Peak Hour – Locations in Los Angeles County

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Table 3.1.6-13: Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2020 – Locations in Los Angeles County

Segment	Direction	Existing 2009						No Build – 2020*						Alternative 1 – 2020*						Alternative 2 – 2020*						Alternative 3 – 2020*					
		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		
		V/C	Den	LOS	V/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS
I-405 Mainline I-605 to Studebaker Road	NB	0.98	38.2	E	0.81	26.9	D	1.16	**	F	1.29	**	F	1.19	**	F	1.40	**	F	1.20	**	F	1.37	**	F	1.23	**	F	1.42	**	F
	SB	0.85	26.6	D	0.84	31.9	D	0.92	29.7	D	0.98	38.5	E	0.94	30.7	D	0.98	38.5	E	0.94	30.7	D	0.99	38.9	E	0.97	32.2	D	1.02	41.1	E
I-405 Mainline Studebaker Road to Lakewood Boulevard	NB***	0.94	52.4	F	0.90	38.1	E	0.90	51.5	F	1.02	45.2	F	0.92	52.6	F	1.10	49.7	F	0.92	52.4	F	1.07	47.8	F	0.95	55.0	F	1.11	50.3	F
	SB***	0.95	42.0	E	0.90	61.6	F	1.00	45.2	F	1.05	71.1	F	1.01	45.3	F	1.08	75.7	F	1.01	45.4	F	1.04	70.9	F	1.03	46.4	F	1.08	73.4	F
I-605 Mainline I-405 to Carson Street	NB	0.81	26.3	C	0.97	35.7	E	0.80	25.8	C	1.00	37.9	E	0.83	27.0	D	1.01	38.5	E	0.75	24.1	C	0.88	31.3	D	0.78	25.0	C	0.88	31.5	D
	SB	1.09	41.1	E	1.00	36.1	E	1.05	37.7	E	0.98	35.0	D	1.07	39.1	E	1.00	36.1	E	1.08	40.4	E	1.00	36.0	E	1.04	37.4	E	1.03	37.8	E
SR-22/7 <sup>th</sup> Street Mainline Studebaker Road to I-405/I-605	EB	0.86	26.1	D	1.05	35.6	E	1.19	**	F	1.08	38.4	E	1.19	**	F	0.98	31.8	D	1.18	**	F	0.95	30.4	D	1.12	41.3	E	0.96	30.8	D
	WB	1.00	33.0	D	0.71	21.1	C	1.06	36.4	E	1.05	36.2	E	1.15	43.9	E	1.09	38.8	E	1.14	42.9	E	1.11	40.9	E	1.11	40.9	E	1.31	**	F

NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio.

\* – For future conditions, the D/C ratio is used instead of the V/C ratio.

\*\* – Density is not calculated under HCM because volume exceeds the range of the density algorithm.

\*\*\* – Density and LOS is based on weaving analysis.

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Table 3.1.6-14 presents the v/c ratios for peak hours of the existing year (2009) in the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **0.45 to 1.06** and **0.38 to 1.04** during the PM peak hour (shown in bold in the table).

A more-detailed link-by-link presentation of the existing freeway mainline LOS under 2009 traffic conditions for GP and HOV lanes is included in Appendix L2.

### **Freeway Connector Volumes**

Table 3.1.6-15 provides the existing branch connector volumes on ramps within the I-405/I-605/SR-22/7<sup>th</sup> Street interchange not presented under the Orange County heading in Section 3.1.6.2, Affected Environment. Branch connectors are the ramps connecting one freeway to another. The freeway-to-freeway branch connectors are currently operating under capacity during both AM and PM peak hours. Branch connectors operate with v/c ratios ranging from **0.31 to 0.81** under existing conditions (shown in bold in the table).

### **Arterials, Intersections, and Interchanges**

To establish existing (year 2009) traffic conditions for arterial and interchange study locations, AM and PM peak-hour turning movement counts were collected. Existing (year 2009) AM and PM peak-hour traffic volumes for arterial and interchange study locations within the study area in Los Angeles County are illustrated in Figure 3.1.6-9. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for existing conditions is provided in Table 3.1.6-12 for all of the study intersections. The study intersections are currently operating at LOS D or better, except for 10 intersections that are operating at LOS E or F during either the AM or PM peak hour or both (shown in bold in the table). Table 3.1.6-12 also shows that study intersections are currently operating under capacity (i.e., v/c less than 1.00) during peak hours, except for three intersections that are currently operating over capacity.

A comparison of existing vehicle queuing (higher of AM or PM peak-hour 95<sup>th</sup> percentile queues) with available storage (in feet) was conducted at all arterial interchange study intersections and is summarized in Table 3.1.6-16. The table shows that all off-ramps with traffic control at their arterial intersections have adequate turning lane storage under existing conditions. Table 3.1.6-16 also shows that 82 percent of arterials have adequate turning lane storage at ramp intersections and 54 percent of turning lanes at arterial/arterial intersections have adequate storage.

### 3.1.6.3 Environmental Consequences

#### ***Permanent Impacts***

Year 2020 is the year in which the proposed project is scheduled to be open to traffic if one of the build alternatives is implemented. Year 2040 is the design horizon for the proposed project build alternatives. Therefore, traffic analyses were conducted for the following eight future conditions:

Opening Year No Build Traffic Conditions – Year 2020

Opening Year Alternative 1 Traffic Conditions – Year 2020

Opening Year Alternative 2 Traffic Conditions – Year 2020

Opening Year Alternative 3 Traffic Conditions – Year 2020

Design Year No Build Traffic Conditions – Year 2040

Design Year Alternative 1 Traffic Conditions – Year 2040

Design Year Alternative 2 Traffic Conditions – Year 2040

Design Year Alternative 3 Traffic Conditions – Year 2040

The four alternatives are generally described as follows:

No Build Alternative. The No Build Alternative would provide no additional lanes or interchange improvements to the I-405 corridor. The project area would continue to operate with no additional improvements except for the following two projects, which are assumed to be completed under all future conditions.

1. The SR-22 WCC Project from SR-22 East to I-605 will add a second HOV lane in each direction and HOV direct connectors between I-605 and I-405 to/from the south and also between SR-22 East and I-405 to/from the north.
2. Continuous access HOV lanes along I-405 throughout the area in which improvements are proposed.

Alternative 1. This alternative would add a single GP lane in each direction of I-405 from Euclid Street to the I-605 interchange.

Alternative 2. This alternative would add one GP lane in each direction of I-405 from Euclid Street to the I-605 interchange (as in Alternative 1), plus add a second GP lane in the northbound direction from Brookhurst Street to the SR-22/7<sup>th</sup> Street interchange and a second GP lane in the southbound direction from the Seal Beach Boulevard on-ramp to Brookhurst Street.

Table 3.1.6-14: Mainline HOV Volume-to-Capacity Ratio for Year 2020 – Locations in Los Angeles County

Segment	Direction	Existing 2009		No Build 2020*		Alternative 1 2020*		Alternative 2 2020*		Alternative 3 2020*	
		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
I-405 HOV	NB	0.84	0.87	<b>1.35</b>	<b>1.51</b>	<b>1.30</b>	1.08	<b>1.24</b>	<b>1.46</b>	<b>1.12</b>	<b>1.24</b>
I-605 to Studebaker Road	SB	0.50	0.95	1.16	1.11	1.21	1.09	1.19	1.09	0.96	1.06
I-405 HOV	NB	<b>1.06</b>	0.74	<b>1.01</b>	1.18	1.12	1.11	1.11	1.26	1.01	1.11
Studebaker Road to Lakewood Boulevard	SB	0.50	<b>1.04</b>	1.16	1.12	1.21	1.16	1.19	1.09	0.94	1.15
I-605 HOV	NB	<b>0.45</b>	<b>0.38</b>	<b>1.01</b>	1.32	<b>1.00</b>	<b>1.31</b>	<b>1.00</b>	1.32	0.99	1.01
I-405 to Carson Street	SB	0.63	0.43	1.16	<b>0.99</b>	1.19	<b>1.02</b>	1.21	<b>1.08</b>	<b>0.81</b>	<b>0.76</b>

NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound; V/C – Volume-to-Capacity Ratio  
 Bolded V/C and D/C (demand volume-to-capacity) ratios indicate the minimum and maximum values as discussed in the text.  
 \* – For future conditions, the D/C ratio is used instead of the V/C ratio.

Table 3.1.6-15: 2020 Branch Connector Volumes and Volume-to-Capacity Ratios – Locations in Los Angeles County

Branch Connector	Existing 2009				No Build – 2020*				Alternative 1 – 2020*				Alternative 2 – 2020*				Alternative 3 – 2020*			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	Volume	V/C	Volume	V/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C
I-605 SB to I-405 NB	848	0.47	1,096	0.61	920	0.51	1,120	0.62	800	0.44	1,000	0.56	790	0.44	960	0.53	790	0.44	1,000	0.56
I-605 SB/7 <sup>th</sup> Street to I-405 NB	1,555	0.43	1,864	0.52	1,680	0.47	1,620	0.45	1,550	0.43	1,480	0.41	1,500	0.42	1,440	0.40	1,460	0.41	1,430	0.40
I-405 SB to I-605 NB	1,376	0.38	1,305	0.36	1,400	0.39	1,260	0.35	1,290	0.36	1,060	0.29	1,250	0.35	980	0.27	1,310	0.36	1,130	0.31
I-605 SB/I-405 SB to 7 <sup>th</sup> Street	1,460	<b>0.81</b>	622	0.35	2,040	<b>1.13</b>	1,360	0.76	2,150	<b>1.19</b>	1,120	0.62	2,050	<b>1.14</b>	1,040	0.58	2,020	<b>1.12</b>	1,930	1.07
7 <sup>th</sup> Street to I-605 NB/I-405 NB	1,100	<b>0.31</b>	1,300	0.36	1,210	0.34	1,330	0.37	1,120	0.31	1,230	0.34	1,060	0.29	1,230	0.34	1,340	0.37	1,170	0.33
7 <sup>th</sup> Street to I-405 NB	707	0.39	768	0.43	770	0.43	440	<b>0.24</b>	750	0.42	430	<b>0.24</b>	720	0.40	420	<b>0.23</b>	720	0.40	430	<b>0.24</b>

V/C – Volume-to-Capacity Ratio based on branch connector capacity of 1,800 vehicles per lane for GP branch connector lanes.  
 D/C – Demand Volume-to-Capacity Ratio based on branch connector capacity of 1,800 vehicles per lane for GP branch connector lanes.  
 Bolded V/C and D/C ratios indicate the minimum and maximum values as discussed in the text.  
 \* – For future conditions, the D/C ratio is used instead of the V/C ratio.

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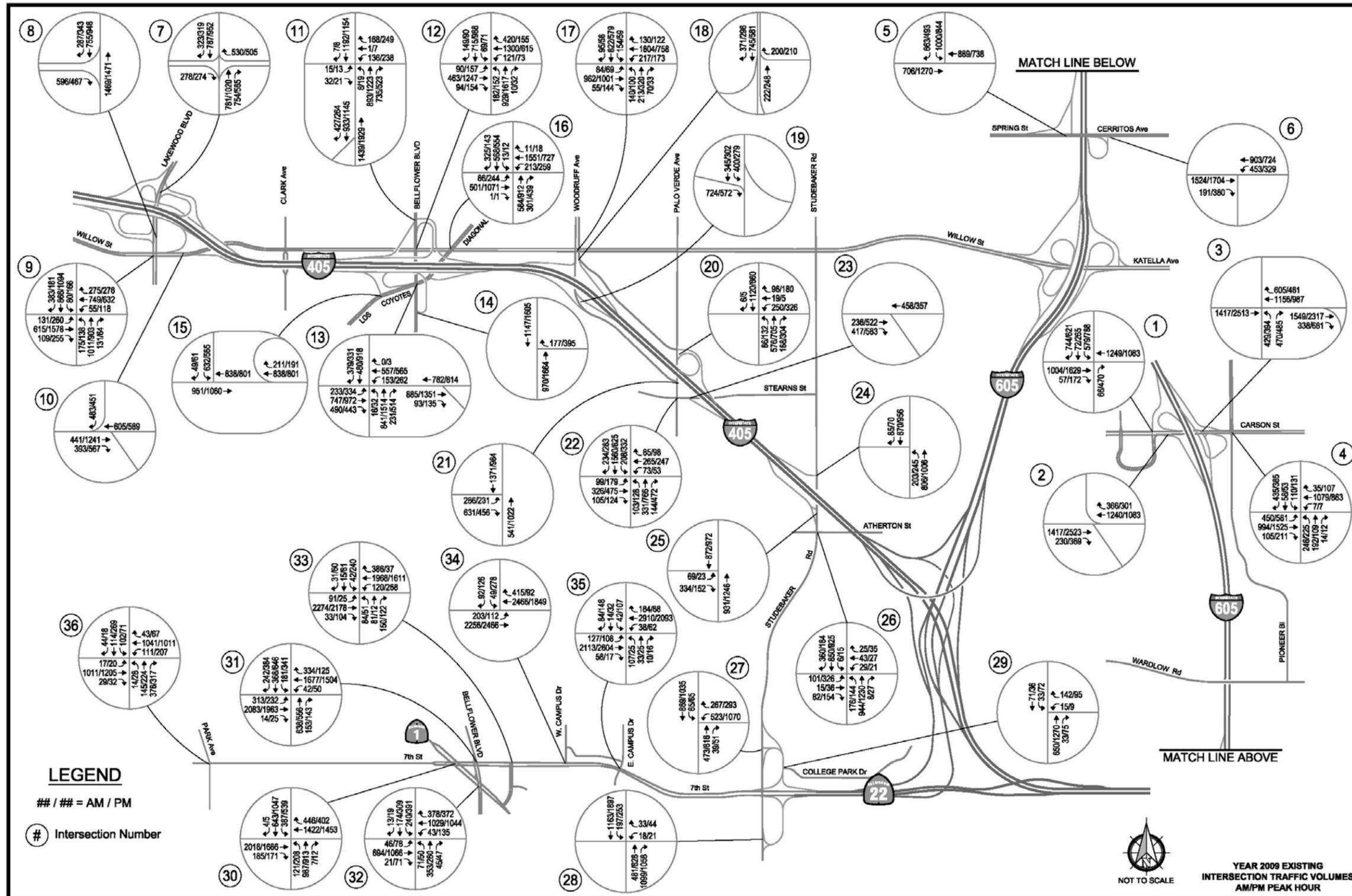


Figure 3.1.6-9: Existing (2009) Intersection Traffic Volumes for AM/PM Peak Hour – Locations in Los Angeles County

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**Table 3.1.6-16: Number of Locations with Adequate Vehicle Storage<sup>1</sup> in 2009 and 2040 – Locations in Los Angeles County**

Location	Existing 2009			No Build – 2040			Alternative 1 – 2040			Alternative 2 – 2040			Alternative 3 – 2040		
	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage	Number of Locations with Adequate Storage	Number of Locations	% with Adequate Storage
Off-Ramp at Arterials	10	10	100	9	10	90	9	10	90	9	10	90	10	10	100
Arterials at Ramps	9	11	82	7	11	64	8	11	73	7	11	64	8	11	73
Arterial/Arterial Intersections	35	65	54	29	65	45	29	65	45	32	65	49	33	65	51

<sup>1</sup> Storage is considered adequate if it will contain the 95th percentile queue.

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Alternative 3. This alternative would add one GP lane in each direction of I-405 from Euclid Street to the I-605 interchange (as in Alternatives 1 and 2), plus add a tolled Express Lane in each direction of I-405 from SR-73 to SR-22 East. The tolled Express Lane and the existing HOV lanes would be managed jointly as an Express Facility with two lanes in each direction from SR-73 to I-605.

The objective is to open the tolled Express Lanes with a HOV2+ occupancy free to encourage rideshare and transit usage. Operational adjustments to the tolled Express Lanes may be implemented based on demand, rates of speed, traffic volumes, and to meet financial covenants, maintenance and operational obligations. Potential operational adjustments include, but are not limited to:

- adjusting to HOV3+ free with HOV2s discounted tolls
- adjusting to HOV3+ free with HOV2s full tolls
- adjusting to tolling HOV2s on individual tolling segments such as direct connectors to or from other freeways
- periodic adjustments of tolling rates to maintain operations on individual tolling segments

All of the build alternatives (i.e., Alternatives 1, 2, and 3) would also add auxiliary lanes at appropriate locations; provide improved left and right shoulders; include improvements to local street overcrossings and bridges; provide the TSM and TDM measures included in Section 2.2.2.1, Common Design Features of the Build Alternatives; include improvements at most of the interchanges, including additional off-ramp vehicle queue storage and on-ramp, and connector metering storage; and provide improvements at selected nearby arterial street intersections affecting interchange operations. A summary of major improvements at each interchange is presented below. A complete listing of improvements at each interchange is provided in the Traffic Study.

### **Orange County**

Fairview Road Interchange. At the Fairview Road interchange, the project would move the ramp meter west of the three-lane section of the ramp and modify the I-405 northbound off-ramp at South Coast Drive to provide off-ramp queue storage of 180 ft.

Harbor Boulevard Interchange. At the Harbor Boulevard interchange, the project would modify the I-405 southbound on-ramp from northbound Harbor Boulevard to provide more queue storage and modify the median on Harbor Boulevard south of Gisler Avenue to provide queue storage of approximately 220 ft for the northbound left-turn movement at the Harbor Boulevard/Gisler Avenue intersection.

Euclid Street and Ellis Avenue Interchange. At the Euclid Street and Ellis Avenue interchange, the project would add a new ramp from eastbound Ellis Avenue to the southbound I-405, eliminating the dual left-turn lanes from eastbound Ellis Avenue to the existing I-405 southbound on-ramp. The project would improve the I-405 southbound and northbound off-ramps to provide increased queue storage and make improvements to Euclid Street and Ellis Avenue in the vicinity of their intersection with the I-405 ramps.

Brookhurst Street and Talbert Avenue Interchange. At the Brookhurst Street and Talbert Avenue interchange, the project would replace the existing cloverleaf interchange at Brookhurst Street with a partial-cloverleaf interchange design, eliminating the loop off-ramps and the northbound and southbound Collector-Distributor (C-D) roads. The remaining ramps would be widened at their arterial end for additional storage and turn lanes.

Magnolia Street and Warner Avenue Interchange. In the Draft EIR/EIS at the Magnolia Street and Warner Avenue interchange, replacement of the northbound C-D road with braided ramps was proposed along with braided ramps in the southbound direction to replace the southbound on-ramp from Magnolia Street and off-ramp to Warner Avenue. In response to comments received on the proposed braided ramps, two separate design options (one in each direction) were considered that would not include braided ramps. In the southbound direction, an auxiliary lane would be provided from the Magnolia Street on-ramp, past the Warner Avenue on-ramp, and terminating upstream of the Warner Avenue on-ramp. In the northbound direction, the braided ramps would be replaced with a C-D road. Both design options are included in the Preferred Alternative.

### **Design Options Included in all Build Alternatives**

All Build Alternatives include two design options: one with no braided ramps in the southbound direction at the Magnolia Street and Warner Avenue interchanges and the other with no braided ramps in the northbound direction at the Magnolia Street and Warner Avenue interchanges.

*No Braided Ramps Southbound at the Magnolia/Warner Interchange.* The design option that has no braided ramps in the southbound direction at the Magnolia Street and Warner Avenue interchanges could affect the configuration of the proposed interchange improvements at the intersection of Magnolia Street and the southbound I-405 ramps. The design option that has no braided ramps in the southbound direction has substantially less ramp meter storage on the southbound I-405 on-ramp from Magnolia Street than the design with the braided ramps. Although the design option without the braided ramps is anticipated to have sufficient storage to contain queues within the ramp (see Traffic Study, Table 3.8.6), if the storage is found to be insufficient the southbound approach of Magnolia Street to the southbound I-405 ramps could be restriped to provide two exclusive through lanes and one exclusive right-turn lane into the ramp;

the exclusive right-turn lane would effectively provide additional ramp storage. LOS at the intersection would be the same or better at the intersection than under the design option with the braided ramps, as shown in Table 3.1.6-23.

An auxiliary lane on the freeway mainline is included in this design option as a replacement for the braided ramps. Operation of the freeway mainline is similar with or without the braided ramps. Additional traffic details for the design option without the braided ramps and a comparison of traffic operations with and without the braided ramp design under Alternative 3 (Preferred Alternative) are provided in Appendix L5.

*No Braided Ramps Northbound at the Magnolia/Warner Interchange.* Operationally, the ramps and their volumes entering and exiting the I-405 northbound mainline under the design option with no braided ramps in the northbound direction at the Magnolia Street and Warner Avenue interchanges are the same as those with the braided ramps. The only operational difference between this design option and the braided ramp design presented in the Draft EIR/EIS is that the traffic volumes using the Warner Avenue on-ramp and the Magnolia Street off-ramp from northbound I-405 would weave across each other on a C-D road that would replace the braided ramps; if these ramps are braided there is no weaving maneuver.

Weaving analysis was conducted for the volumes weaving on the C-D road proposed in this design option. The HCS weaving analysis worksheets are presented in Appendix L6. The worksheets for year 2020 show that the weaving section is anticipated to operate at LOS B and C during the AM and PM peak hours, respectively. The worksheets for year 2040 show that the weaving section is anticipated to operate at LOS B and D during the AM and PM peak hours, respectively.

The Magnolia Street overcrossing would be widened from four to six through lanes, and a third through lane in each direction on Magnolia Street between Warner Avenue and Heil Avenue would be provided. Ramps would be widened to provide additional storage and turn lanes, and several ramps would be modified to intersect arterials at right angles to increase the distance between ramp/arterial and arterial/arterial intersections.

Beach Boulevard and Edinger Avenue Interchange. At the Beach Boulevard and Edinger Avenue interchange, the project would replace the existing cloverleaf interchange with a partial cloverleaf, eliminating the loop off-ramps and the northbound and southbound C-D roads. The remaining ramps would be modified to provide additional lanes at their arterial ends for storage and turns. A fifth lane on Beach Boulevard in each direction under the I-405 bridge would be added and would require relocating the sidewalks under the bridge behind the columns.

Goldenwest Street and Bolsa Avenue Interchange. At the Goldenwest Street and Bolsa Avenue interchange, the project would widen Bolsa Avenue in both directions and the Goldenwest Street overcrossing in each direction. Ramps would be modified to provide additional lanes at their arterial ends for turn lanes and storage. Two ramps would be modified to intersect Bolsa Avenue at right angles.

Springdale Street and Westminster Avenue Interchange. At the Springdale Street and Westminster Avenue interchange, the project would separate the two I-405 southbound off-ramps, one for Springdale Street and the other for eastbound Westminster Avenue, by removing the C-D road and providing direct off-ramps from southbound I-405. Interchange improvements would consolidate all northbound off-ramp traffic to a single ramp by widening the I-405 northbound (loop) off-ramp, accommodating left turns at the end of the ramp, and removing the existing I-405 northbound off-ramp to eastbound Westminster Avenue at Willow Lane. The left turn from westbound Westminster Avenue into the I-405 southbound on-ramp would be removed to provide turning-lane improvements at the Westminster Avenue/Springdale Street intersection. Additional lanes on the ramps at their arterial end would provide additional storage and turn lanes, and the ramp to eastbound Bolsa Avenue would be modified to a right-angle intersection.

Bolsa Chica Road/Valley View Street and Garden Grove Boulevard Interchange. At the Bolsa Chica Road/Valley View Street and Garden Grove Boulevard interchange, the project would widen the Bolsa Chica Road overcrossing on I-405 to provide three through lanes. The I-405 southbound off-ramp at Bolsa Chica Road would be modified to allow left turns from the ramp and provide a new access from northbound Bolsa Chica Road to the I-405 southbound on-ramp.

Seal Beach Boulevard Interchange. At the Seal Beach Boulevard interchange, the project would provide additional turn lanes at the ramp/arterial intersections and modify the Seal Beach Boulevard northbound exclusive right-turn lane onto northbound I-405 to one that would be controlled by the traffic signal. Queue storage of approximately 500 ft would be provided for this exclusive northbound right-turn lane.

### **Traffic Forecasting Model**

The traffic forecasts for the project were developed using Orange County Transportation Analysis Model (OCTAM), Version 3.3. OCTAM is a regional model that is based on the traditional four-step sequential modeling methodology. The model incorporates multimodal analytical capabilities to analyze the following modes of travel: autos, local and express bus transit, urban rail, commuter rail, toll roads, carpools, and truck traffic, as well as nonmotorized transportation, which includes pedestrian and bicycle trips. The model responds to changes in land use types, household characteristics, transportation infrastructure, and travel costs such as transit fares, parking costs, tolls, and auto operating costs.

Year 2040 future traffic volumes for the study area within Orange County were developed using projections from OCTAM. Traffic volume forecasts for year 2035 were developed first from OCTAM and then a growth factor was applied to obtain year 2040 volumes. The growth factor applied was 1 percent. Population and employment in Orange County is forecast by the Center for Demographic Research at the California State University at Fullerton to increase by approximately 1 percent from 2030 to 2035, which is the last 5-year period for which forecasts are available. A similar growth rate is assumed for the period 2035 to 2040. Year 2020 traffic forecasts were developed by adjusting the OCTAM 2035 model forecasts downward based on forecast 2020 population and employment. SCAG forecasts show that 61 percent of population and employment growth projected in Orange County is forecast to occur by 2020. Traffic growth forecasts for 2020 were adjusted down from 2040 on that basis.

A single demand forecast was prepared for the study area within Orange County. Freeway mainline forecasts for each of the alternatives utilize the same total traffic volumes on a segment but redistribute volumes among the different lane types, as necessary. Forecast AM and PM peak-hour traffic volumes on the freeway mainline and ramps are shown for each alternative for years 2020 and 2040 in Figures 3.1.6-10 through 3.1.6-17.

Because of a very small variation in projected traffic volumes during the peak hours at the freeway interchanges among the three project alternatives, it was determined that only one set of future traffic volumes would be used for analyzing the project condition on the arterials. The project condition traffic volumes were developed using the highest of the three project alternative traffic volume projections (Alternative 1, 2, or 3 condition) and are evaluated assuming the worst-case condition; however, because there are only minor variations in alternative traffic volume projections at the interchanges and on the arterials, there are no significant differences for interchange configurations using the worst-case data. Graphics showing the forecast 2020 and 2040 traffic volumes at each interchange are presented in the Traffic Study.

Traffic data and the results of operational analysis are presented below for the No Build Alternative and three build alternatives for both the freeway mainline and the interchange areas. Analysis and data are presented for both the expected Opening Year 2020 and the Design Year 2040.

### **No Build Alternative**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) No Build Alternative AM/PM peak-hour traffic volumes, along with lane schematics for the I-405 mainline and all interchange ramps within the project limits, are presented in Figures 3.1.6-10 and 3.1.6-14, respectively.

The No Build Alternative ADT along the I-405 mainline freeway in 2020 and 2040 is presented in Table 3.1.6-2. ADTs in 2020 range from **297,200 to 441,400 vpd** and from **324,000 to 489,000 vpd** in 2040, compared to the range of **257,000 to 370,000 vpd** under the existing condition. As shown in Table 3.1.6-3, no-build daily VMT in the study corridor is forecast to be **4,804,000** in 2020 and **5,299,000** in 2040, compared to **4,063,000** under the existing condition.

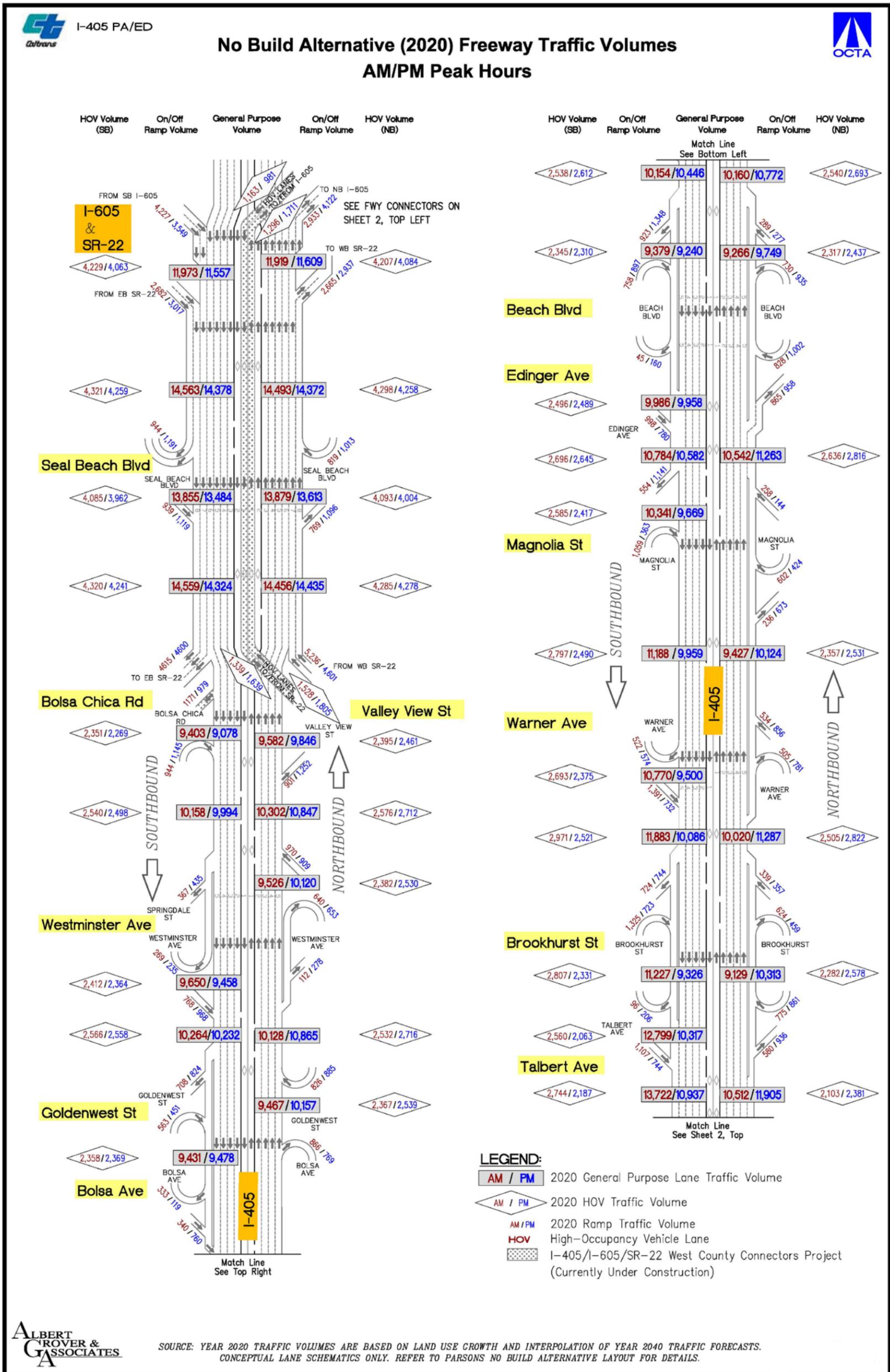


Figure 3.1.6-10: 2020 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County  
(page 1 of 2)

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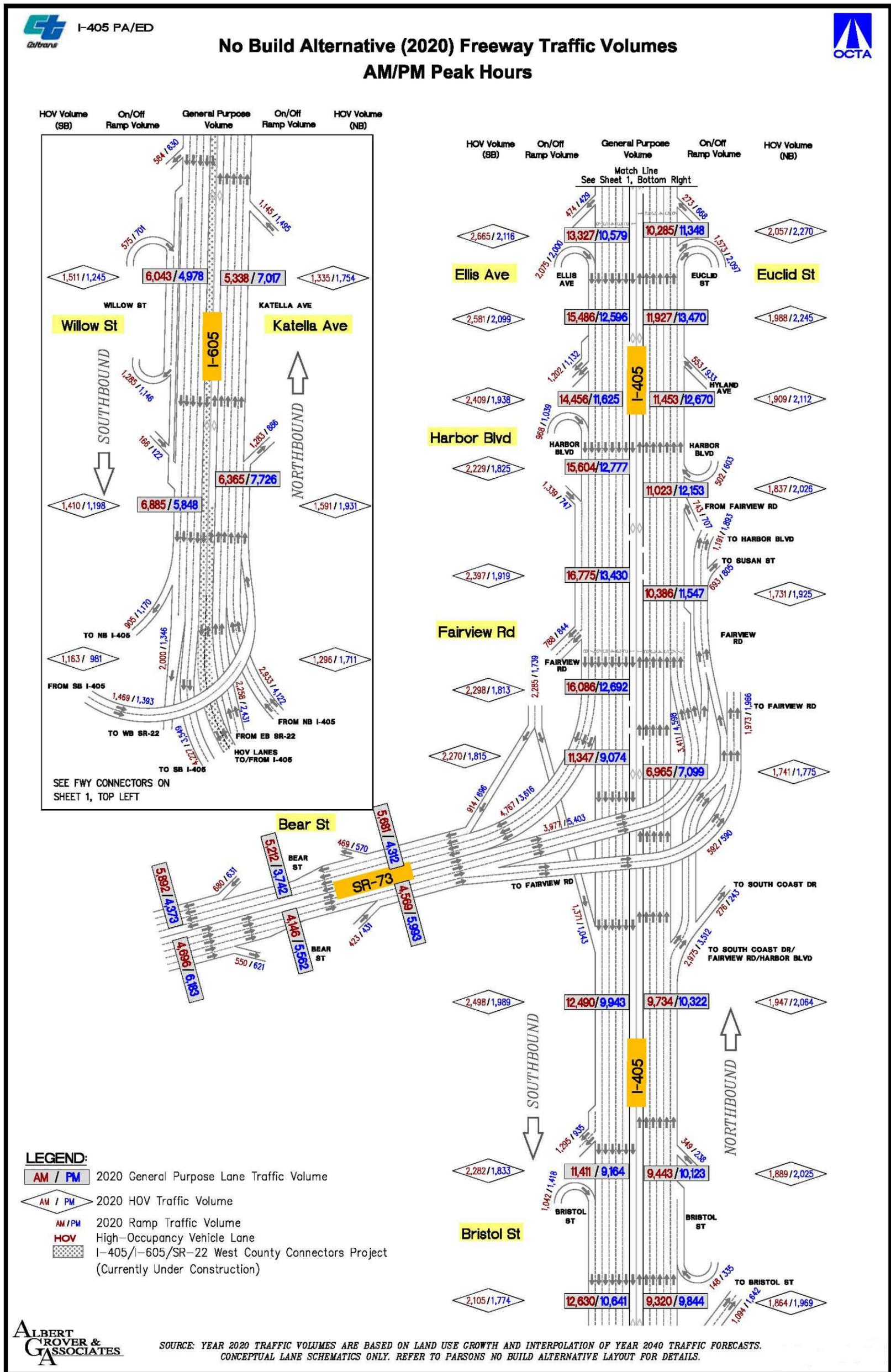


Figure 3.1.6-10: 2020 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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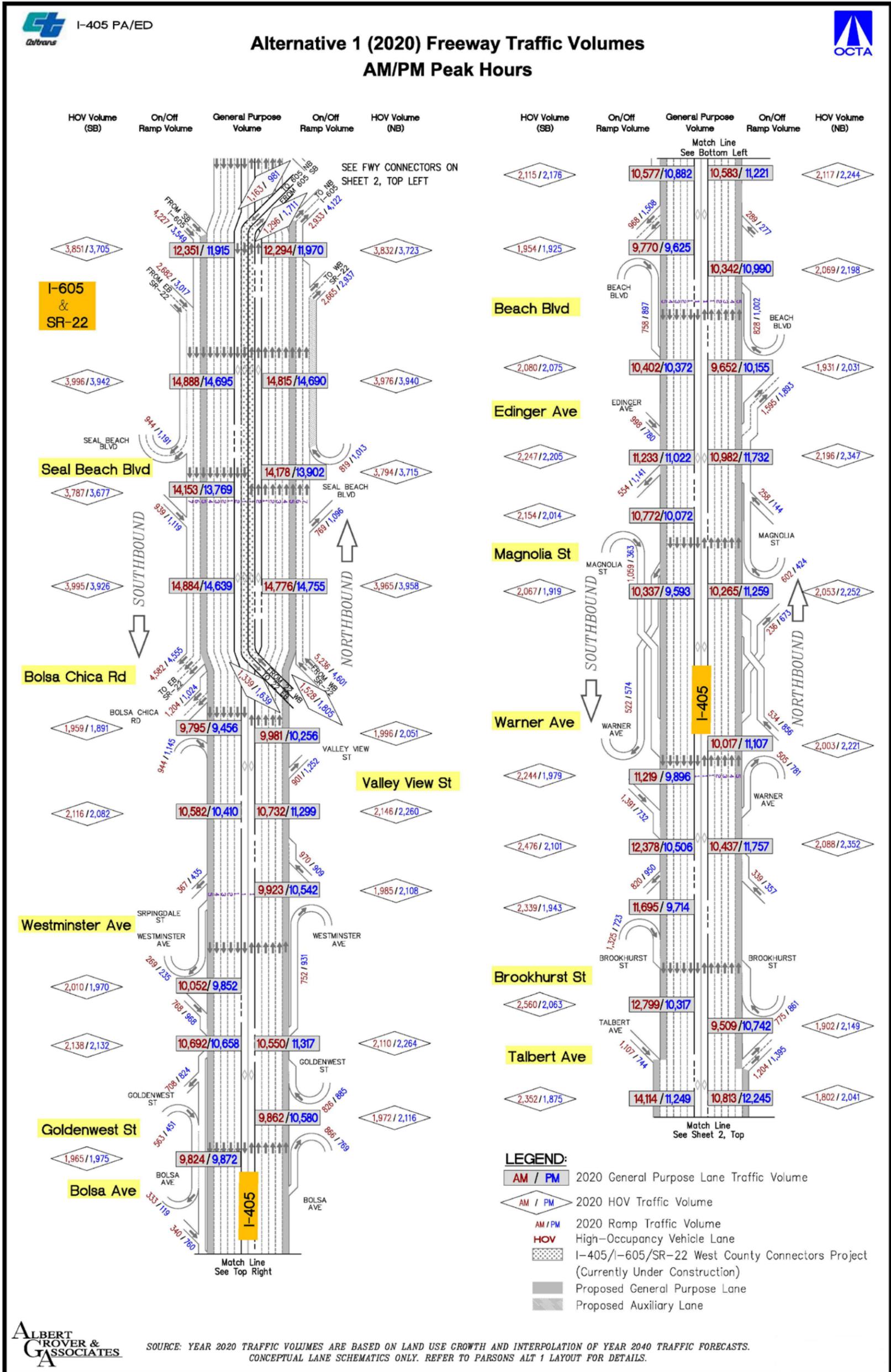


Figure 3.1.6-11: 2020 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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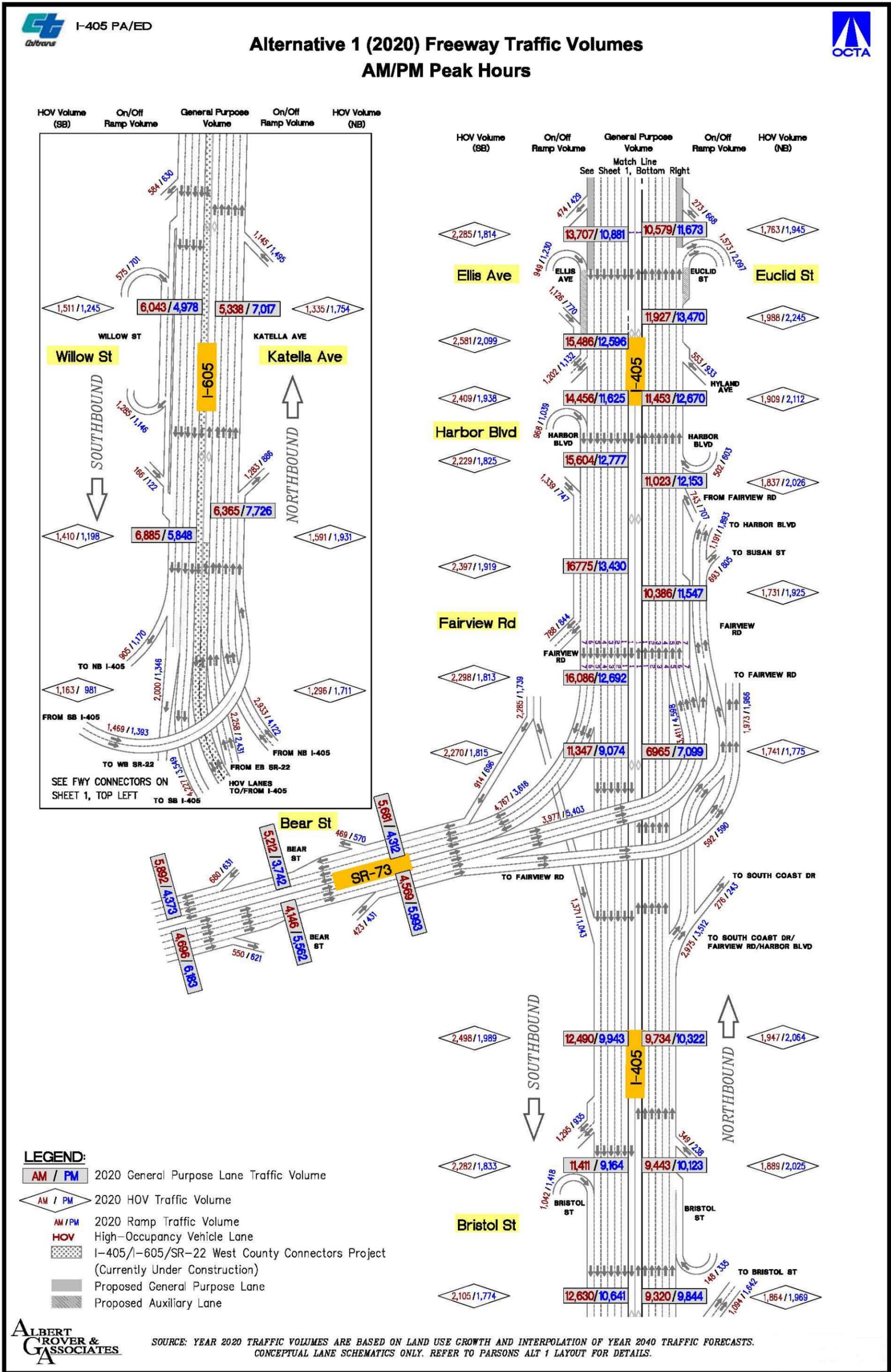


Figure 3.1.6-11: 2020 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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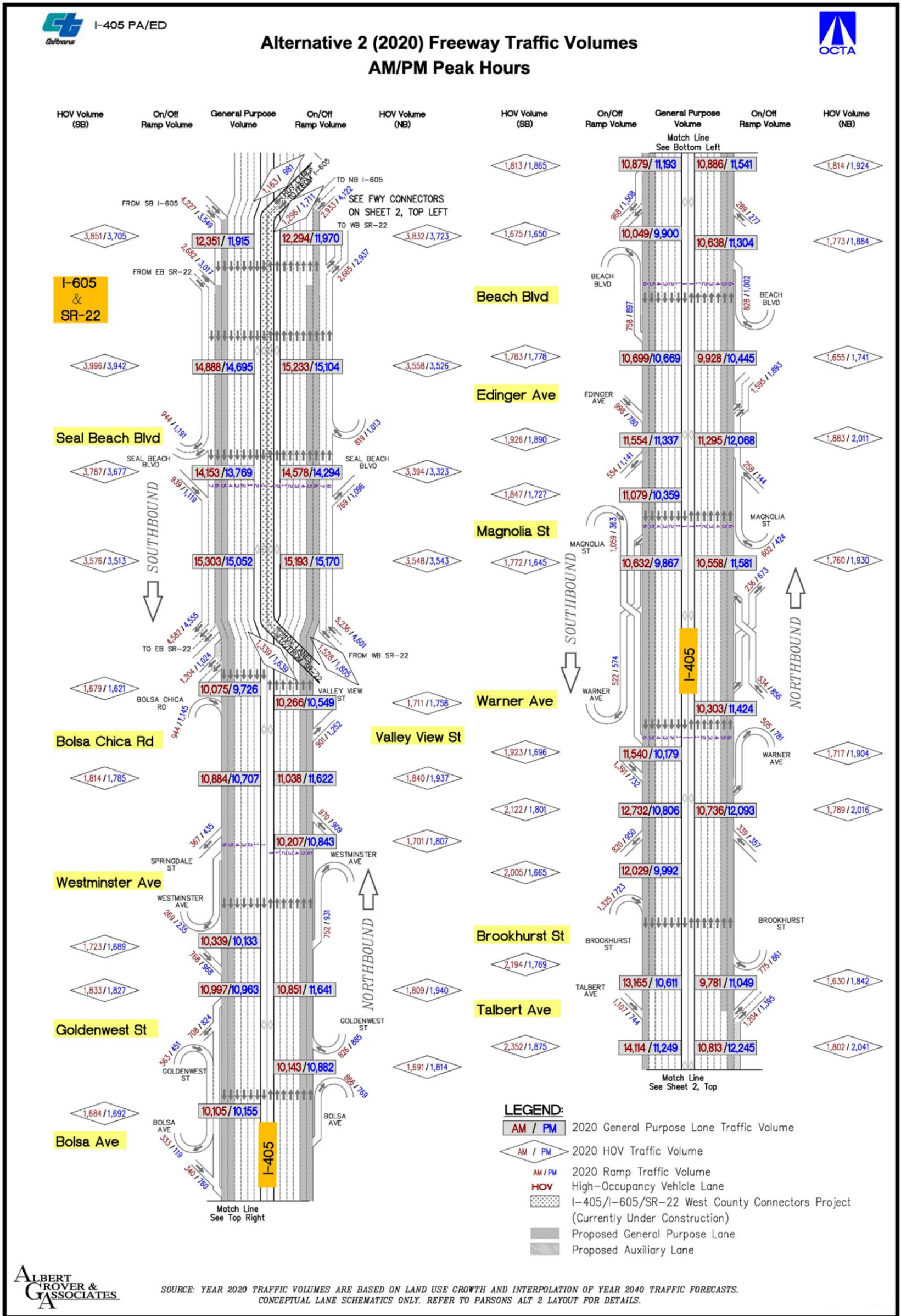


Figure 3.1.6-12: 2020 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

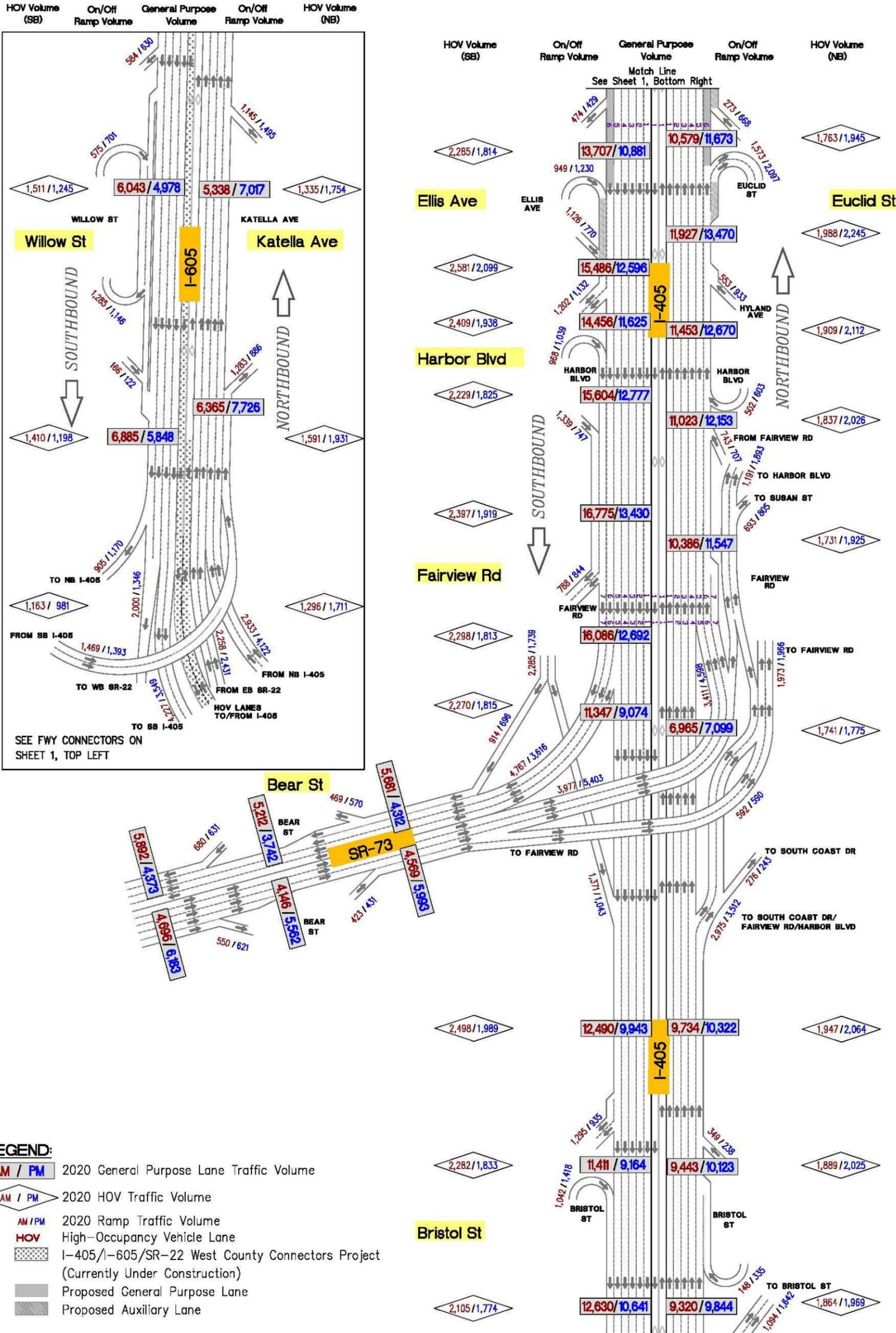
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I-405 PA/ED



### Alternative 2 (2020) Freeway Traffic Volumes AM/PM Peak Hours



03/31/2011

Figure 3.1.6-12: 2020 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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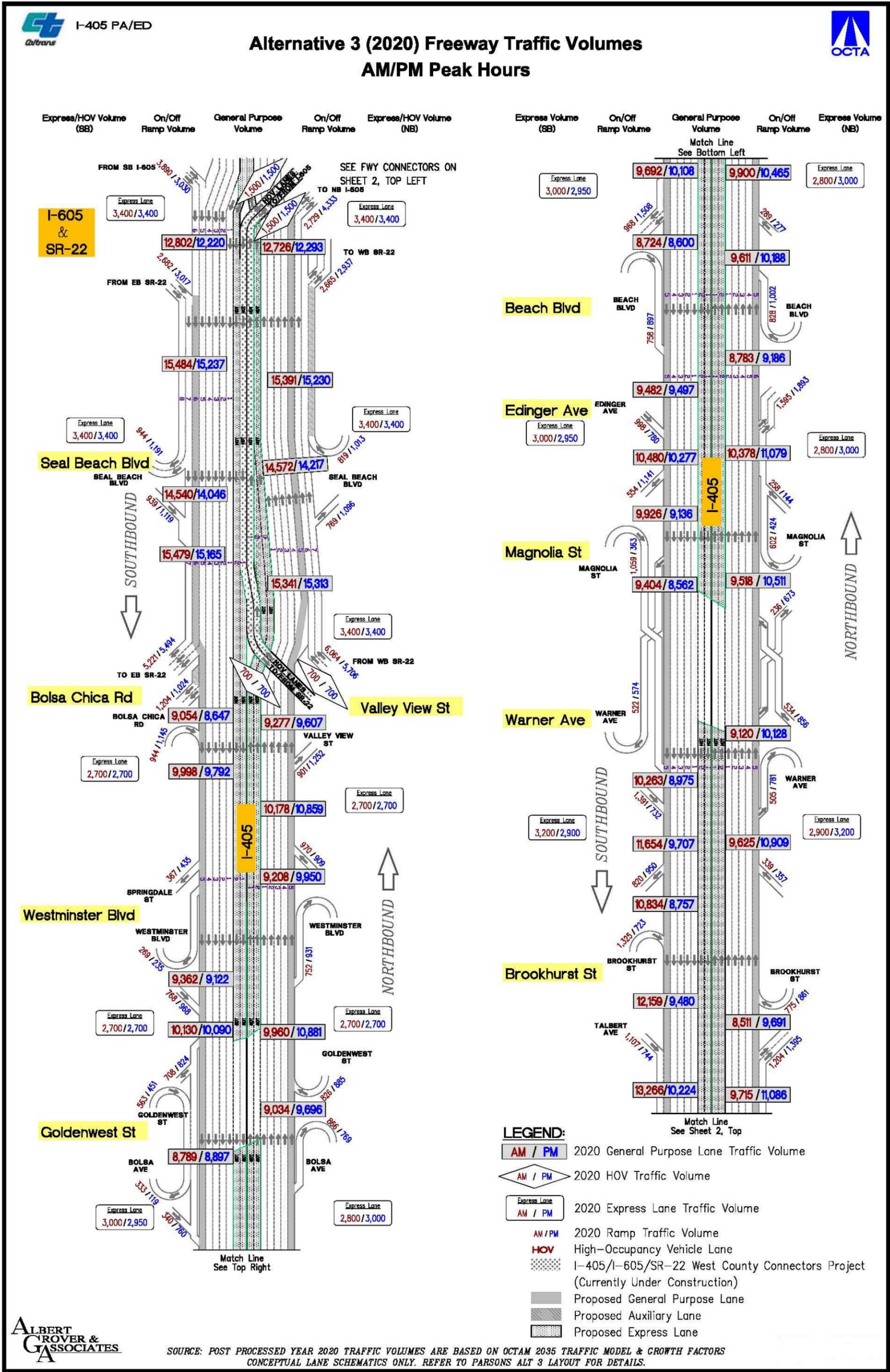


Figure 3.1.6-13: 2020 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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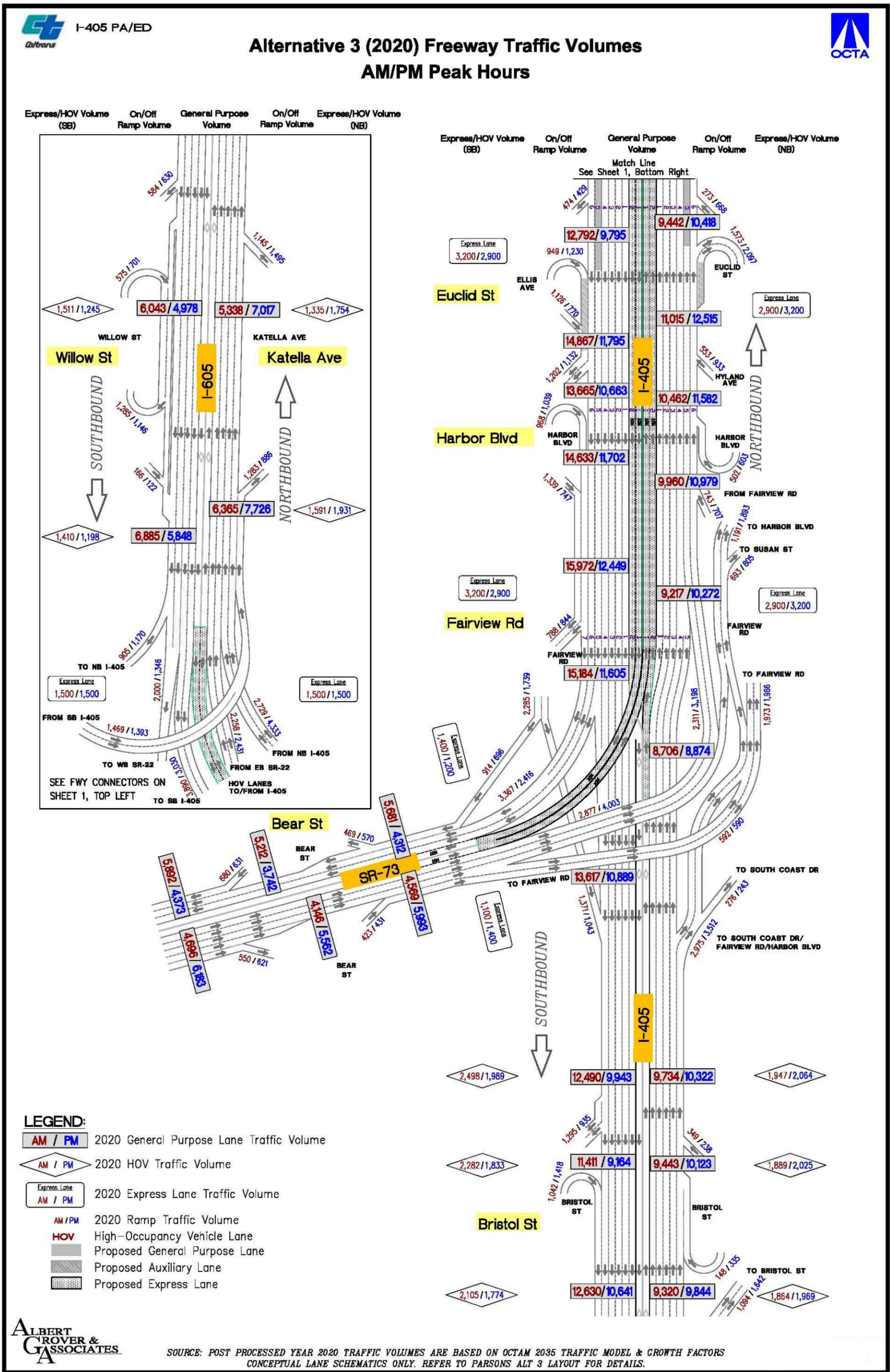


Figure 3.1.6-13: 2020 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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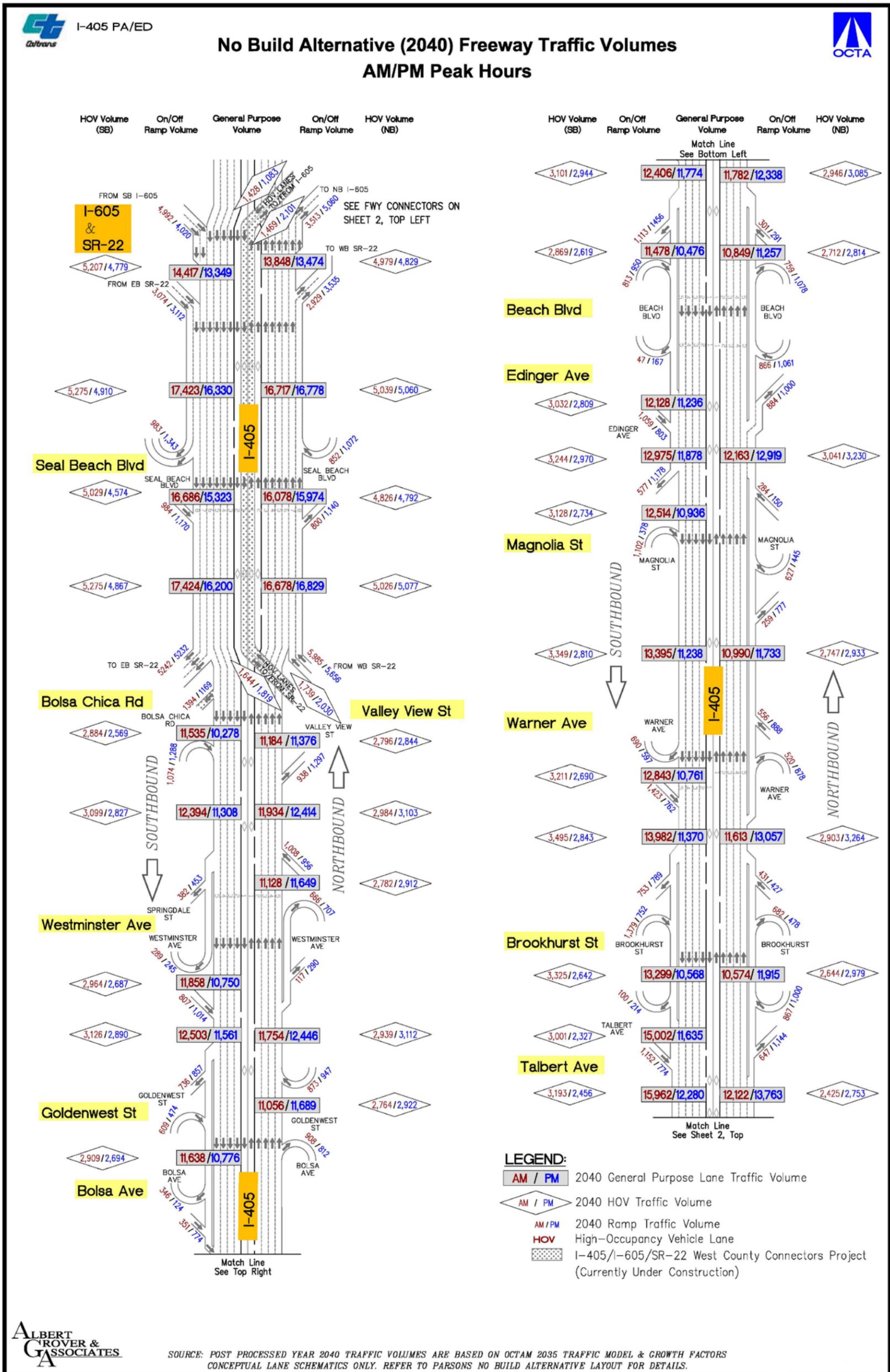


Figure 3.1.6-14: 2040 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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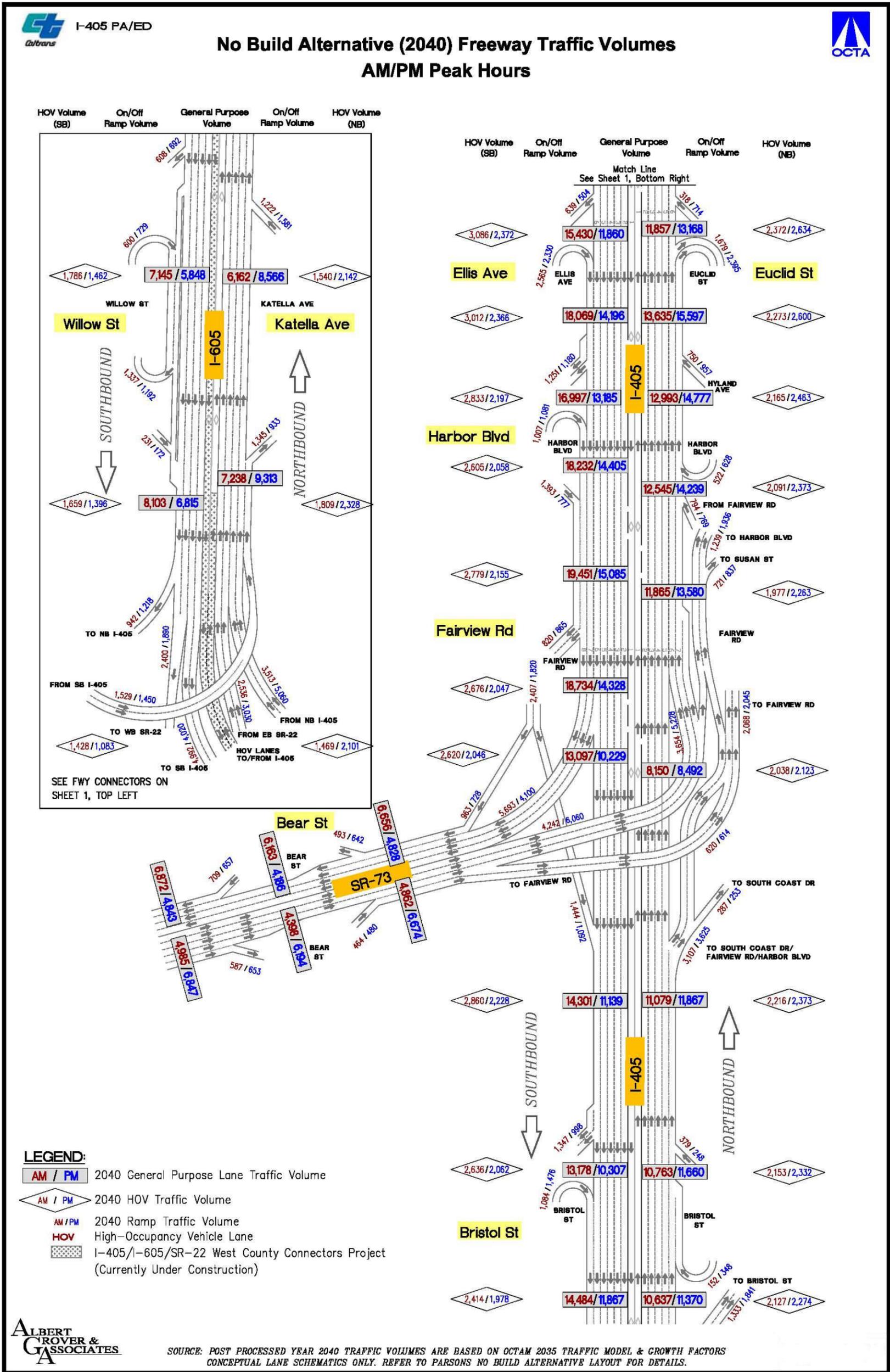


Figure 3.1.6-14: 2040 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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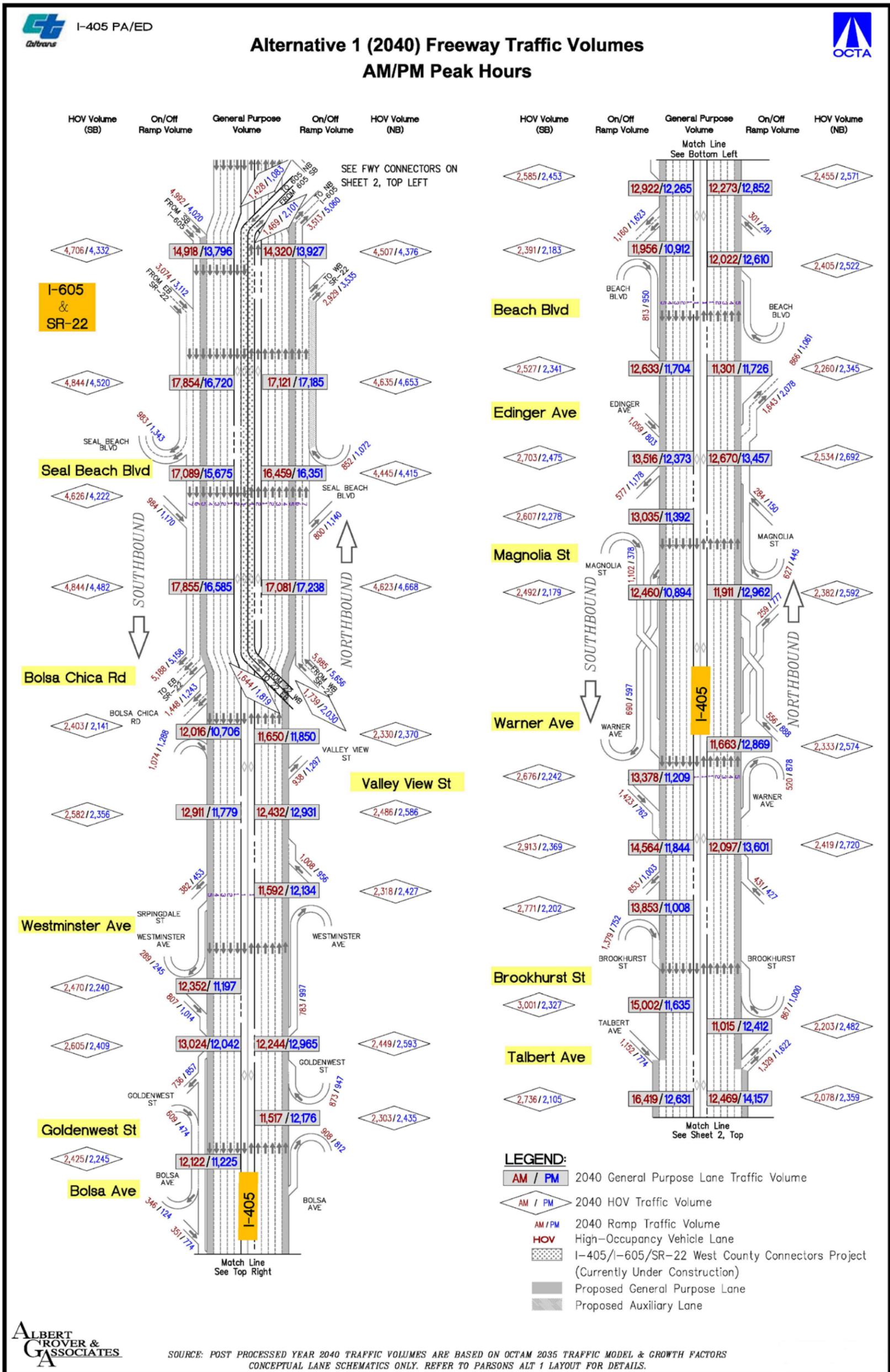
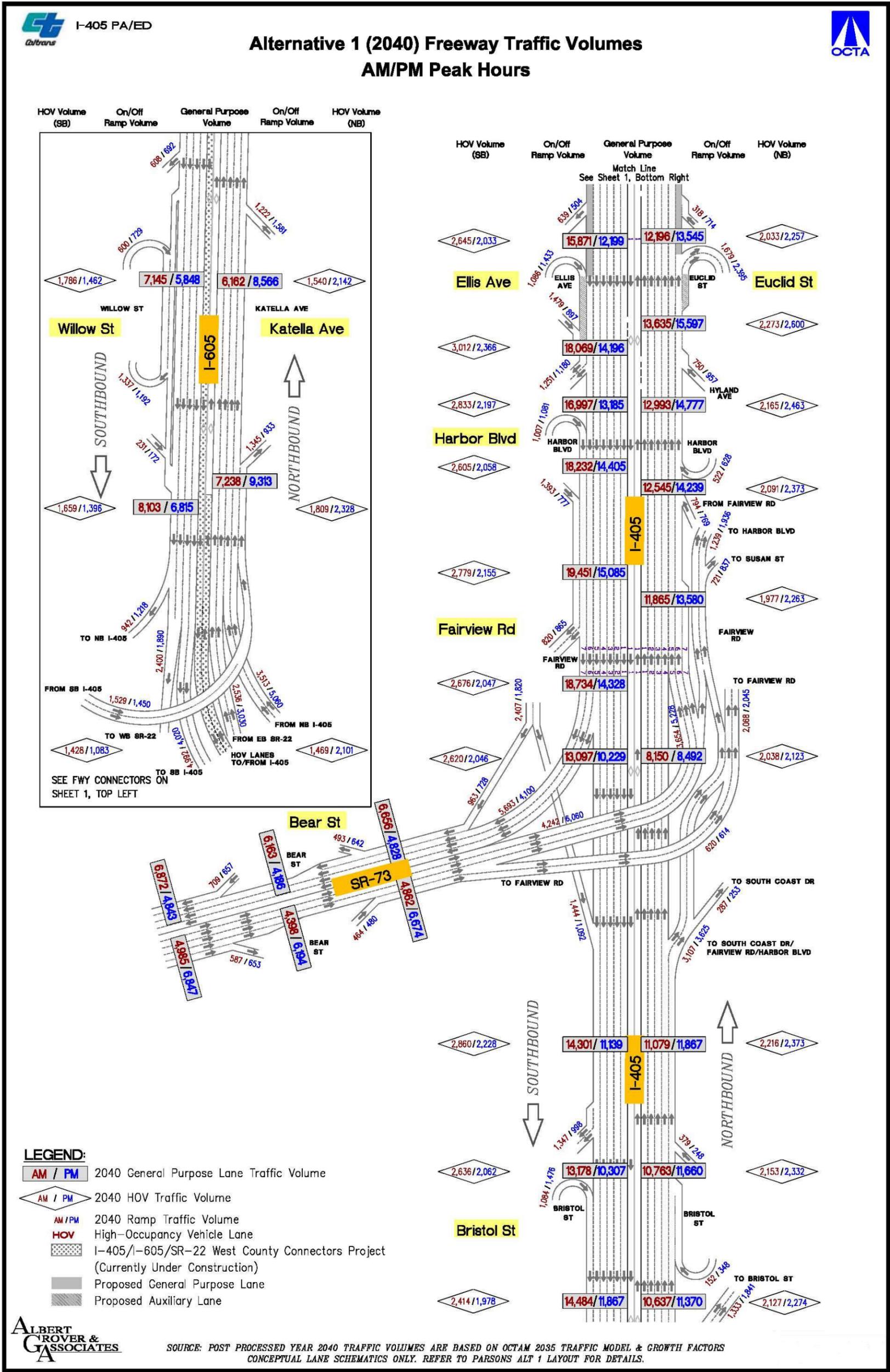


Figure 3.1.6-15: 2040 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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03/31/2011

Figure 3.1.6-15: 2040 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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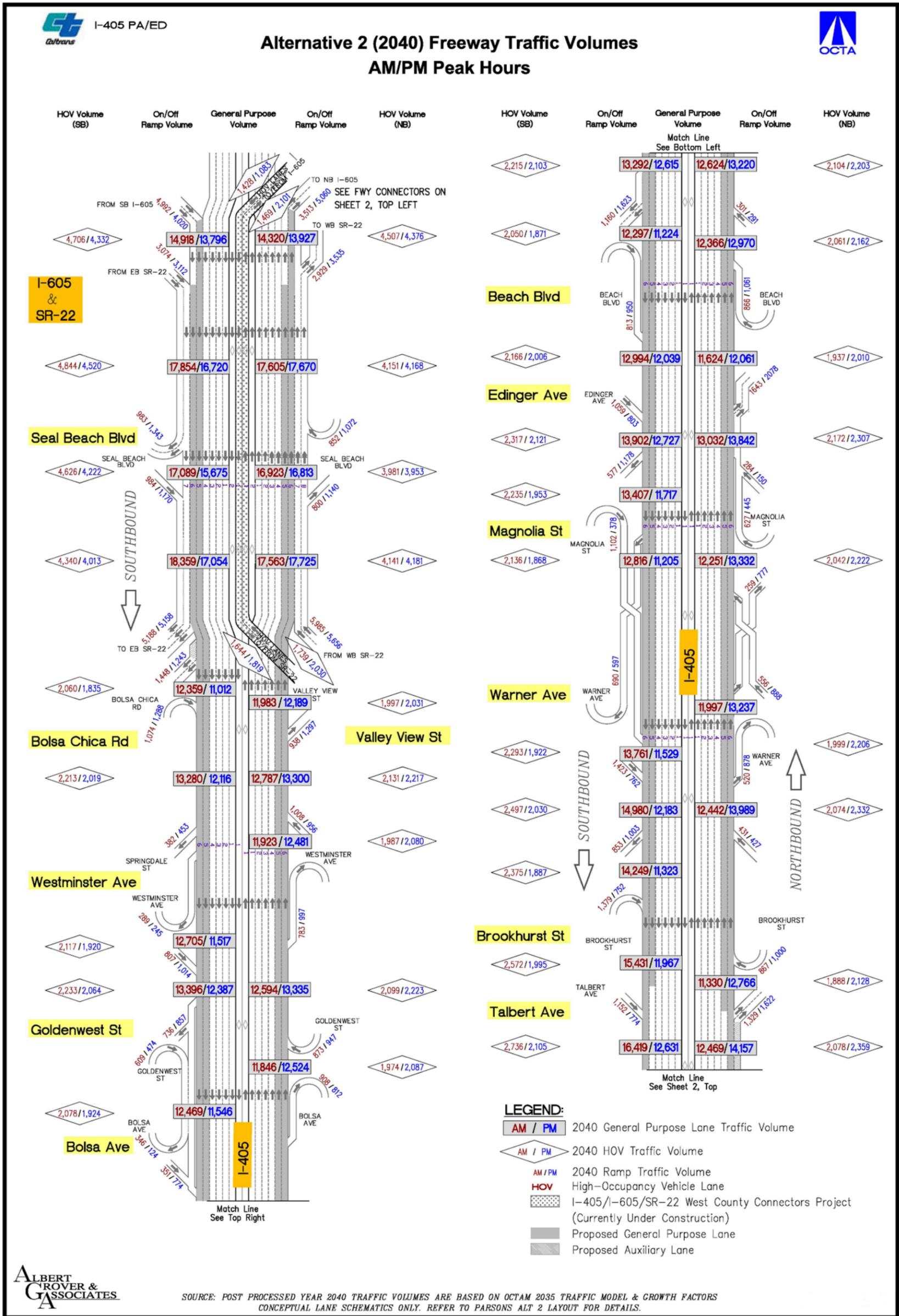


Figure 3.1.6-16: 2040 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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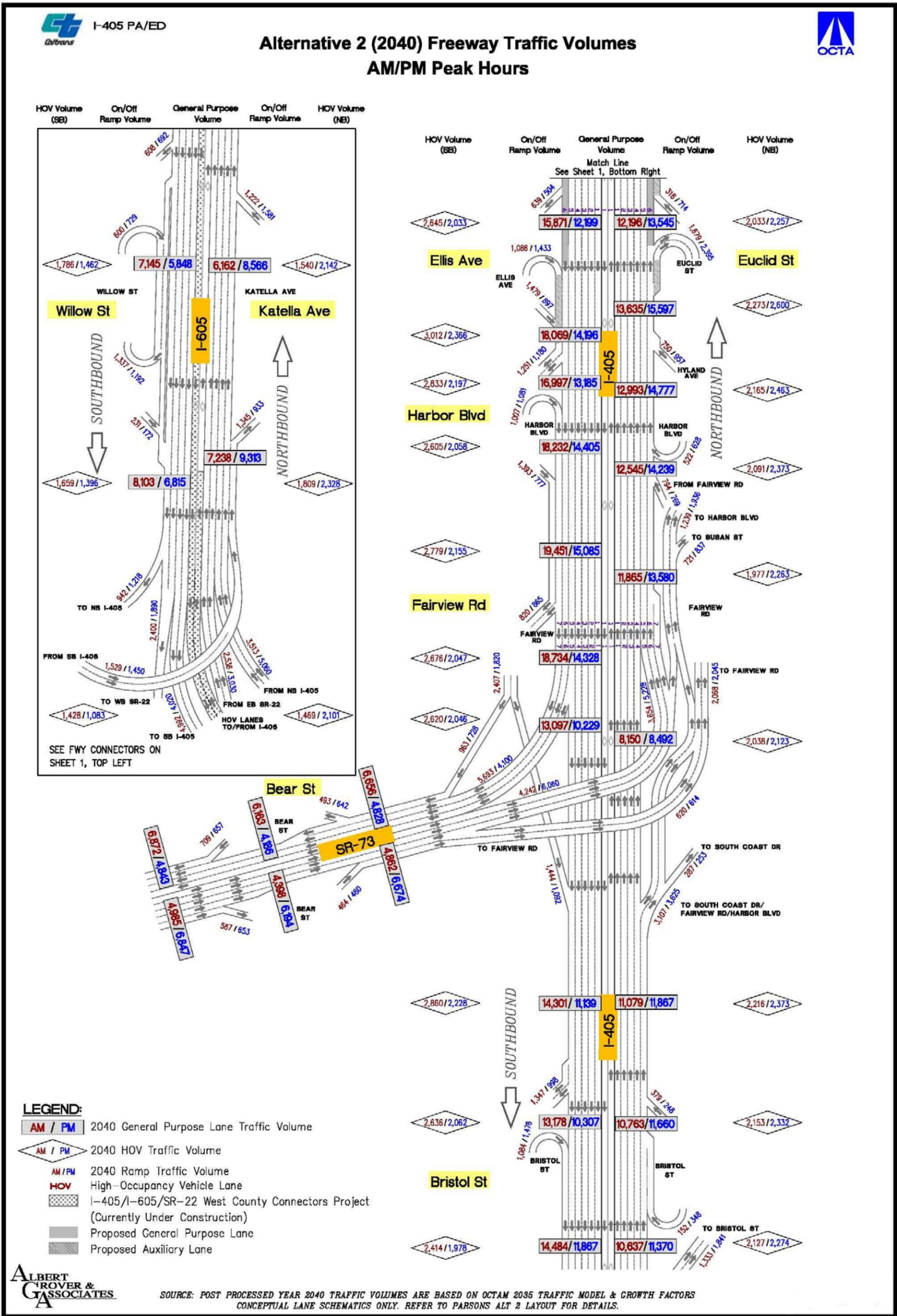


Figure 3.1.6-16: 2040 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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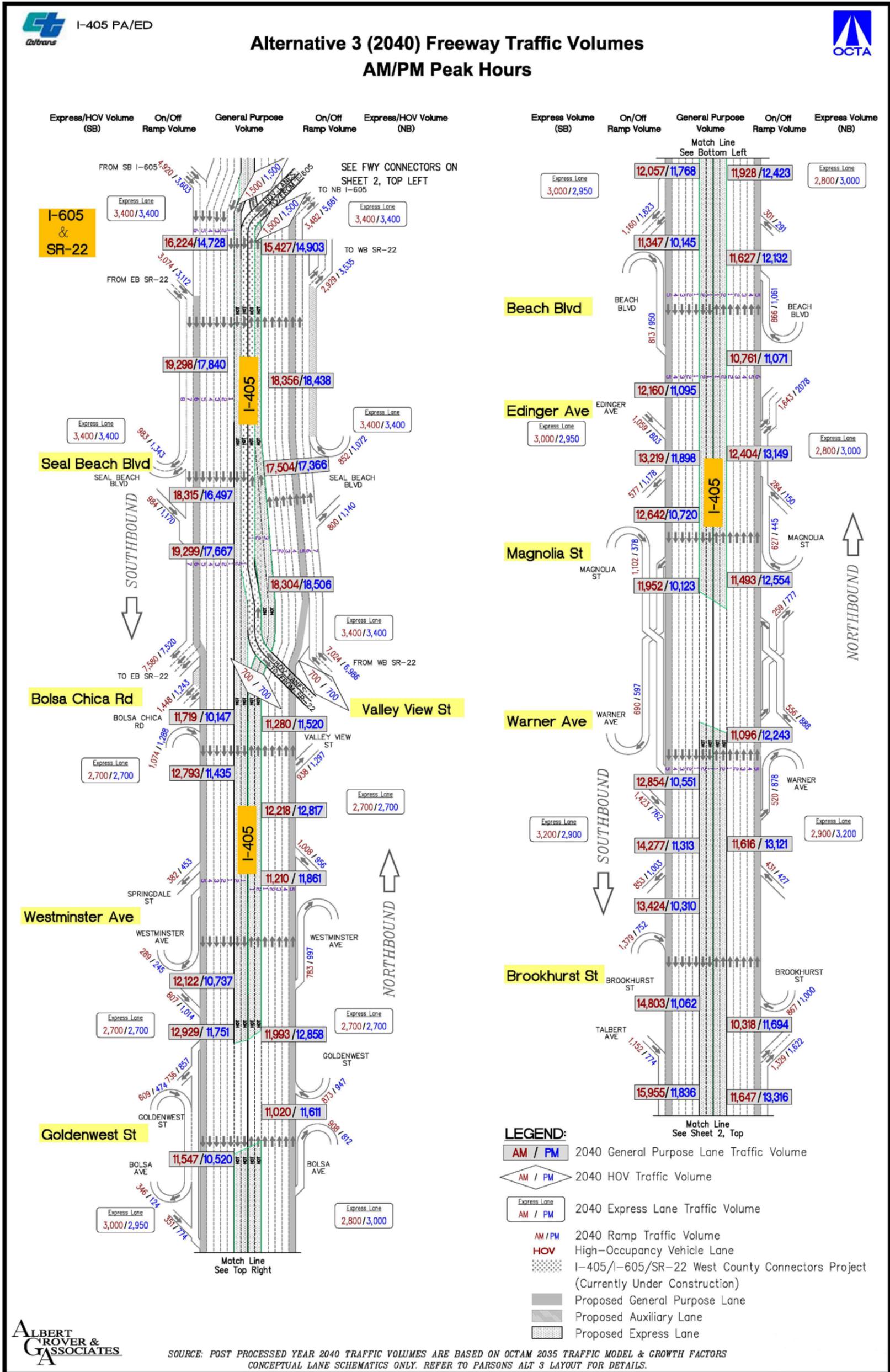


Figure 3.1.6-17: 2040 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 1 of 2)

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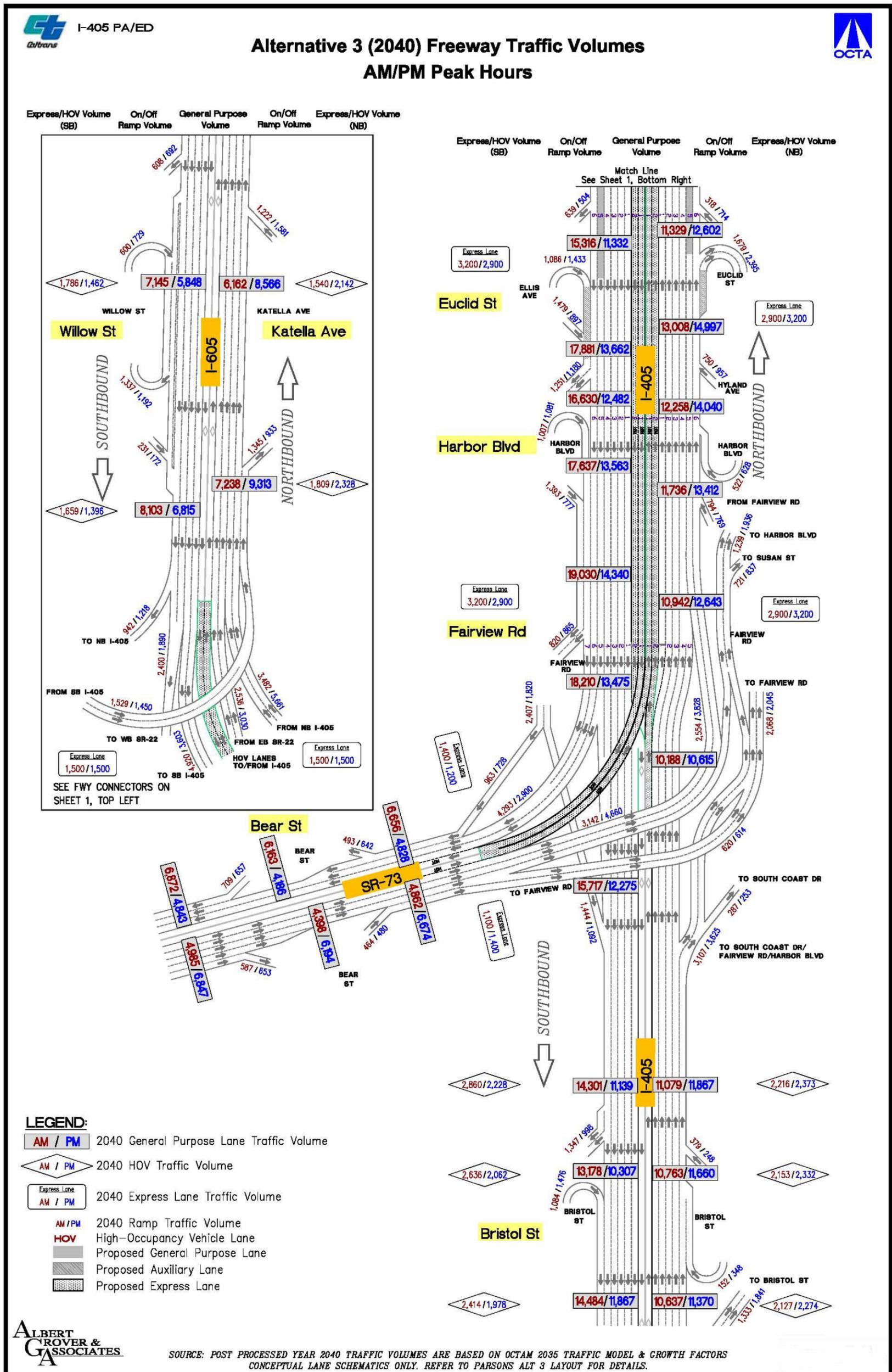


Figure 3.1.6-17: 2040 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Orange County (page 2 of 2)

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*V/C Ratio and LOS.* Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2020 for the GP lanes of the northbound and southbound freeway. Under no-build conditions in year 2020, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2020 under the No Build Alternative is **1.14 to 1.61** and **1.18 to 1.53** during the PM peak hour. The v/c ratios increase between 0.18 and 0.37 for the AM peak hour from the existing condition to the 2020 no-build condition and between 0.14 and 0.38 for the PM peak hour. A more-detailed link-by-link presentation of the freeway mainline LOS under the no-build traffic condition for both GP and HOV lanes is included in Appendix L1 (Table O-7).

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2020 for the HOV lanes of the northbound and southbound freeway. Under no-build conditions in year 2020, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2020 is **1.14 to 1.61** and **1.16 to 1.53** during the PM peak hour. The v/c ratios increase from 0.35 to 0.78 for the AM peak hour from the existing condition to the 2020 no-build condition and 0.15 to 0.45 for the PM peak hour.

Table 3.1.6-17 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2040 for the GP lanes of the northbound and southbound freeway. Under no-build conditions in year 2040, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2040 is **1.31 to 1.89** and **1.33 to 1.76** during the PM peak hour. The v/c ratios increase from 0.38 to 0.65 for the AM peak hour from the existing condition to the 2040 no-build condition and 0.31 to 0.61 for the PM peak hour.

Table 3.1.6-18 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2040 for the HOV lanes of the northbound and southbound freeway. Under no-build conditions in year 2040, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2040 is **1.31 to 1.89** and **1.33 to 1.76** during the PM peak hour. The v/c ratios increase from 0.56 to 1.01 for the AM peak hour from the existing condition to the 2040 no-build condition and 0.36 to 0.68 for the PM peak hour.

The HOV lanes under the no-build condition are assumed to have continuous access with no change in the HOV eligibility requirement of two persons per vehicle. Like many freeways with carpool lanes in southern California, almost all segments of carpool lanes on I-405 between SR-73 and I-605 are operating under degraded conditions (*California HOV/Express Lane*

*Business Plan*, March 31, 2009). As traffic grows over time, these conditions will degrade further; as conditions degrade, incentives such as higher travel speeds in carpool lane versus GP lanes will diminish. It is anticipated that by 2020, when the proposed I-405 improvements would be open to traffic, the travel speed incentive to use the carpool lanes on I-405 will have completely disappeared between SR-73 and SR-22 East. North of SR-22 East to I-605, there will be dual carpool lanes in each direction, and the travel speed incentive is anticipated to continue in that area for some period after 2020.

The GP and HOV lanes in the No Build Alternative are anticipated to operate at LOS F during the peak hours in 2040. This is expected to result in reduced and unstable throughput. A summary of 2040 peak-hour throughput anticipated under the No Build Alternative is presented in Table 3.1.6-19. Table 3.1.6-19 shows the number of lanes by type in each freeway study segment by direction and the throughput under the congested conditions that are anticipated. A volume of 1,200 vehicles per lane per hour (vphpl) is used for throughput for over-capacity conditions, as explained in the Traffic Study. Table 3.1.6-19 shows that the total throughput anticipated in 2040 across all lanes ranges from **6,000 to 9,600 vehicles per hour (vph)** under the no-build condition.

*Peak-Period Performance.* Table 3.1.6-6 shows forecast no-build speeds for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Forecast year 2040 speeds under the no-build condition in the GP lanes during peak hours range from **5 to 8 mph**, compared to existing condition speeds of 22 to 54 mph. Forecast year 2040 no-build speeds in the HOV lanes during peak hours range from **6 to 9 mph**, compared to existing condition speeds of 43 to 62 mph. For both lane types combined, average speeds weighted for the volumes using each lane type range from **5 to 8 mph** in 2040 under the no-build condition compared to existing condition average speeds of 28 to 56 mph.

*Corridor Travel Time.* Table 3.1.6-7 shows forecast no-build corridor travel time for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-7 also shows the average travel time across both lane types. Forecast year 2040 no-build travel time in the GP lanes during peak hours ranges from **107 to 163 minutes**, compared to 15 to 37 minutes under the existing condition. Forecast year 2040 no-build travel time in the HOV lanes during peak hours ranges from **95 to 147 minutes**, compared to 13 to 19 minutes under the existing condition. For both lane types combined, average travel time under the no-build condition in year 2040 weighted for the volumes using each lane type ranges from **105 to 160 minutes**, compared to 15 to 30 minutes under existing conditions.

Table 3.1.6-17: I-405 Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2040 – Locations in Orange County

Segment	NB or SB	Existing 2009						No Build – 2040						Alternative 1 – 2040						Alternative 2 – 2040						Alternative 3 – 2040					
		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		
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C
SR-73 to Brookhurst Street	NB	27.1	D	0.89	*	F	0.93	*	F	1.31	*	F	1.49	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	41.2	F	1.17	*	F	1.35
	SB	43.9	F	1.16	29.6	D	0.95	*	F	1.73	*	F	1.33	*	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	*	F	1.61	*	F	1.23
Brookhurst Street to SR-22 East	NB	*	F	1.14	42.9	F	1.15	*	F	1.64	*	F	1.76	*	F	1.37	*	F	1.47	41.4	F	1.17	*	F	1.26	*	F	1.34	*	F	1.42
	SB	*	F	1.24	42	F	1.16	*	F	1.89	*	F	1.61	*	F	1.57	*	F	1.34	*	F	1.35	39.2	F	1.15	*	F	1.54	*	F	1.29
SR-22 East to I-605	NB	*	F	1.13	*	F	1.06	*	F	1.51	*	F	1.52	*	F	1.32	*	F	1.33	42.8	F	1.19	43.6	F	1.20	*	F	1.42	*	F	1.43
	SB	*	F	1.1	*	F	1.16	*	F	1.57	*	F	1.47	*	F	1.38	*	F	1.29	*	F	1.38	*	F	1.29	*	F	1.49	*	F	1.38

NB – Northbound; SB – Southbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; \* - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2040 than in 2009.  
Source: Albert Grover & Associates 2011.

Table 3.1.6-18: I-405 Mainline HOV/Express Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2040 – Locations in Orange County

Segment	NB or SB	Existing 2009 HOV Lane						No Build HOV Lane – 2040						Alternative 1 HOV Lane – 2040						Alternative 2 HOV Lane – 2040						Alternative 3 Express Lane – 2040					
		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		
		Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C	Den	LOS	V/C
SR-73 to Brookhurst Street	NB	15.6	B	0.58	46.4	F	0.93	*	F	1.31	*	F	1.49	*	F	1.23	*	F	1.41	*	F	1.23	*	F	1.41	22.3	C	0.78	24.6	C	0.86
	SB	27.8	D	0.81	27.8	D	0.82	*	F	1.73	*	F	1.33	*	F	1.63	*	F	1.28	*	F	1.63	*	F	1.28	24.6	C	0.86	22.3	C	0.78
Brookhurst Street to SR-22 East	NB	28.2	D	0.85	30.9	F	1.08	*	F	1.64	*	F	1.76	*	F	1.37	*	F	1.47	41.4	F	1.17	*	F	1.26	22.3	C	0.78	24.6	C	0.86
	SB	25.4	D	0.88	36	E	0.99	*	F	1.89	*	F	1.61	*	F	1.57	*	F	1.34	35.8	F	1.35	39.2	F	1.15	24.6	C	0.86	22.7	C	0.80
SR-22 East to I-605	NB	27.7	D	0.94	32.5	F	1.01	*	F	1.50	*	F	1.37	*	F	1.25	*	F	1.26	42.8	F	1.12	43.6	F	1.13	26.2	D	0.92	26.2	D	0.92
	SB	52.7	D	0.67	52.7	F	1.05	*	F	1.43	*	F	1.41	*	F	1.31	*	F	1.22	*	F	1.31	*	F	1.22	26.2	D	0.92	26.2	D	0.92

NB – Northbound; SB – Southbound; HOV – High-Occupancy Vehicle; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; \* - Density not calculated under HCM because volume exceeds the range of the density algorithm; Shaded cells have lower V/C in 2040 than in 2009.  
Source: Albert Grover & Associates 2011.

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**Table 3.1.6-19: Peak-Period Hourly Throughput Comparison in the Area of Proposed Improvements  
for Northbound and Southbound I-405 –Year 2040**

Segment	Condition	Number of Lanes				GP Lanes		HOV Lanes		Express Lanes		Throughput (vph)				% Gain
		GP	HOV	Express	Total	LOS	V/C	LOS	V/C	LOS	V/C	GP	HOV	Express	Total	
SR-73 to Brookhurst Street	No Build	6	1	-	7	F	1.31	F	1.31	-	-	7,200	1,200	-	8,400	
	Alternative 1	6	1	-	7	F	1.23	F	1.23	-	-	7,200	1,200	-	8,400	0
	Alternative 2	6	1	-	7	F	1.23	F	1.23	-	-	7,200	1,200	-	8,400	0
	Alternative 3	6	-	2	8	F	1.17	-	-	C	0.86	7,200	-	3,200	10,400	24
Brookhurst Street to SR-22 East	No Build	4	1	-	5	F	1.61	F	1.61	-	-	4,800	1,200	-	6,000	
	Alternative 1	5	1	-	6	F	1.34	F	1.34	-	-	6,000	1,200	-	7,200	20
	Alternative 2	6	1	-	7	F	1.15	F	1.15	-	-	7,200	1,200	-	8,400	40
	Alternative 3	5	-	2	7	F	1.29	-	-	C	0.86	6,000	-	3,000	9,000	50
SR-22 East to I-605	No Build	6	2	-	8	F	1.47	F	1.37	-	-	7,200	2,400	-	9,600	
	Alternative 1	7	2	-	9	F	1.29	F	1.22	-	-	8,400	2,400	-	10,800	13
	Alternative 2	8	2	-	10	F	1.19	F	1.12	-	-	9,600	2,400	-	12,000	25
	Alternative 3	7	-	2	9	F	1.38	-	-	D	0.92	8,400	-	3,400	11,800	23

Notes:

1. GP = General Purpose; HOV = High-Occupancy Vehicle; V/C = volume-to-capacity ratio of demand volume based on lowest directional peak hour v/c from Table 3.1.6-12; Throughput units are vehicles per hour (vph). V/C ratios are provided principally to distinguish operations within LOS F. Higher v/c ratios mean greater levels of congestion.
2. Traffic flow throughput for each GP and HOV lane is 1,200 vph under congested (LOS F) conditions. Express Lanes will be managed to avoid congestion and maintain higher speeds and higher throughput.
3. Traffic flow throughput for each managed Express Lane is equivalent to forecast traffic.

*Vehicle Hours of Delay.* Table 3.1.6-8 presents the daily and annual VHD forecast to occur on I-405 on weekdays in 2020 and 2040. VHD is based on the number of additional hours of vehicle travel required within the corridor due to speeds lower than 65 mph on weekdays during peak periods when congestion reduces speeds and increases corridor travel times. Under the no-build condition in 2020, approximately **103,000 daily and 23 million annual VHD** are anticipated on I-405; in 2040 under the no-build condition, approximately **413,000 daily and 91 million annual VHD** are anticipated, compared to 19,000 daily and 4 million annual VHD under the existing condition.

Freeway Connector Volumes. Tables 3.1.6-9 and 3.1.6-20 provide the 2020 and 2040 forecast, respectively, of branch connector volumes and v/c ratios on ramps between freeways within the project limits. The branch connectors at SR-73 have three lanes in each direction. The branch connectors at SR-22 East have three lanes in the eastbound direction and two lanes in the westbound direction. The branch connectors at the SR-22 West (7<sup>th</sup> Street) and I-605 have two lanes in each direction. Table 3.1.6-9 includes the HOV direct connectors currently under construction at the I-405 interchanges with SR-22 East and I-605, both of which have a single lane in each direction. Branch connectors are forecast to operate with v/c ratios ranging from 0.63 to 1.20 in 2020 and from 0.68 to 1.41 in 2040 under the no-build condition, compared to 0.53 to 1.17 under existing conditions.

The following branch connectors are anticipated to operate with v/c ratios in excess of 1.00 in 2040 under the no-build condition:

- GP from westbound SR-22 to I-405 northbound during AM and PM peak hours;
- HOV from westbound SR-22 to I-405 northbound during AM and PM peak hours;
- GP from northbound I-405 to I-605 northbound during the PM peak hour;
- HOV from northbound I-405 to I-605 northbound during the PM peak hour;
- GP from southbound I-605 to I-405 southbound during AM and PM peak hours;
- HOV from southbound I-405 to SR-22 eastbound during AM and PM peak hours; and
- GP from southbound I-405 to SR-73 southbound during the AM peak hour.

Arterials, Intersections, and Interchanges. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2020 no-build conditions is provided in Table 3.1.6-1 for all study intersections. In 2020 under no-build conditions, the study intersections are anticipated to operate at LOS D or better, except for 12 intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both, compared to 5 intersections in the existing condition.

Table 3.1.6-20: 2040 Branch Connector Volumes and Volume-to-Capacity Ratios– Locations in Orange County

Branch Connector	Existing 2009				No Build – 2040				Alternative 1 – 2040				Alternative 2 – 2040				Alternative 3 – 2040			
	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	
	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C	Volume	V/C
NB GP On from NB SR-73	3,030	0.56	3,610	0.67	3,654	0.68	5,228	0.97	3,654	0.68	5,228	0.97	3,654	0.68	5,228	0.97	2,554	0.71	3,828	1.06
NB Express On from NB SR-73	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		1,000	0.67	1,400	0.93
NB On from WB SR-22	5,260	1.17	4,400	0.98	5,985	1.33	5,656	1.26	5,985	1.33	5,656	1.26	5,985	1.33	5,656	1.26	7,024	1.56	6,986	1.55
NB HOV/Express* On from WB SR-22	N/A		N/A		1,739	1.16	2,030	1.35	1,739	1.16	2,030	1.35	1,739	1.16	2,030	1.35	700	0.47	700	0.47
NB Off to WB SR-22	2,250	0.63	2,000	0.56	2,929	0.81	3,535	0.98	2,929	0.81	3,535	0.98	2,929	0.81	3,535	0.98	2,929	0.81	3,535	0.98
NB Off to NB I-605	3,050	0.85	3,750	1.04	3,513	0.98	5,060	1.41	3,513	0.98	5,060	1.41	3,513	0.98	5,060	1.41	3,482	0.97	5,661	1.57
NB HOV/Express* Off to NB I-605	N/A		N/A		1,469	0.98	2,101	1.40	1,469	0.98	2,101	1.40	1,469	0.98	2,101	1.40	1,500	1.00	1,500	1.00
SB GP On from SB I-605	3,776	1.05	3,632	1.01	4,992	1.39	4,020	1.12	4,992	1.39	4,020	1.12	4,992	1.39	4,020	1.12	4,920	1.37	3,603	1.00
SB HOV/Express* On from SB I-605	N/A		N/A		1,428	0.95	1,083	0.72	1,428	0.95	1,083	0.72	1,428	0.95	1,083	0.72	1,500	1.00	1,500	1.00
SB On from EB SR-22	2,067	0.57	2,868	0.80	3,074	0.85	3,112	0.86	3,074	0.85	3,112	0.86	3,074	0.85	3,112	0.86	3,074	0.85	3,112	0.86
SB Off to EB SR-22	5,313	0.98	5,647	1.05	5,242	0.97	5,232	0.97	5,188	0.96	5,158	0.96	5,188	0.96	5,158	0.96	7,580	1.40	7,520	1.39
SB HOV/Express* Off to EB SR-22	N/A		N/A		1,644	1.10	1,819	1.21	1,644	1.10	1,819	1.21	1,644	1.10	1,819	1.21	700	0.47	700	0.47
SB GP Off to SB SR-73	3,315	0.61	2,857	0.53	5,693	1.05	4,100	0.76	5,693	1.05	4,100	0.76	5,693	1.05	4,100	0.76	4,293	1.19	2,900	0.81
SB Express Off to SB SR-73	N/A		N/A		N/A		N/A		N/A		N/A		N/A		N/A		1,400	0.93	1,200	0.80

HOV – High-Occupancy Vehicle; LOS – Level of Service; V/C – Volume-to-Capacity ratio based on branch connector capacity of 1,800 per lane for GP branch connector lanes and 1,500 per lane for Express Lane direct connectors, which have a single lane in each direction.

\*For the no-build condition and Alternatives 1 and 2, the connector in this row is managed as an HOV facility. For Alternative 3, the connector in this row is managed as an Express Facility.

Source: Albert Grover & Associates 2011.

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Table 3.1.6-1 shows that the study intersections are anticipated to operate under capacity (v/c less than 1.00) in 2020 under no-build conditions during peak hours, except for 10 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. This compares to 2 intersections that are anticipated to operate over capacity under existing conditions.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2040 no-build conditions is provided in Table 3.1.6-1 for all study intersections. In 2040 under no-build conditions, the study intersections are anticipated to operate at LOS D or better, except for 16 intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both, compared to 5 intersections in the existing condition.

Table 3.1.6-1 shows that the study intersections are anticipated to operate under capacity (v/c less than 1.00) in 2040 under no-build conditions during peak hours, except for 14 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. This compares to 2 intersections that are anticipated to operate over capacity under existing conditions.

A comparison of vehicle queuing (higher of AM or PM peak-hour 95th percentile queues) in year 2040 with available storage (in feet) was conducted at all arterial interchange study intersections and is summarized in Table 3.1.6-11. Table 3.1.6-11 shows that 79 percent of off-ramps with traffic control at their arterial intersections are anticipated to have adequate turning lane storage under no-build conditions in 2040, compared to 91 percent under existing conditions. Table 3.1.6-11 also shows that 73 percent of arterials are anticipated to have adequate turning lane storage at ramp intersections under no-build conditions in 2040, compared to 89 percent under existing conditions. Additionally, Table 3.1.6-11 shows that 50 percent of turning lanes at arterial/arterial intersections are anticipated to have adequate storage under no-build conditions in 2040, compared to 67 percent under existing conditions. Finally, Table 3.1.6-11 shows that 73 percent of the on-ramps with ramp meters are anticipated to have sufficient storage to avoid queuing onto adjacent arterials under no-build conditions in 2040.

### **Alternative 1**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) Alternative 1 AM/PM peak-hour traffic volumes, along with lane schematics for the I-405 mainline and all interchange ramps within the project limits, are presented in Figures 3.1.6-11 and 3.1.6-15, respectively.

The Alternative 1 ADT along the I-405 mainline freeway in 2020 and 2040 is presented in Table 3.1.6-2. ADTs in 2020 for Alternative 1 range from 303,200 to 447,400 vpd, compared to the

range of 297,200 to 441,400 vpd for the No Build Alternative. ADTs in 2040 for Alternative 1 range from **334,000 to 499,000** compared to the range of 324,000 to 489,000 vpd for the No Build Alternative. As shown in Table 3.1.6-3, Alternative 1 daily VMT in the study corridor is forecast to be **4,867,000** in 2020 and **5,406,000** in 2040, compared to 4,804,000 in 2020 and 5,299,000 in 2040 under the No Build Alternative. The increase in ADT and VMT anticipated along the I-405 mainline results from reductions in congestion diversion from the freeway. Currently, motorists avoid I-405 and use local streets because the freeway is heavily congested. As traffic demand grows, this condition is expected to intensify under the No Build Alternative. VMT can be expected to increase on I-405 under the build alternatives because freeway congestion would be reduced with a consequential reduction in diversion from the freeway to local streets.

*V/C Ratio and LOS.* Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of Alternative 1 in 2020 for the GP lanes of the northbound and southbound freeway. Under Alternative 1 in year 2020, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2020 under Alternative 1 is **1.07 to 1.40** and **1.13 to 1.27** during the PM peak hour; the Alternative 1 v/c ratios are lower than the No Build Alternative by 0.07 to 0.27 for the AM peak hour and 0.05 to 0.26 for the PM peak hour. A more-detailed link-by-link presentation of the freeway mainline LOS under Alternative 1 Opening Year (2020) and Design Year (2040) traffic conditions for both GP and HOV lanes is included in Appendix L1 (Table O-11).

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of Alternative 1 in 2020 for the HOV lanes of the northbound and southbound freeway. Under Alternative 1 in year 2020, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2020 under Alternative 1 is **1.07 to 1.40** and **1.07 to 1.27** during the PM peak hour; the Alternative 1 v/c ratios are lower than the No Build Alternative by 0.07 to 0.27 for the AM peak hour and 0.05 to 0.26 for the PM peak hour.

Table 3.1.6-17 presents the LOS and v/c ratios for peak hours of Alternative 1 in 2040 for the GP lanes of the northbound and southbound freeway. Under Alternative 1 in year 2040, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions

under the No Build Alternative. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2040 under Alternative 1 is **1.23 to 1.63** and **1.28 to 1.47** during the PM peak hour; the Alternative 1 v/c ratios are lower than the No Build Alternative by 0.08 to 0.32 for the AM peak hour and 0.05 to 0.29 for the PM peak hour.

Table 3.1.6-18 presents the LOS and v/c ratios for peak hours of Alternative 1 in 2040 for the HOV lanes of the northbound and southbound freeway. Under Alternative 1 in year 2040, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2040 is **1.23 to 1.63** and **1.22 to 1.47** during the PM peak hour; the Alternative 1 v/c ratios are lower than the No Build Alternative by 0.08 to 0.32 for the AM peak hour and 0.05 to 0.29 for the PM peak hour.

The HOV lanes under Alternative 1 are assumed to have continuous access with no change in the HOV eligibility requirement of two persons per vehicle. The same observations regarding the lack of a speed incentive to use the carpool lanes in 2020 made for the No Build Alternative apply to Alternative 1.

A "build" option that has been considered is provision of dual HOV lanes in each direction. This option was considered during the MIS phase of project development and eliminated from further consideration as described in Section 2.2.5, Eliminated Alternative Developed after PSR/PDS. Another option that could be jointly considered by OCTA, Caltrans, and FHWA to restore the travel speed incentive to use the carpool lanes on I-405 would be to increase the eligibility requirement from two to three persons per vehicle. An HOV3+ occupancy policy was not considered, and should not have been considered, because it is not reasonable to change the HOV occupancy policy solely for the 12 miles of I-405 from Euclid Street to I-605 along which Alternative 1 proposes improvements. HOV occupancy requirements could reasonably be adopted for a much larger geography covering the entire county or southern California region, but this I-405 project is much more limited.

The GP and HOV lanes in Alternative 1 are anticipated to operate at LOS F during the peak hours in 2040. This is expected to result in reduced and unstable throughput. A summary of 2040 peak-hour throughput anticipated under Alternative 1 is presented in Table 3.1.6-19. Table 3.1.6-19 shows the number of lanes by type in each freeway study segment by direction and the throughput under the congested conditions that are anticipated. A volume of 1,200 vphpl is used for throughput with over-capacity conditions. As explained in the Traffic Study, LOS is characterized by unstable speeds and vehicle throughput, such as occurs under "stop-and-go"

conditions. Vehicle throughput ranges from zero when traffic is at a full stop to as much as 1,850 vphpl. Because traffic speeds and throughput are unstable, an average throughput value of 1,200 vphpl is used for LOS F conditions. Table 3.1.6-19 shows the total throughput anticipated in 2040 across all lanes. For Alternative 1, the throughput ranges from **7,200 to 10,800 vph**, which is an increase of 1,200 compared to the no-build condition with its range of 6,000 to 9,600.

The TSM and TDM measures included in Alternative 1 (identified in Section 2.2.2.1, Common Design Features of the Build Alternatives) are expected to improve operations as freeway operations begin to break down during peak periods. Ramp metering will reduce congestion at entrance ramp merges, auxiliary lanes at on-ramps and off-ramps will improve operations in the influence zones of those ramp junctions, and ITS elements will improve incident response and keep motorists better informed of conditions through information posted on changeable message signs and online traffic condition sites. These measures are not expected to eliminate the LOS F conditions expected during peak periods, but they are expected to provide incremental benefits as the freeway approaches LOS F and marginally reduce the duration of the LOS F conditions.

*Peak-Period Performance.* Table 3.1.6-6 shows forecast Alternative 1 speeds for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Forecast year 2040 speeds for Alternative 1 in the GP lanes during peak hours range from **9 to 25 mph**, compared to no-build condition speeds of 5 to 8 mph. Forecast year 2040 Alternative 1 speeds in the HOV lanes during peak hours range from **10 to 27 mph**, compared to no-build condition speeds of 6 to 9 mph. For both lane types combined, average speeds weighted for the volumes using each lane type range from **9 to 25 mph** in 2040 under Alternative 1, compared to no-build average speeds of 5 to 8 mph.

*Corridor Travel Time.* Table 3.1.6-7 shows forecast Alternative 1 corridor travel time for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-7 also shows the average travel time across both lane types. Forecast year 2040 Alternative 1 travel time in the GP lanes during peak hours ranges from **33 to 89 minutes**, compared to 107 to 163 minutes under the no-build condition. Forecast year 2040 Alternative 1 travel time in the HOV lanes during peak hours ranges from **30 to 85 minutes**, compared to 95 to 147 minutes under the no-build condition. For both lane types combined, average travel time under Alternative 1 in year 2040, weighted for the volumes using each lane type, ranges from **32 to 88 minutes**, compared to 105 to 160 minutes under no-build conditions.

*Vehicle Hours of Delay.* Table 3.1.6-8 presents the daily and annual VHD forecast to occur on I-405 on weekdays in 2020 and 2040. VHD is based on the number of additional hours of vehicle travel required within the corridor due to speeds lower than 65 mph on weekdays during peak

periods when congestion reduces speeds and increases corridor travel times. Under Alternative 1 in 2020, approximately **27,000 daily and 6 million annual VHD** are anticipated on I-405, compared to 103,000 daily and 23 million annual VHD under the no-build condition. In 2040 under Alternative 1, approximately **147,000 daily and 32 million annual VHD** are anticipated, compared to 413,000 daily and 91 million annual VHD under the no-build condition.

Freeway Connector Volumes. As noted above under the heading “Traffic Forecasting Model,” a single traffic demand forecast was used for the study area within Orange County. No geometric changes are proposed for the branch connectors under Alternative 1, so the freeway connector volumes and operations are the same for Alternative 1 as for the no-build condition. Seven of the branch connectors, including GP and HOV connectors, are anticipated to operate with v/c ratios in excess of 1.00 in 2040. In no instance would additional lanes on branch connectors be feasible. Ramp metering was considered as a means to improve connector operations, but it was not included in the project because it would further reduce the capacity of the branch connectors.

Arterials, Intersections, and Interchanges. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2020 Alternative 1 conditions is provided in Table 3.1.6-1 for all study intersections. Alternative 1 conditions appear on Table 3.1.6-1 under the “Build Traffic on No Build Geometry” heading, where forecast Alternative 1 traffic is evaluated on no-build lanes and traffic control. In 2020 under Alternative 1, the study intersections are anticipated to operate at LOS D or better, except for 12 intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both; these same 12 intersections are anticipated to operate at LOS E or F under no-build conditions in 2020.

Table 3.1.6-1 shows that the study intersections are anticipated to operate under capacity (v/c less than 1.00) in 2020 under Alternative 1 during peak hours, except for 9 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. This compares to 10 intersections, including the 9 intersections under Alternative 1, that are anticipated to operate over capacity under the no-build condition in 2020.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2040 Alternative 1 conditions is provided in Table 3.1.6-1 for all study intersections. In 2040 under Alternative 1, the study intersections are anticipated to operate at LOS D or better, except for 15 intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both, compared to 16 intersections under no-build conditions in 2040. Of the 15 intersections anticipated to operate over capacity in 2040 under Alternative 1, 14 are also anticipated to operate over capacity under the no-build condition, with only 1 intersection (I-405 northbound

ramps at Seal Beach Boulevard) anticipated to operate at LOS E or F under Alternative 1 but anticipated to operate at LOS D or better under the no-build condition.

Table 3.1.6-1 shows that the study intersections are anticipated to operate under capacity (v/c less than 1.00) in 2040 under Alternative 1 during peak hours, except for 12 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. This compares to 14 intersections, including the 12 intersections under Alternative 1, that are anticipated to operate over capacity under no-build conditions in 2040.

Table 3.1.6-1 shows that the project has an adverse effect on the following eight study intersections:

Slater Avenue/Brookhurst Street (2040: AM and PM peak hours, LOS F, v/c 0.12 and 0.04 greater under Alternative 1 than under the No Build Alternative in the AM and PM peak hours, respectively)

Talbert Avenue/Brookhurst Street (2040: PM peak hour, LOS F, v/c 0.07 greater under Alternative 1 than under the No Build Alternative)

Warner Avenue/Magnolia Street (2040: AM and PM peak hours, LOS F, v/c 0.03 and 0.05 greater under Alternative 1 than under the No Build Alternative in the AM and PM peak hours, respectively)

McFadden Avenue/Beach Boulevard (2040: AM peak hour, LOS F, v/c 0.04 greater under Alternative 1 than under the No Build)

Center Avenue/Beach Boulevard (2040: PM peak hour, LOS F, v/c 0.04 greater under Alternative 1 than under the No Build Alternative)

Edinger Avenue/Beach Boulevard (2020: PM peak hour, LOS F, v/c 0.03 greater under Alternative 1 than under the No Build Alternative; 2040: AM and PM peak hours, LOS F, v/c 0.06 and 0.07 greater under Alternative 1 than under the No Build Alternative in the AM and PM peak hours, respectively)

Bolsa Avenue/Goldenwest Street (2040: PM peak hour, LOS F, v/c 0.09 greater under Alternative 1 than under the No Build Alternative)

Garden Grove Boulevard/Bolsa Chica Road/Valley View Street (2020: PM peak hour, LOS F, v/c 0.03 greater under Alternative 1 than under the No Build Alternative; 2040: PM peak hour, LOS F, v/c 0.04 greater under Alternative 1 than under the No Build Alternative)

Measures to Lessen Traffic Impacts at Intersections. The mitigations listed in Section 3.1.6.4 are proposed to address the adverse effects at the intersections identified above.

Table 3.1.6-21 provides a summary of the LOS analysis and v/c ratios for all study intersections during AM and PM peak hours anticipated in 2020 under Alternative 1 with all improvements, including the mitigations identified above. Alternative 1 with all improvements, including mitigations, appear on the tables under the heading “Build Traffic on Build Geometry including Mitigations.” Table 3.1.6-21 shows that, with all improvements including mitigations, Alternative 1 does not have an adverse effect on any study intersection. In 2020 under Alternative 1 with all improvements including mitigations, Table 3.1.6-21 shows that 36 study intersections with traffic control are anticipated to operate at LOS D or better, while 5 intersections are anticipated to operate at LOS E or F during either the AM or PM peak hour or both; 12 intersections, including the 5 intersections under Alternative 1, are anticipated to operate at LOS E or F under no-build conditions in 2020.

Table 3.1.6-21 shows that, in 2020 under Alternative 1 with all improvements including mitigations, the 69 study intersections are anticipated to operate under capacity (v/c less than 1.00) during peak hours, except for 4 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. This compares to 10 intersections, including the 4 intersections under Alternative 1, that are anticipated to operate over capacity under the no-build condition in 2020.

Table 3.1.6-21 provides a summary of the LOS analysis and v/c ratios for all study intersections during AM and PM peak hours anticipated in 2040 under Alternative 1 with all improvements, including the mitigations identified above. Table 3.1.6-21 shows that, with all improvements including mitigations, Alternative 1 does not have an adverse effect on any study intersection. In 2040 under Alternative 1 with all improvements including mitigations, Table 3.1.6-21 shows that 30 study intersections with traffic control are anticipated to operate at LOS D or better, while 11 intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both; 16 intersections, including the 11 intersections under Alternative 1, are anticipated to operate at LOS E or F under no-build conditions in 2040.

Table 3.1.6-21 shows that, in 2040 under Alternative 1 with all improvements including mitigations, the 69 study intersections are anticipated to operate under capacity (v/c less than 1.00) during peak hours, except for 9 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. This compares to 14 intersections, including the 9 intersections under Alternative 1, that are anticipated to operate over capacity under the no-build condition in 2040.

A comparison of vehicle queuing (higher of AM or PM peak-hour 95<sup>th</sup> percentile queues) in year 2040 with available storage (in feet) was conducted at all arterial interchange study intersections

and is summarized in Table 3.1.6-11. Table 3.1.6-11 shows that 100 percent of off-ramps with traffic control at their arterial intersections are anticipated to have adequate turning lane storage under Alternative 1 in 2040, compared to 79 percent under no-build conditions. No off-ramps are anticipated to back onto the freeway mainline.

Table 3.1.6-11 also shows that 86 percent of arterials are anticipated to have adequate turning lane storage at ramp intersections under Alternative 1 in 2040, compared to 73 percent under no-build conditions. One of the seven locations anticipated to have inadequate storage for 95<sup>th</sup> percentile queues has more storage under Alternative 1 than under the No Build Alternative. The remaining six locations are generally physically constrained by distance to adjacent intersections, provision of back-to-back left-turn pockets with adjacent intersections, or other features.

Additionally, Table 3.1.6-11 shows that 80 percent of turning lanes at arterial/arterial intersections are anticipated to have adequate storage under Alternative 1 in 2040, compared to 50 percent under no-build conditions. Six of the 14 locations anticipated to have inadequate storage for 95<sup>th</sup> percentile queues has more storage under Alternative 1 than under the No Build Alternative. The remaining 8 locations are generally physically constrained by distance to adjacent intersections, provision of back-to-back left-turn pockets with adjacent intersections, or other features.

Finally, Table 3.1.6-11 shows that 95 percent of the on-ramps with ramp meters are anticipated to have sufficient storage to avoid queuing onto adjacent arterials under Alternative 1 in 2040, compared to 73 percent under no-build conditions. There are two on-ramps that are not anticipated to have adequate storage under Alternative 1. They are also not anticipated to have adequate storage under the No Build Alternative. The condition is not caused by the proposed project, and the proposed project would result in neither a better nor worse condition on the ramps. The two ramps are outside the limits of all improvements under Alternatives 1 and 2; the two ramps are outside the limits of interchange improvements in Alternative 3 in a location where the only proposed improvements are signing and striping of the freeway transition areas associated with the Express Lane terminations.

## **Alternative 2**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) Alternative 2 AM/PM peak-hour traffic volumes, along with lane schematics for the I-405 mainline and all interchange ramps within the project limits, are presented in Figures 3.1.6-12 and 3.1.6-16, respectively.

Table 3.1.6-21: Year 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Mitigations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009												Year 2020												Year 2040											
				Existing Traffic						No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						No Build- Build Adverse Effect	No Build Traffic on No Build Geometry						Build Traffic on Build Geometry including Mitigations						No Build- Build Adverse Effect				
				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							
				V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	
Bristol Street	I-405 NB off-ramp/ South Coast Drive	Bristol Street	Sig	0.45	16.4	B	0.73	30.4	C	0.59	19.7	B	0.86	37.1	D	0.59	18.8	B	0.90	38.7	D	N	0.70	24.4	C	0.96	44.2	D	0.71	21.9	C	0.98	46.0	D	N				
	I-405 NB On-Ramp (from NB Bristol Street)	Bristol Street	None	0.08	--	--	0.21	--	--	0.10	--	--	0.22	--	--	0.10	--	--	0.22	--	--	--	0.10	--	--	0.23	--	--	0.10	--	--	0.23	--	--	--				
	I-405 NB On-Ramp (from SB Bristol Street)	Bristol Street	None	0.20	--	--	0.15	--	--	0.23	--	--	0.16	--	--	0.23	--	--	0.16	--	--	--	0.25	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--				
	I-405 SB ramps	Bristol Street	Sig	0.61	15.8	B	0.80	14.8	B	0.63	16.6	B	0.95	19.2	B	0.63	15.5	B	0.96	19.3	B	N	0.68	16.3	B	<b>1.03</b>	<b>27.6</b>	<b>F*</b>	0.67	17.2	B	<b>1.05</b>	<b>32.0</b>	<b>F*</b>	N				
Fairview Road and South Coast Drive	I-405 NB ramps	Fairview Road	Sig	0.93	28.4	C	0.93	24.1	C	<b>1.06</b>	<b>44.0</b>	<b>F*</b>	<b>1.02</b>	<b>35.1</b>	<b>F*</b>	<b>1.07</b>	<b>44.5</b>	<b>F*</b>	<b>1.02</b>	<b>32.9</b>	<b>F*</b>	N	<b>1.14</b>	<b>55.5</b>	<b>F*</b>	<b>1.06</b>	<b>41.8</b>	<b>F*</b>	<b>1.15</b>	<b>56.6</b>	<b>F*</b>	<b>1.08</b>	<b>45.8</b>	<b>F*</b>	N				
	I-405 SB ramps	Fairview Road	Sig	0.79	16.0	B	0.72	17.6	B	0.91	20.5	C	0.76	19.7	B	0.92	20.1	C	0.77	18.5	B	N	0.97	24.8	C	0.79	19.7	B	0.99	25.7	C	0.81	20.1	C	N				
	South Coast Drive	I-405 NB off-ramp	Sig	0.19	21.0	C	0.35	24.9	C	0.23	21.6	C	0.39	26.3	C	0.24	21.8	C	0.40	27.1	C	N	0.25	22.0	C	0.41	28.3	C	0.27	22.4	C	0.43	30.8	C	N				
Harbor Boulevard and Hyland Avenue	I-405 NB on-ramp/ South Coast Drive	Hyland Avenue	Sig	0.26	8.7	A	0.58	8.0	A	0.42	7.8	A	0.64	9.3	A	0.42	7.8	A	0.64	9.3	A	N	0.57	9.5	A	0.72	12.0	B	0.52	7.9	A	0.67	10.1	B	N				
	I-405 SB On-Ramp (from SB Harbor Boulevard)	Harbor Boulevard	None	0.60	--	--	0.65	--	--	0.65	--	--	0.69	--	--	0.65	--	--	0.69	--	--	--	0.67	--	--	0.72	--	--	0.67	--	--	0.72	--	--	--				
	I-405 NB off-ramp	Harbor Boulevard	Sig	0.55	19.7	B	0.75	28.3	C	0.61	20.3	C	0.78	28.6	C	0.61	19.5	B	0.78	28.5	C	N	0.63	20.6	C	0.81	29.4	C	0.65	20.2	C	0.81	29.4	C	N				
	I-405 NB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.31	--	--	0.38	--	--	0.33	--	--	0.40	--	--	0.33	--	--	0.40	--	--	--	0.35	--	--	0.42	--	--	0.35	--	--	0.42	--	--	--				
	I-405 SB off-ramp	Harbor Boulevard	Sig	0.58	18.3	B	0.71	18.1	B	0.63	18.6	B	0.77	19.5	B	0.63	18.4	B	0.77	19.4	B	N	0.65	18.9	B	0.81	20.9	C	0.67	18.9	B	0.80	20.8	C	N				
	I-405 SB On-Ramp (from NB Harbor Boulevard)	Harbor Boulevard	None	0.42	--	--	0.23	--	--	0.45	--	--	0.25	--	--	0.45	--	--	0.25	--	--	--	0.46	--	--	0.26	--	--	0.46	--	--	0.26	--	--	--				
	Gisler Avenue	Harbor Boulevard	Sig	0.71	26.8	C	0.87	31.8	C	0.77	30.4	C	0.90	33.6	C	0.80	30.6	C	0.89	33.1	C	N	0.80	32.2	C	0.97	40.3	D	0.82	32.8	C	0.96	39.3	D	N				
Ikea Way	Susan Street/ I-405 NB off-ramp	Sig	0.26	2.9	A	0.33	8.0	A	0.31	6.2	A	0.36	8.5	A	0.32	6.4	A	0.36	8.4	A	N	0.35	7.7	A	0.38	8.8	A	0.35	8.0	A	0.37	8.6	A	N					
Euclid Street and Ellis Avenue	I-405 NB ramps/ Newhope Street	Euclid Street	Sig	0.48	33.0	C	0.64	37.8	D	0.59	31.3	C	0.82	43.7	D	0.56	30.7	C	0.83	43.9	D	N	0.66	34.2	C	0.91	50.9	D	0.64	31.0	C	0.91	49.0	D	N				
	Ellis Avenue/Euclid Street	I-405 SB ramps	Sig	0.94	46.3	D	0.98	51.2	D	<b>1.14</b>	<b>82.2</b>	<b>F</b>	<b>1.30</b>	<b>141.7</b>	<b>F</b>	N/A			N/A			N	<b>1.37</b>	<b>158.7</b>	<b>F</b>	<b>1.51</b>	<b>186.3</b>	<b>F</b>	N/A			N/A			N				
	Ellis Avenue/Euclid Street	I-405 SB ramps (from SB Euclid)	Sig	N/A			N/A			N/A			N/A			0.64	19.2	B	0.76	17.2	B		N	N/A			N/A			0.73	22.1	C	0.89	20.0	B				
	Ellis Avenue EB	Proposed I-405 SB ramp	None	N/A			N/A			N/A			N/A			0.75	--	--	0.51	--	--		N	N/A			N/A			0.99	--	--	0.60	--	--				
Slater Avenue	Brookhurst Street	Sig	0.93	46.5	D	0.81	38.3	D	<b>1.03</b>	<b>57.4</b>	<b>F*</b>	0.91	47.0	D	<b>1.00</b>	<b>54.3</b>	<b>F*</b>	0.89	42.7	D	N		<b>1.05</b>	<b>67.8</b>	<b>F*</b>	<b>0.97</b>	<b>57.6</b>	<b>E</b>	<b>1.05</b>	<b>62.8</b>	<b>F*</b>	0.95	52.3	D	N				
Brookhurst Street and Talbert Avenue	I-405 NB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.08	--	--	0.11	--	--	0.12	--	--	0.23	--	--	0.24	--	--	--	0.14	--	--	0.14	--	--	0.29	--	--	0.28	--	--	--				
	I-405 NB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.32	--	--	0.41	--	--	0.39	--	--	0.62	--	--	N/A			N/A			N	0.43	--	--	0.76	--	--	N/A			N/A			N				
	I-405 NB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.36	--	--	0.29	--	--	0.42	--	--	0.31	--	--	N/A			N/A				N	0.45	--	--	0.32	--	--	N/A			N/A			N			
	I-405 NB Off-Ramp (to NB & SB Brookhurst Street)	Brookhurst Street	Sig	N/A			N/A			N/A			N/A			0.62	13.4	B	0.70	18.4	B		N	N/A			N/A			0.66	13.9	B	0.72	19.2	B				
	I-405 NB On-Ramp (from NB Brookhurst Street)	Brookhurst Street	None	0.42	--	--	0.43	--	--	0.52	--	--	0.57	--	--	0.52	--	--	0.57	--	--		--	0.58	--	--	0.67	--	--	0.58	--	--	0.67	--	--	--			

**Table 3.1.6-21: Year 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Mitigations for the Build Alternatives – Locations in Orange County**

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020										Year 2040															
				Existing Traffic						No Build Traffic on No Build Geometry			Build Traffic on Build Geometry including Mitigations							No Build-Adverse Effect	No Build Traffic on No Build Geometry					Build Traffic on Build Geometry including Mitigations					No Build-Adverse Effect				
				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		
				East/West Street	North/South Street	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)		LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C
Talbert Avenue	I-405 SB On-Ramp (from SB Brookhurst Street)	Brookhurst Street	None	0.83	--	--	0.45	--	--	0.88	--	--	0.48	--	--	0.44	--	--	0.24	--	--	--	0.92	--	--	0.50	--	--	0.46	--	--	0.25	--	--	--
	I-405 SB Off-Ramp (to NB Brookhurst Street)	Brookhurst Street	None	0.06	--	--	0.13	--	--	0.06	--	--	0.14	--	--	N/A			N/A				N	0.07	--	--	0.14	--	--	N/A			N/A		N
	I-405 SB Off-Ramp (to SB Brookhurst Street)	Brookhurst Street	None	0.45	--	--	0.45	--	--	0.48	--	--	0.50	--	--	N/A			N/A					0.50	--	--	0.53	--	--	N/A			N/A		
	I-405 SB Off-Ramp (to NB & SB Brookhurst Street)	Brookhurst Street	Sig	N/A			N/A			N/A			N/A				0.55	16.3	B	0.54	14.5	B		N/A			N/A		0.59	15.2	B	0.58	14.9	B	
	Talbert Avenue	Brookhurst Street	Sig	0.95	47.3	D	0.90	47.8	D	<b>1.24</b>	<b>92.8</b>	<b>F</b>	<b>0.99</b>	<b>58.2</b>	<b>E</b>	<b>1.24</b>	<b>92.7</b>	<b>F</b>	0.92	48.1	D	N	<b>1.40</b>	<b>123.5</b>	<b>F</b>	<b>1.05</b>	<b>70.7</b>	<b>F*</b>	<b>1.18</b>	<b>94.1</b>	<b>F</b>	<b>1.04</b>	<b>66.0</b>	<b>F*</b>	N
	Talbert Avenue	I-405 SB On-Ramp (from EB Talbert Avenue)	None	0.69	--	--	0.46	--	--	0.74	--	--	0.50	--	--	0.37	--	--	0.25	--	--	--	0.77	--	--	0.52	--	--	0.38	--	--	0.26	--	--	--
Magnolia Street and Warner Avenue	Heil Avenue	Magnolia Street	Sig	0.75	22.3	C	0.51	16.1	B	0.82	25.2	C	0.63	18.5	B	0.83	26.7	C	0.65	18.4	B	N	0.87	28.7	C	0.71	20.3	C	0.89	33.0	C	0.78	22.3	C	N
	I-405 NB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.07	--	--	0.05	--	--	0.09	--	--	0.05	--	--	0.17	--	--	0.10	--	--	--	0.09	--	--	0.05	--	--	0.19	--	--	0.10	--	--	N
	I-405 NB Off-Ramp (to NB Magnolia Street)	Magnolia Street	None	0.13	--	--	0.34	--	--	0.16	--	--	0.45	--	--	N/A			N/A				N	0.17	--	--	0.52	--	--	N/A			N/A		N
	I-405 NB On-Ramp (from NB Magnolia Street)	Magnolia Street	None	0.37	--	--	0.26	--	--	0.40	--	--	0.28	--	--	N/A			N/A					0.42	--	--	0.30	--	--	N/A			N/A		
	I-405 NB Ramps (to NB & SB Magnolia, from NB Magnolia)	Magnolia Street	Sig	N/A			N/A			N/A				0.47	1.3	A	0.70	6.1	A	N/A				N/A		0.52	1.3	A	0.82	10.3	B	N/A			
	I-405 SB On-Ramp (from SB Magnolia Street)	Magnolia Street	None	0.66	--	--	0.23	--	--	0.71	--	--	0.24	--	--	0.77	9.6	A	0.71	10.9	B	N	0.73	--	--	0.25	--	--	0.85	11.7	B	0.80	20.7	C	N
	I-405 SB off-ramp (to NB and SB Magnolia Street)	Magnolia Street	Sig	0.88	23.1	C	0.77	18.0	B	0.97	36.7	D	0.83	16.7	B								0.86	46.0	D	0.88	43.8	D							
	Warner Avenue	Magnolia Street	Sig	0.91	44.8	D	0.94	47.6	D	<b>0.98</b>	<b>53.1</b>	<b>D</b>	<b>1.01</b>	<b>53.8</b>	<b>F*</b>	0.86	46.0	D	0.88	43.8	D	N	<b>1.00</b>	<b>62.6</b>	<b>F*</b>	<b>1.07</b>	<b>63.0</b>	<b>F*</b>	0.99	54.4	D	<b>1.01</b>	<b>58.9</b>	<b>F*</b>	N
	I-405 SB On-Ramp (from EB Warner Avenue)	Warner Avenue	None	0.45	--	--	0.23	--	--	0.46	--	--	0.24	--	--	0.46	--	--	0.24	--	--	--	0.47	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--
	I-405 SB Off-Ramp (to EB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.36	--	--	0.35	--	--	0.38	--	--	0.35	--	--	0.38	--	--	--	0.46	--	--	0.40	--	--	0.46	--	--	0.40	--	--	--
	I-405 NB Off-Ramp (to WB Warner Avenue)	Warner Avenue	None	0.32	--	--	0.42	--	--	0.34	--	--	0.52	--	--	0.34	--	--	0.52	--	--	--	0.35	--	--	0.59	--	--	0.35	--	--	0.59	--	--	--
	I-405 NB On-Ramp (from WB Warner Avenue)	Warner Avenue	None	0.17	--	--	0.27	--	--	0.18	--	--	0.29	--	--	0.18	--	--	0.29	--	--	--	0.19	--	--	0.30	--	--	0.19	--	--	0.30	--	--	--
Beach Boulevard and Edinger Avenue	McFadden Avenue	Beach Boulevard	Sig	0.94	46.3	D	<b>0.97</b>	<b>60.9</b>	<b>E</b>	<b>1.03</b>	<b>72.5</b>	<b>F*</b>	<b>1.05</b>	<b>74.7</b>	<b>F*</b>	<b>1.02</b>	<b>62.2</b>	<b>F*</b>	<b>1.01</b>	<b>64.7</b>	<b>F*</b>	N	<b>1.11</b>	<b>81.8</b>	<b>F</b>	<b>1.13</b>	<b>86.6</b>	<b>F</b>	<b>1.09</b>	<b>78.2</b>	<b>F*</b>	<b>1.02</b>	<b>75.7</b>	<b>F*</b>	N
	I-405 NB On-Ramp (from SB Beach Boulevard)	Beach Boulevard	None	0.18	--	--	0.17	--	--	0.19	--	--	0.18	--	--	N/A			N/A				N	0.20	--	--	0.19	--	--	N/A			N/A		N
	I-405 NB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.56	--	--	0.60	--	--	0.58	--	--	0.64	--	--	N/A			N/A					0.59	--	--	0.67	--	--	N/A			N/A		
	I-405 NB Off-Ramp (to SB Beach Boulevard)	Beach Boulevard	None	0.46	--	--	0.47	--	--	0.49	--	--	0.62	--	--	N/A			N/A					0.51	--	--	0.72	--	--	N/A			N/A		
	I-405 NB On-Ramp (from NB Beach Boulevard)	Beach Boulevard	None	0.51	--	--	0.61	--	--	0.55	--	--	0.67	--	--	N/A			N/A				0.58	--	--	0.71	--	--	N/A			N/A			
	I-405 NB Ramps	Beach Boulevard	Sig	N/A			N/A			N/A				N/A				0.71	14.8	B	0.80	16.4	B	N/A			N/A		0.77	15.6	B	0.86	19.0	B	

Table 3.1.6-21: Year 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Mitigations for the Build Alternatives – Locations in Orange County

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020										Year 2040															
				Existing Traffic						No Build Traffic on No Build Geometry			Build Traffic on Build Geometry including Mitigations							No Build- Build Adverse Effect	No Build Traffic on No Build Geometry					Build Traffic on Build Geometry including Mitigations					No Build- Build Adverse Effect				
				AM Peak Hour			PM Peak Hour			AM Peak Hour			PM Peak Hour			AM Peak Hour					PM Peak Hour			AM Peak Hour			PM Peak Hour								
				V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C		Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)		LOS	V/C	Avg Delay (sec)	LOS
	Center Avenue	Beach Boulevard	Sig	0.72	18.2	B	0.83	17.6	B	0.82	11.5	B	0.93	27.2	C	0.82	12.9	B	0.87	18.0	B	N	0.92	19.5	B	<b>1.00</b>	<b>37.8</b>	<b>F*</b>	0.91	18.3	B	0.95	26.6	C	N
	Center Avenue (Huntington Beach Mall)	I-405 SB ramps	Sig	0.43	15.3	B	0.77	22.9	C	0.58	16.9	B	0.86	28.1	C	0.54	18.8	B	0.74	24.7	C	N	0.65	17.5	B	0.92	36.4	D	0.65	18.9	B	0.83	26.7	C	N
	I-405 SB Off-Ramp (to NB Beach Boulevard)	Beach Boulevard	None	0.03	--	--	0.10	--	--	0.03	--	--	0.11	--	--	N/A				N/A		N	0.03	--	--	0.11	--	--	N/A				N/A	N/A	N
	Edinger Avenue	Beach Boulevard	Sig	<b>0.94</b>	<b>55.1</b>	<b>E</b>	<b>0.99</b>	<b>59.1</b>	<b>E</b>	<b>1.06</b>	<b>60.6</b>	<b>F*</b>	<b>1.05</b>	<b>66.6</b>	<b>F*</b>	0.97	50.0	D	<b>0.98</b>	<b>62.7</b>	<b>E</b>	N	<b>1.15</b>	<b>78.9</b>	<b>F*</b>	<b>1.11</b>	<b>79.4</b>	<b>F*</b>	<b>1.06</b>	<b>62.9</b>	<b>F*</b>	<b>1.07</b>	<b>82.7</b>	<b>F</b>	N
	Edinger Avenue	I-405 SB On-Ramp	None	0.60	--	--	0.50	--	--	0.67	--	--	0.52	--	--	0.33	--	--	0.26	--	--	--	0.71	--	--	0.54	--	--	0.35	--	--	0.27	--	--	--
Goldenwest Street and Bolsa Avenue	I-405 NB On-Ramp (from NB Goldenwest Street)	Goldenwest Street	None	0.50	--	--	0.53	--	--	0.55	--	--	0.59	--	--	0.28	--	--	0.30	--	--	--	0.58	--	--	0.63	--	--	0.29	--	--	0.32	--	--	--
	Westminster Mall	I-405 SB ramps	Sig	0.31	6.5	A	0.37	8.9	A	0.36	6.9	A	0.40	9.9	A	0.36	7.1	A	0.40	9.6	A	N	0.39	6.8	A	0.42	10.4	B	0.39	8.1	A	0.43	10.1	B	N
	Westminster Mall	Goldenwest Street	Sig	0.65	9.3	A	0.61	10.5	B	0.71	10.5	B	0.69	12.1	B	0.59	9.3	A	0.59	7.4	A	N	0.76	11.7	B	0.75	13.2	B	0.69	11.1	B	0.69	10.2	B	N
	Bolsa Avenue	Goldenwest Street	Sig	0.68	36.0	D	0.95	49.4	D	<b>0.76</b>	<b>36.8</b>	<b>D</b>	<b>1.00</b>	<b>61.8</b>	<b>F*</b>	0.71	35.5	D	0.82	45.3	D	N	0.80	38.2	D	<b>1.04</b>	<b>72.0</b>	<b>F*</b>	0.74	37.5	D	<b>0.99</b>	<b>59.3</b>	<b>E</b>	N
	I-405 SB On-Ramp (from EB Bolsa Avenue)	Bolsa Avenue	None	0.22	--	--	0.49	--	--	0.23	--	--	0.51	--	--	0.11	--	--	0.25	--	--	--	0.23	--	--	0.52	--	--	0.12	--	--	0.26	--	--	--
	I-405 SB Off-Ramp (to EB Bolsa Avenue)	Bolsa Avenue	Stop	0.35	10.7	B	0.15	10.3	B	0.38	11.0	B	0.17	10.5	B	0.35	10.4	B	0.15	10.1	B	N	0.40	11.3	B	0.18	10.7	B	0.37	10.7	B	0.16	10.2	B	N
	I-405 NB Off-Ramp (to WB Bolsa Avenue)	Bolsa Avenue	None	0.53	--	--	0.47	--	--	0.58	--	--	0.51	--	--	0.58	--	--	0.51	--	--	--	0.61	--	--	0.54	--	--	0.61	--	--	0.54	--	--	--
Springdale Street and Westminster Avenue	I-405 SB off-ramp	Springdale Street	Stop*	<b>0.47</b>	<b>28.1</b>	<b>D</b>	<b>0.60</b>	<b>36.1</b>	<b>E</b>	<b>0.67</b>	<b>47.9</b>	<b>E</b>	<b>0.69</b>	<b>45.9</b>	<b>E</b>	N/A				N/A		N	<b>0.83</b>	<b>76.2</b>	<b>F</b>	<b>0.85</b>	<b>75.8</b>	<b>F</b>	N/A				N/A	N/A	N
			Sig	N/A			N/A			N/A			N/A			0.35	9.6	A	0.40	9.0	A	N	N/A			N/A			0.38	9.9	A	0.42	9.2	A	N
	Westminster Avenue	Springdale Street	Sig	0.76	39.9	D	0.79	40.1	D	0.83	42.0	D	0.89	44.9	D	0.88	44.2	D	0.89	47.3	D	N	0.84	44.1	D	<b>0.98</b>	<b>60.7</b>	<b>E</b>	0.89	47.1	D	<b>0.97</b>	<b>56.8</b>	<b>E</b>	N
	I-405 SB On-Ramp	Westminster Avenue	None	0.24	--	--	0.30	--	--	0.26	--	--	0.32	--	--	0.51	--	--	0.65	--	--	--	0.27	--	--	0.34	--	--	0.27	--	--	0.34	--	--	--
	I-405 SB Off-Ramp (to EB Westminster Avenue)	Westminster Avenue	None	0.16	--	--	0.15	--	--	0.18	--	--	0.16	--	--	0.18	--	--	0.16	--	--	--	0.19	--	--	0.16	--	--	0.19	--	--	0.16	--	--	--
	I-405 NB Off-Ramp (to WB Westminster Avenue)	Westminster Avenue	None	0.40	--	--	0.38	--	--	0.43	--	--	0.43	--	--	N/A				N/A		N	0.44	--	--	0.47	--	--	N/A				N/A	N/A	N
				0.30	--	--	0.28	--	--	0.32	--	--	0.30	--	--	N/A				N/A		N	0.34	--	--	0.32	--	--	N/A				N/A	N/A	N
	I-405 NB Ramps (to EB & WB Westminster Avenue)	Westminster Avenue	Sig	N/A			N/A			N/A			N/A			0.64	21.0	C	0.74	16.5	B	N	N/A			N/A			0.67	21.7	C	0.80	17.9	B	N
Westminster Avenue	Willow Lane	Sig	0.50	14.1	B	0.53	12.6	B	0.58	14.6	B	0.65	14.7	B	0.56	15.1	B	0.61	11.5	B	N	0.61	15.4	B	0.72	19.2	B	0.61	15.6	B	0.68	11.8	B	N	
Bolsa Chica Road/ Valley View Street/ Garden Grove Boulevard	Garden Grove Boulevard	I-405 NB off-ramp/ SR-22 EB ramps	Sig	0.84	47.3	D	0.93	54.7	D	<b>0.89</b>	<b>55.8</b>	<b>E</b>	<b>0.99</b>	<b>67.6</b>	<b>E</b>	0.85	43.9	D	0.88	43.7	D	N	<b>0.94</b>	<b>60.4</b>	<b>E</b>	<b>1.03</b>	<b>75.8</b>	<b>F*</b>	0.91	48.7	D	0.94	47.6	D	N
	Garden Grove Boulevard	Bolsa Chica Road/ Valley View Street	Sig	0.92	23.7	C	<b>1.06</b>	<b>40.7</b>	<b>F*</b>	0.91	23.3	C	<b>1.00</b>	<b>39.1</b>	<b>F*</b>	0.90	20.2	C	0.92	25.8	C	N	0.99	32.2	C	<b>1.06</b>	<b>57.0</b>	<b>F*</b>	0.97	24.6	C	<b>1.03</b>	<b>44.6</b>	<b>F*</b>	N
	I-405 SB On-Ramp (from SB Bolsa Chica Road)	Bolsa Chica Road	None	0.49	--	--	0.61	--	--	0.63	--	--	0.76	--	--	N/A				N/A		N	0.72	--	--	0.86	--	--	N/A				N/A	N/A	N
				0.55	--	--	0.45	--	--	0.78	--	--	0.65	--	--	N/A				N/A		N	0.93	--	--	0.78	--	--	N/A				N/A	N/A	N
	I-405 SB Ramps (to NB & SB Bolsa Chica Road)	Bolsa Chica Road	Sig	N/A			N/A			N/A			N/A			0.72	13.1	B	0.76	9.9	A	N	N/A			N/A			0.85	15.5	B	0.85	10.8	B	N

**Table 3.1.6-21: Year 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Mitigations for the Build Alternatives – Locations in Orange County**

Interchange Location	Intersection Location		Traffic Control	Year 2009						Year 2020										Year 2040															
				Existing Traffic			No Build Traffic on No Build Geometry			Build Traffic on Build Geometry including Mitigations						No Build- Build Adverse Effect	No Build Traffic on No Build Geometry					Build Traffic on Build Geometry including Mitigations					No Build- Build Adverse Effect								
				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											
				V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS		V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	V/C		Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS			
Seal Beach Boulevard	I-405 NB ramps/ Old Ranch Parkway	Seal Beach Boulevard	Sig	0.88	36.0	D	0.92	38.7	D	0.74	27.6	C	0.88	33.3	C	0.61	22.2	C	0.67	26.0	C	N	0.82	31.6	C	0.93	40.8	D	0.70	23.6	C	0.84	29.0	C	N
	I-405 SB ramps/ Beverly Manor Road	Seal Beach Boulevard	Sig	<b>0.95</b>	<b>46.4</b>	<b>D</b>	<b>1.01</b>	<b>55.2</b>	<b>F*</b>	<b>1.04</b>	<b>57.1</b>	<b>F*</b>	<b>1.12</b>	<b>63.1</b>	<b>F*</b>	0.80	33.6	C	0.94	41.0	D	N	<b>1.10</b>	<b>66.5</b>	<b>F*</b>	<b>1.21</b>	<b>81.0</b>	<b>F</b>	0.87	36.0	D	<b>1.12</b>	<b>67.0</b>	<b>F*</b>	N
	Old Ranch Pkwy	SR-22 WB On-Ramp	None	0.30	--	--	0.22	--	--	0.32	--	--	0.24	--	--	0.32	--	--	0.24	--	--	--	0.34	--	--	0.25	--	--	0.34	--	--	0.25	--	--	--
Bear Street at SR-73	SR-73 NB ramps	Bear Street	Sig	0.50	13.6	B	0.47	12.8	B	0.55	14.1	B	0.53	13.3	B	0.55	16.1	B	0.52	15.0	B	N	0.59	14.7	B	0.56	13.8	B	0.59	14.5	B	0.56	13.8	B	N
	SR-73 SB ramps	Bear Street	Sig	0.43	13.1	B	0.51	13.5	B	0.48	13.3	B	0.55	14.3	B	0.49	14.4	B	0.58	16.1	B	N	0.52	13.6	B	0.63	15.9	B	0.53	13.7	B	0.67	16.7	B	N
Katella Avenue/ Willow Street at I-605	Katella Avenue	I-605 NB on-ramp	Sig	0.64	1.7	A	0.65	3.7	A	0.69	2.5	A	0.73	5.1	A	0.69	2.6	A	0.73	5.0	A	N	0.75	3.2	A	0.80	6.6	A	0.75	3.2	A	0.79	6.4	A	N
	Katella Avenue	I-605 NB Off-Ramp (to EB Katella Avenue)	None	0.76	--	--	0.49	--	--	0.81	--	--	0.52	--	--	0.81	--	--	0.52	--	--	--	0.84	--	--	0.55	--	--	0.84	--	--	0.55	--	--	--
	Katella Avenue	I-605 NB Off-Ramp (to WB Katella Avenue)	None	0.03	--	--	0.05	--	--	0.05	--	--	0.07	--	--	0.05	--	--	0.07	--	--	--	0.06	--	--	0.08	--	--	0.06	--	--	0.08	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from WB Katella Avenue)	None	0.36	--	--	0.44	--	--	0.38	--	--	0.47	--	--	0.38	--	--	0.47	--	--	--	0.40	--	--	0.49	--	--	0.40	--	--	0.49	--	--	--
	Katella Avenue	I-605 SB Off-Ramp (to EB Katella Avenue)	None	0.80	--	--	0.72	--	--	0.86	--	--	0.76	--	--	0.86	--	--	0.76	--	--	--	0.89	--	--	0.79	--	--	0.89	--	--	0.79	--	--	--
	Katella Avenue	I-605 SB On-Ramp (from EB Katella Avenue)	None	0.04	--	--	0.03	--	--	0.11	--	--	0.08	--	--	0.11	--	--	0.08	--	--	--	0.15	--	--	0.11	--	--	0.15	--	--	0.11	--	--	--
	Willow Street	I-605 SB Off-Ramp (to WB Willow Street)	None	0.36	--	--	0.36	--	--	0.39	--	--	0.42	--	--	0.39	--	--	0.42	--	--	--	0.41	--	--	0.46	--	--	0.41	--	--	0.46	--	--	--

- Notes:
1. LOS – Level of Service; V/C – Volume-to-Capacity Ratio
  2. F\* = Due to excessive v/c ratio (over 1.0), the intersection is expected to operate at LOS F.
  3. \* = LOS is based on the stop-controlled off-ramp movement (left turn or right turn) with the highest delay.
  4. Rows are bold when an intersection is forecast to operate at LOS E or F under no-build or project conditions.
  5. Shaded cells indicate an adverse effect/significant impact.
  6. N/A = Not applicable because the cell represents a circumstance that does not exist under the specified scenario.
  7. -- = LOS and average delay are not calculated from intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  8. "Build" refers to all three build alternatives, Alternatives 1, 2, and 3. There is very small variation among the forecast peak hour traffic volumes at the freeway interchanges. The highest of the three alternative forecasts was used for the Build condition, representing a worst-case condition.

Source: Albert Grover & Associates 2011.

The Alternative 2 ADT along the I-405 mainline freeway in 2020 and 2040 is presented in Table 3.1.6-2. ADTs in 2020 for Alternative 2 range from **309,200 to 453,400 vpd**, compared to the range of 276,200 to 441,400 vpd for the No Build Alternative. ADTs in 2040 for Alternative 2 range from **344,000 to 509,000 vpd** compared to the range of 324,000 to 489,000 vpd for the No Build Alternative. As shown in Table 3.1.6-3, Alternative 2 daily VMT in the study corridor is forecast to be **4,932,000** in 2020 and **5,512,000** in 2040, compared to 4,804,000 in 2020 and 5,299,000 in 2040 under the No Build Alternative. The reason for the increase in ADT and VMT anticipated along the I-405 mainline is the same under this alternative as under Alternative 1.

*V/C Ratio and LOS.* Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of Alternative 2 in 2020 for the GP lanes of the northbound and southbound freeway. Under Alternative 2 in year 2020, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2020 under Alternative 2 is **1.02 to 1.40** and **1.02 to 1.21** during the PM peak hour; the Alternative 2 v/c ratios are lower than the No Build Alternative by 0.07 to 0.46 for the AM peak hour and 0.05 to 0.44 for the PM peak hour. A more-detailed link-by-link presentation of the freeway mainline LOS under Alternative 2 Opening Year (2020) and Design Year (2040) traffic conditions for both GP and HOV lanes is included in Appendix L1 (Table O-15).

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of Alternative 2 in 2020 for the HOV lanes of the northbound and southbound freeway. Under Alternative 2 in year 2020, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions, except for the northbound segment from SR-22 East to I-605, which is anticipated to operate at LOS D. LOS F is anticipated on all segments during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2020 is **0.96 to 1.40** and **0.96 to 1.21** during the PM peak hour; the Alternative 2 v/c ratios are lower than the No Build Alternative by 0.07 to 0.46 for the AM peak hour and 0.05 to 0.44 for the PM peak hour.

Table 3.1.6-17 presents the LOS and v/c ratios for peak hours of Alternative 2 in 2040 for the GP lanes of the northbound and southbound freeway. Under Alternative 2 in year 2040, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2040 under Alternative 2 is **1.17 to 1.63** and **1.15 to 1.41** during the PM peak hour;

the Alternative 2 v/c ratios are lower than the No Build Alternative by 0.08 to 0.54 for the AM peak hour and 0.05 to 0.50 for the PM peak hour.

Table 3.1.6-18 presents the LOS and v/c ratios for peak hours of Alternative 2 in 2040 for the HOV lanes of the northbound and southbound freeway. Under Alternative 2 in year 2040, the HOV lanes are anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's HOV lanes during the AM peak hour in 2040 is **1.12 to 1.63** and **1.13 to 1.41** during the PM peak hour; the Alternative 2 v/c ratios are lower than the No Build Alternative by 0.08 to 0.54 for the AM peak hour and 0.05 to 0.50 for the PM peak hour.

The HOV lanes under Alternative 2 are assumed to have continuous access with no change in the HOV eligibility requirement of two persons per vehicle. The same observations regarding the lack of a speed incentive to use the carpool lanes in 2020 made for the No Build Alternative apply to Alternative 2. The same options concerning HOV eligibility and provision of dual HOV lanes in each direction discussed for Alternative 1 pertain to Alternative 2.

The GP and HOV lanes in Alternative 2 are anticipated to operate at LOS F during the peak hours in 2040. This is expected to result in reduced and unstable throughput. A summary of 2040 peak-hour throughput anticipated under Alternative 2 is presented in Table 3.1.6-19. Table 3.1.6-19 shows the number of lanes by type in each freeway study segment by direction and the throughput under the congested conditions that are anticipated. A volume of 1,200 vphpl is used for throughput under over-capacity conditions, as explained in the Traffic Study. Table 3.1.6-19 shows the total throughput anticipated in 2040 across all lanes. For Alternative 2, the throughput ranges from **8,400 to 12,000 vph**, which is an increase of 2,400 vph compared to the no-build condition with its range of 6,000 to 9,600 vph.

The TSM and TDM measures included in Alternative 2 (identified in Section 2.2.2.1, Common Design Features of the Build Alternatives) are the same as those in Alternative 1 and are anticipated to provide the same benefits.

*Peak-Period Performance.* Table 3.1.6-6 shows forecast Alternative 2 speeds for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Forecast year 2040 speeds for Alternative 2 in the GP lanes during peak hours range from **16 to 42 mph**, compared to no-build condition speeds of 5 to 8 mph. Forecast year 2040 Alternative 2 speeds in the HOV lanes during peak hours range from **17 to 44 mph**, compared to no-build condition speeds of 6 to 9 mph. For both lane types combined, average speeds weighted for the

volumes using each lane type range from **16 to 42 mph** in 2040 under Alternative 2, compared to no-build average speeds of 5 to 8 mph.

*Corridor Travel Time.* Table 3.1.6-7 shows forecast Alternative 2 corridor travel time for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and HOV). Table 3.1.6-7 also shows the average travel time across both lane types. Forecast year 2040 Alternative 2 travel time in the GP lanes during peak hours ranges from **20 to 52 minutes**, compared to 107 to 163 minutes under the no-build condition. Forecast year 2040 Alternative 2 travel time in the HOV lanes during peak hours ranges from **19 to 50 minutes**, compared to 95 to 147 minutes under the no-build condition. For both lane types combined, average travel time under Alternative 2 in year 2040, weighted for the volumes using each lane type, ranges from **19 to 51 minutes**, compared to 105 to 160 minutes under no-build conditions.

*Vehicle Hours of Delay.* Table 3.1.6-8 presents the daily and annual VHD forecast to occur on the freeway on weekdays in 2020 and 2040. VHD is based on the number of additional hours of vehicle travel required within the corridor due to speeds lower than 65 mph on weekdays during peak periods when congestion reduces speeds and increases corridor travel times. Under Alternative 2 in 2020, approximately 12,000 daily and 3 million annual VHD are anticipated on the freeway, compared to 103,000 daily and 23 million annual VHD under the no-build condition. In 2040 under Alternative 2, approximately **66,000 daily and 14 million annual VHD** are anticipated, compared to 413,000 daily and 91 million annual VHD under the no-build condition.

Freeway Connector Volumes. As noted above under the heading “Traffic Forecasting Model,” a single set of future traffic volumes would be used for analyzing the project condition at the freeway interchanges and along arterials. No geometric changes are proposed for the branch connectors under Alternative 2, so the freeway connector volumes and operations are the same for Alternative 2 as for Alternative 1.

Arterials, Intersections, and Interchanges. As noted above under the heading “Traffic Forecasting Model,” a single set of future traffic volumes would be used for analyzing the project condition at the freeway interchanges and along arterials. Consequently, the interchange and arterial analysis and conclusions are the same for Alternatives 1 and 2.

### **Alternative 3 (Preferred Alternative)**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) AM and PM peak-hour traffic volumes, along with lane schematics for I-405 mainline and all interchange ramps within the project limits for Alternative 3, are presented in Figures 3.1.6-13 and 3.1.6-17, respectively.

The volumes identified in the figures are traffic demand volumes and are based on an Express Lane operating policy providing that HOV2s would be tolled and HOV3+ would either be free or receive a discount. The demand volumes would be similar for an HOV2+ free policy south of SR-22 (near Bolsa Chica Road). North of SR-22 the demand volumes would be similar to the Alternative 1 demand volumes because the total number of lanes allows HOV2+ vehicles in both the HOV lanes in Alternative 1 and the Express Lanes in Alternative 3.

The remainder of this section on Alternative 3 (Preferred Alternative) explicitly identifies where values would be substantially different under the HOV2 tolled/HOV+3 free or discount policy, and the HOV+2 free policy. Where values for the policies are different, the former policy values are presented first (and may not be explicitly identified as applying to the former policy) followed by the information for the latter policy that is explicitly identified as applying to the latter policy.

It is assumed that, by 2040 and due to the volume of HOV2s, the operating policy for the Express Lanes would be adjusted to a toll policy providing that HOV2s would be tolled and HOV3+ would either be free or receive a discount. Consequently, if different values are provided for the policy providing that HOV2s would be tolled and HOV3+ would either be free or receive a discount and for the policy providing that HOV2+ would be free, they are provided only for 2020.

The Alternative 3 ADT along the I-405 mainline freeway in 2020 and 2040 is presented in Table 3.1.6-2. ADTs in 2020 for Alternative 3 range from **311,600 to 449,800 vpd**, compared to the range of 276,200 to 441,400 vpd for the No Build Alternative. ADTs in 2040 for Alternative 3 range from **348,000 to 503,000 vpd** compared to the range of 324,000 to 489,000 vpd for the No Build Alternative. As shown in Table 3.1.6-3, Alternative 3 daily VMT in the study corridor is forecast to be **4,957,000** in 2020 and **5,554,000** in 2040, compared to 4,804,000 in 2020 and 5,299,000 in 2040 under the No Build Alternative. The reason for the increase in ADT and VMT anticipated along the I-405 mainline is the same under this alternative as under Alternative 1.

*V/C Ratio and LOS.* Table 3.1.6-4 presents the LOS and v/c ratios for peak hours of Alternative 3 in 2020 for the GP lanes of the northbound and southbound freeway. Under Alternative 3 in year 2020, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions, except for the northbound segment from SR-73 to Brookhurst Street during the AM peak hour when LOS D is anticipated. LOS F is anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2020 under Alternative 3 is **0.99 to 1.34** and **1.06 to 1.20** during the PM peak hour; the Alternative 3 v/c ratios are lower than the No Build

Alternative by 0.11 to 0.35 for the AM peak hour and 0.12 to 0.33 for the PM peak hour. Under an HOV2+ free policy, the GP lanes north of SR-22 are anticipated to have v/c ratios similar to Alternative 1 and range from 1.13 to 1.15 based on the demand volume forecasts. A more-detailed link-by-link presentation of the freeway mainline LOS under Alternative 3 Opening Year (2020) and Design Year (2040) traffic condition for both GP and Express Lanes is included in Appendix L1 (Table O-19).

Table 3.1.6-5 presents the LOS and v/c ratios for peak hours of Alternative 3 in 2020 for the Express Lanes of the northbound and southbound I-405. Under Alternative 3 in year 2020, the Express Lanes are expected to operate at LOS C or D during both the AM and PM peak hours in both directions. LOS F is anticipated in the HOV lanes on all segments during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the Express Lanes during the AM and PM peak hours in 2020 is **0.78 to 0.92**; the Alternative 3 v/c ratios in the Express Lanes are lower than the v/c ratios in the HOV lanes under the No Build Alternative by 0.25 to 0.75 for the AM peak hour and 0.24 to 0.67 for the PM peak hour. Under an HOV2+ free policy, the Express Lanes north of SR-22 are anticipated to have v/c ratios similar to the HOV lanes in Alternative 1 and range from 1.17 to 1.08 based on the demand volume forecasts.

The volume of traffic in the Express Lanes would be actively managed to maintain high-speed operations with maximum hourly volumes of 3,400. Tolls would be used to control the volume of traffic in the Express Lanes and minimize the potential for congestion, thereby avoiding speed degradation. As demand for the Express Lanes increases, tolls would be increased to limit the volume of traffic in the Express Lanes to no more than 3,400 vehicles per hour to limit congestion and maintain high speeds. Similarly, as demand for the Express Lanes decreases, tolls would be decreased to increase the volume of traffic in the Express Lanes, attract traffic from the GP lanes, and improve GP lane operations. Independent toll adjustments would be necessary on each of the Express Lane segments between access points.

Under an HOV2+ free policy the Express Lanes north of SR-22 are anticipated to exceed the 3,400 target volume and be similar to the HOV volumes anticipated under Alternative 1 ranging from approximately 3,700 to 4,000 vehicles per hour. These values are based on traffic demand forecasts and represent a worst case condition for the Express Lanes; these values are based on the assumption that all upstream traffic can reach the Express Lanes north of SR-22 and are not reduced by upstream congestion along I-405, I-605, and SR-22 as they feed traffic into the Express Lanes. Prior to completion of final design of the Express Lanes, Caltrans will develop a process to address this potential operational challenge. The process will determine the

anticipated operational volumes under which the Express Lanes will open and, if necessary, make operational adjustments to the Express Lanes and Express Lane access include, but are not limited to:

- adjusting to HOV3+ free with HOV2s discounted tolls
- adjusting to HOV3+ free with HOV2s full tolls
- adjusting to tolling HOV2s on individual tolling segments such as direct connectors to or from other freeways
- periodic adjustments of tolling rates to maintain operations on individual tolling segments

The process to be developed is included in Section 3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures as Measure T-12.

Access points where Express Lanes begin or end would require transition areas. Transition areas near the beginning of Express Lanes would allow traffic in HOV and GP lanes to change lanes to access the GP and Express Lanes within the project limits of Alternative 3. Transition areas at the end of Express Lanes would allow traffic in the Express and GP lanes to change lanes to access the GP and HOV lanes downstream of the end of the Express Facility. Table 3.1.6-22 summarizes the LOS in each of the transition areas anticipated in 2020 and 2040. The No Build Alternative LOS for the nearest freeway segment is also shown for comparison. The transition areas are anticipated to operate at a level similar to that anticipated for the HOV and/or GP lanes of the No Build Alternative in the vicinity of the transition area.

Under the No Build Alternative, continuous HOV lanes with a minimum occupancy requirement of 2 persons are available along I-405 within the project limits. Under Alternative 3, the HOV lanes would be discontinuous between SR-73 and I-605, although HOVs with 2 or more occupants would use the Express Lanes free initially.

The objective is to operate the tolled Express Lanes with a HOV2+ occupancy free to encourage rideshare and transit usage. Caltrans may implement operational adjustments to the tolled express lanes based on demand, rates of speed, transit operational improvements and overall congestion levels and to meet financial covenants, maintenance and operational obligations. Potential operational revisions are identified in the bullets above.

Under the No Build Alternative, LOS F conditions are anticipated in the HOV lanes during peak hours, as shown in Table 3.1.6-5. A comparison to Table 3.1.6-4 shows that V/C ratios in the HOV and GP lanes are identical in the segments south of SR-22 East. The potential travel time savings from use of the HOV lanes for the entire length of the project corridor compared to the

GP lanes is approximately 10 percent (see Table 3.1.6-7) depending upon direction and peak hour; all of that savings is expected to occur in the segment from SR-22 East to I-605 where V/C ratios are slightly lower in the HOV lanes than GP lanes. Consequently, no significant impact to HOV lane users is anticipated as a result of the break in continuous HOV lanes along I-405.

**Table 3.1.6-22: Transition Area LOS**

Alternative 3				No Build Alternative		
Transition Area	Direction	LOS		Mainline Freeway Segment	GP Lane LOS	
		AM	PM		AM	PM
<b>Year 2020</b>						
I-405 - Bear Street to SR-73	NB	F	F	I-405 - Bristol Street to Fairview Road	F/F	F/F
	SB	F	F		F/F	F/F
I-405 - I-605 to San Gabriel	NB	F	F	I-405 - I-605 to San Gabriel	F/F	F/F
	SB	F	F		F/F	F/F
SR-73 - Bear Street to Fairview Road	NB	C	C	SR-73 - Bear Street to Fairview Road	C/--	C/--
	SB	C	B		C/--	B/--
SR-22 - Valley to Express/HOV Transition	WB	F	F	SR-22/I-405 Branch Connectors	F/F	F/F
	EB	C	C		D/D	D/F
I-605 - Express/HOV Transition to Katella Avenue	NB	C	F	I-605 - I-405 to Katella Avenue	C/**	F/**
	SB	D	C		D/**	C/**
<b>Year 2040</b>						
I-405 - Bear Street to SR-73	NB	F	F	I-405 - Bristol Street to Fairview Road	F/F	F/F
	SB	F	F		F/F	F/F
I-405 - I-605 to San Gabriel	NB	F	F	I-405 - I-605 to San Gabriel	F/F	F/F
	SB	F	F		F/F	F/F
SR-73 - Bear Street to Fairview Road	NB	C	D	SR-73 - Bear Street to Fairview Road	C/--	C/--
	SB	D	C		D/--	C/--
SR-22 - Valley to Express/HOV Transition	WB	F	F	SR-22/I-405 Branch Connectors	F/F	F/F
	EB	F	F		E/F	E/F
I-605 - Express/HOV Transition to Katella Avenue	NB	D	F	I-605 - I-405 to Katella Avenue	C/**	F/**
	SB	F	C		F/**	D/**

The 2012 RTP “includes a regional Express Lane network that would build upon the success of the 91 Express Lanes in Orange County and two demonstration projects in Los Angeles County planned for operation in late 2012.” I-405 within the project limits is part of that network, which includes more than 250 miles of freeway in southern California. With respect to Express Lanes, the RTP notes that “additional efforts underway include the extension of the 91 Express Lanes to I-15 in Riverside County along with planned Express Lane on I-15.” The extension of the SR-91 Express Lanes would incorporate the existing HOV lanes into the Express Lanes as is proposed for I-405 Alternative 3. The 2012 RTP also notes that “traffic and revenue studies are proceeding for I-10 and I-15 in San Bernardino County.” Incorporation of the existing HOV lanes on I-405 into the Express Lanes proposed in Alternative 3 is consistent with the 2012 RTP and the more diverse set of strategies emerging for management of existing HOV lanes (see 2012 RTP Highways and Arterials Appendix pages 15 and 16).

There are three locations between SR-73 and I-605 where access would be provided to the Express Lanes. At two of these locations, near the Magnolia Street/Warner Avenue interchange and the Bolsa Avenue/Goldenwest Street interchange, the intermediate access would be at-grade. A qualitative analysis is presented for the year 2040 operations anticipated in the two intermediate access areas because the LOS F conditions expected in the GP lanes make an HCM analysis unreliable.

The LOS F conditions expected during peak hours in the GP lanes at the Magnolia Street/Warner Avenue intermediate access area would affect vehicles exiting the Express Lanes. Slower speeds are expected in the #2 Express Lane as motorists exiting the Express Lanes match the slower speed of the GP lanes before making the lane change to the #1 GP lane. Slower speeds are also expected in the #2 Express Lane as motorists entering the Express Lanes move out of the LOS F conditions in the #1 GP lane into the #2 Express Lane. This condition is similar to the condition experienced in the existing limited-access HOV lanes along I-405 during periods of congestion in the adjacent GP lanes. Experience over the last 20 years has shown that these HOV access locations operate efficiently and safely. Motorists adjust speeds as necessary to complete the required lane changes between the higher-speed HOV lane and the lower-speed GP lane. Some deterioration in LOS is anticipated in the Express Lanes in the vicinity of the Magnolia Street/Warner Avenue intermediate access area.

The LOS F conditions expected in the GP lanes at the Magnolia Street/Warner Avenue and Bolsa Avenue/Goldenwest Street intermediate access area are not expected to affect vehicles exiting or entering the Express Lanes. A weaving lane is provided between the #2 Express Lane and the #1 GP lane to accommodate adjustments in speed between those lanes. The weaving lane provides the necessary length (per Caltrans TOPD 11-02) to accommodate motorists entering

and exiting the Express Lanes as they adjust their speed between the higher-speed #2 Express Lane and the lower-speed #1 GP lane.

A third intermediate access area is located at the SR-22 East. The direct connector from the median of SR-22 East to the median of I-405 as part the WCC Project would become part of the Express Facility and would be tolled. The merge of the single-lane direct connector from SR-22 westbound into the northbound Express Lanes on I-405 is forecast to operate at LOS D during both the AM and PM peak hours in years 2020 and 2040. The volumes using the direct connector and the Express Lanes would be managed to maintain the same volumes on those facilities in both directions in years 2020 and 2040, as shown in Figures 3.1.6-13 and 3.1.6-17. The diverge of the single-lane direct connector to SR-22 eastbound from the southbound Express Lanes on I-405 is forecast to operate at LOS C during both the AM and PM peak hours in years 2020 and 2040. Under an HOV2+ free policy in 2020, the Express Lanes north of SR-22 are anticipated to operate at LOS F similar to Alternative 1 based on the demand volumes shown in Figure 3.1.6-13. Consequently, the merge and diverge for the SR-22 direct connector would operate at LOS F. As noted above, Measure T-12 included in Section 3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures provides a process to address this potential operation challenge. Also noted above, it is anticipated by 2040 the operating policy for the Express Lanes would be adjusted to a toll policy providing HOV2s would be tolled and HOV3+ would be free or receive a discount.

Table 3.1.6-17 presents the LOS and v/c ratios for peak hours of Alternative 3 in 2040 for the GP lanes of the northbound and southbound freeway. Under Alternative 3 in year 2040, the freeway mainline is anticipated to operate at LOS F during both the AM and PM peak hours in both directions. LOS F is also anticipated during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the freeway's GP lanes during the AM peak hour in 2040 under Alternative 3 is **1.17 to 1.61** and **1.23 to 1.43** during the PM peak hour; the Alternative 3 v/c ratios are lower than the No Build Alternative by 0.08 to 0.35 for the AM peak hour and 0.09 to 0.34 for the PM peak hour.

Table 3.1.6-18 presents the LOS and v/c ratios for peak hours of Alternative 3 in 2040 for the Express Lanes of the northbound and southbound I-405. Under Alternative 3 in year 2040, the Express Lanes are anticipated to operate at LOS C or D during both the AM and PM peak hours in both directions. LOS F is anticipated in the HOV lanes during both the AM and PM peak hours in both directions under the No Build Alternative. The range of v/c ratios in the Express Lanes during both the AM and PM peak hours in 2040 is **0.78 to 0.92**; the Alternative 3 v/c ratios in the Express Lanes are lower than the v/c ratios in the HOV lanes of the No Build Alternative by 0.51 to 1.03 for the AM peak hour and 0.45 to 0.90 for the PM peak hour.

The GP lanes in Alternative 3 are anticipated to operate at LOS F during the peak hours in 2040. This is expected to result in reduced and unstable throughput. The Express Lanes would be managed to maintain LOS D or better, thus avoiding the unstable and reduced throughput conditions anticipated in the GP lanes. Peak-period throughput in the Express Lanes would be managed to a target volume not to exceed 1,700 vphpl, as explained in Section 2.2.2, Unique Features of Build Alternatives. A summary of 2040 peak-hour throughput anticipated under Alternative 3 is presented in Table 3.1.6-19. Table 3.1.6-19 shows the number of lanes by type in each freeway study segment by direction and the throughput under the congested conditions that are anticipated in the GP lanes. A volume of 1,200 vphpl is used for throughput under over-capacity conditions, as explained in the Traffic Study. Table 3.1.6-19 shows the total throughput anticipated in 2040 across all lanes. For Alternative 3, the throughput ranges from **9,000 to 11,800 vph**, which is an increase of 2,200 to 3,000 compared to the no-build condition with its range of 6,000 to 9,600.

The TSM and TDM measures included in Alternative 3 (identified in Section 2.2.2.1, Common Design Features of the Build Alternatives) are the same as those in Alternative 1 and are expected to provide the same benefits.

*Peak-Period Performance.* Table 3.1.6-6 shows forecast Alternative 3 speeds for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and Express). Forecast year 2040 speeds for Alternative 3 in the GP lanes during peak hours range from **18 to 38 mph**, compared to no-build condition speeds of 5 to 8 mph. Forecast year 2040 Alternative 3 speeds in the Express Lanes are expected to be **65 mph**, compared to no-build condition speeds in the HOV lanes of 6 to 9 mph. For both lane types combined, average speeds weighted for the volumes using each lane type range from **28 to 44 mph** in 2040 under Alternative 3, compared to no-build average speeds of 5 to 8 mph. As noted above, it is anticipated by 2040, due to volumes of HOV2s, the operating policy for the Express Lanes would be adjusted to a tolled policy where HOV2s would be tolled and HOV3+ would be either free or receive a discount.

*Corridor Travel Time.* Table 3.1.6-7 shows forecast Alternative 3 corridor travel time for 2040 along I-405 between SR-73 and I-605 during peak hours in each direction by lane type (GP and Express). Table 3.1.6-7 also shows the average travel time across both lane types. Forecast year 2040 Alternative 3 travel time in the GP lanes during peak hours ranges from **22 to 45 minutes**, compared to 107 to 163 minutes under the no-build condition. Forecast year 2040 Alternative 3 travel time in the Express Lanes during peak hours is expected to be **13 minutes**, compared to 95 to 147 minutes in the HOV lanes under the no-build condition. For both lane types combined,

average travel time under Alternative 3 in year 2040, weighted for the volumes using each lane type, ranges from **19 to 30 minutes**, compared to 105 to 160 minutes under no-build conditions.

*Vehicle Hours of Delay.* Table 3.1.6-8 presents the daily and annual VHD forecast to occur on the freeway on weekdays in 2020 and 2040. VHD is based on the number of additional hours of vehicle travel required within the corridor due to speeds lower than 65 mph on weekdays during peak periods when congestion reduces speeds and increases corridor travel times. Under Alternative 3 in 2020, approximately **10,000 daily and 2.2 million annual VHD** are anticipated on the freeway, compared to 103,000 daily and 23 million annual VHD under the no-build condition. Under an HOV2+ free policy in 2020, approximately **11,000 daily and 2.4 million annual VHD** are anticipated on the freeway. In 2040 under Alternative 3, approximately **57,000 daily and 13 million annual VHD** are anticipated, compared to 413,000 daily and 91 million annual VHD under the no-build condition.

Freeway Connector Volumes. Tables 3.1.6-9 and 3.1.6-20 provide the 2020 and 2040 forecast, respectively, of branch connector volumes and v/c ratios on ramps between freeways within the project limits. The lanes on the branch connectors are the same in Alternative 3 as identified above under the no-build condition, except that there is a direct connector with a single lane in each direction linking the Express Lanes to the median lane of SR-73, the number of lanes at the merge point of northbound I-405 and northbound SR-73 is reduced from 3 to 2, and the number of lanes from southbound I-405 to southbound SR-73 is reduced from 3 to 2 in the body of the connector. This last reduction would be reversed if the HOV lanes planned on SR-73 open to traffic. With the lane reductions on the existing branch connectors by 1 in each direction and the addition of the direct connector with a single lane in each direction, the total number of lanes linking SR-73 and I-405 remains the same under Alternative 3 as under the No Build Alternative. Branch connectors are forecast to operate with v/c ratios ranging from 0.47 to 1.35 in 2020 and from 0.47 to 1.57 in 2040 under Alternative 3.

As noted in Section 2.2.2.2, Unique Features of Build Alternatives, the HOV direct connectors, as part of the SR-22 WCC Project between SR-22 East and I-405 and between I-605 and I-405, would be incorporated into the Express Lane element of Alternative 3 and would be tolled. Imposition of tolls on these direct connectors is expected to have different effects on the direct connectors and their parallel GP direct connectors, based on a comparison of the data in Tables 3.1.6-9 and 3.1.6-20.

The following paragraphs summarize the branch and direct connectors with v/c ratios anticipated to be in excess of 1.00. Options to address v/c ratios in excess of 1.00 were considered; however, in no instance would additional lanes on branch connectors be feasible because of the ROW acquisition required to provide additional receiving or departing lanes on the I-405 mainline. Ramp

metering was considered as a means to improve GP lane connector operations, but it was not included in the project because it would further reduce the capacity of the branch connectors. Toll amounts would be used to limit v/c ratios on Express Lane direct connectors to no more than 1.00 under a toll policy providing HOV2s would be tolled and HOV3+ would be free or receive a discount. Express Lane direct connectors under a toll policy providing that HOV2+ would be free. V/C ratios are discussed in the sections below.

*Northbound SR-73 to I-405 Northbound.* From northbound SR-73 to northbound I-405, the GP branch connector is anticipated to be over capacity in 2040 during the PM peak hour. Under the No Build Alternative, the v/c ratio is anticipated to be less than 1.00; however, under the no-build condition, the third lane entering northbound I-405 from SR-73 northbound is terminated as a lane drop approximately 2,200 ft downstream of the merge point. This lane termination creates a bottleneck on the I-405 mainline. The proposed reduction in the number of lanes entering northbound I-405 from SR-73 northbound would remove this bottleneck from the I-405 mainline to the branch connector. The lane reduction on the branch connector would be partially offset by construction of the direct connector from northbound SR-73 to the tolled Express Lanes northbound. Under an HOV2+ free policy, the Express Lane direct connector is anticipated to operate below capacity in 2020. HOV lane v/c ratios for Alternative 1 changes by less than 0.10 north and south of Fairview Road based on the data presented in Table O-7 of Appendix L. The change includes HOV traffic associated with SR-73; since the change is extremely small, the HOV volume on the direct connector would be small providing the opportunity to achieve the forecast volume by allowing single occupant vehicles to use the directly connector for a toll.

*Westbound SR-22 to I-405 Northbound.* From westbound SR-22 to I-405 northbound, the GP branch connectors are anticipated to be over capacity (i.e., v/c greater than 1.00) in 2020 and 2040 under either the No Build Alternative or Alternative 3. The HOV direct connector is also anticipated to be over capacity in 2020 and 2040 under the no-build condition; however, under Alternative 3 the direct connector v/c would fall below 1.00 and provide an uncongested path through this interchange. In Alternative 3, the GP direct connector would have a higher v/c ratio than under the no-build condition. Overall, the effect of Alternative 3 would be to increase the duration of the congested period on the GP branch connector and provide uncongested travel on the Express Lane direct connector. Under an HOV2+ free policy, the Express Lane direct connector is anticipated to operated over capacity in 2020 based on the v/c ratios associated with the demand volume of HOVs using this direct connector under Alternative 1 as shown in Figure 3.1.6-13. As noted above, Measrue T-12 included in Section 3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures provides a process to address this potential operation challenge.

*Northbound I-405 to I-605 Northbound.* From northbound I-405 to I-605 northbound, the GP branch connector is anticipated to have a lower v/c ratio under Alternative 3 than under the No Build Alternative in the AM peak hour and a higher v/c ratio in the PM peak hour. The converse applies to the direct connectors. Overall, the effect of Alternative 3 would be to increase duration of the PM congested period on the GP branch connector and provide the potential for some modest congestion on the Express Lane direct connector. Under an HOV2+ free policy, the Express Lane direct connector is anticipated to operated over capacity during the PM peak hour in 2020 based on the v/c ratios associated with the demand volume of HOVs using this direct connector under Alternative 1 as shown in Figure 3.1.6-13. As noted above, Measure T-12 included in Section 3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures provides a process to address this potential operation challenge.

Where the northbound direct connector to I-605 diverges from the Express Lanes, a single northbound Express Lane remains to serve traffic continuing north on I-405. Based on the 2020 values shown for Alternative 1 in Figure 3.1.6-11, the AM and PM peak hour demand volumes on that single Express Lane under an HOV2+ free policy would be 2,536 and 2,012 respectively. These values exceed the capacity of the single Express Lane and will result in queuing at the diverge. As noted above, Measure T-12 included in Section 3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures provides a process to address this potential operation challenge.

*Southbound I-605 to I-405 Southbound.* From southbound I-605 to I-405 southbound, the GP branch connectors are anticipated to have a lower v/c ratio under Alternative 3 than under the No Build Alternative. The v/c ratios on the direct connectors would be higher under Alternative 3 than under the No Build Alternative. Overall, the effect of Alternative 3 would be to improve flow on the GP branch connector and provide the potential for some modest congestion on the Express Lane direct connector. Under an HOV2+ free policy, the Express Lane direct connector is anticipated to operate below capacity in 2020 based on the v/c ratios associated with the demand volume of HOVs using this direct connector under Alternative 1 as show in Figure 3.1.6-13.

*Southbound I-405 to SR-22 Eastbound.* From southbound I-405 to SR-22 eastbound, the GP branch connector is anticipated to have higher v/c ratios under Alternative 3 than under the No Build Alternative. Because the southbound freeway GP lanes upstream of SR-22 East are forecast to have v/c ratios in excess of 1.00 during peak hours under both the No Build Alternative and Alternative 3, the branch connector would actually serve approximately the same volume under either alternative.

The direct connector v/c ratio is lower under Alternative 3 than under the No Build Alternative. During the AM peak hour, the direct connector is below capacity under the No Build Alternative and over capacity during the PM peak hour. Under Alternative 3, the direct connector would be under capacity during both periods and would provide uncongested operations during peak hours. Overall, the effect of Alternative 3 would be to increase the duration of the congested period on the GP branch connector and provide uncongested travel on the Express Lane direct connector. Under an HOV2+ free policy, the Express Lane direct connector is anticipated to operate over capacity during the PM peak hour in 2020 based on the v/c ratios associated with the demand volume of HOVs using this direct connector under Alternative 1 as shown in Figure 3.1.6-13. As noted above, Measure T-12 included in Section 3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures provides a process to address this potential operation challenge.

*Southbound I-405 to SR-73 Southbound.* The GP branch connector from southbound I-405 to SR-73 southbound is anticipated to have a v/c ratio in excess of 1.00 in 2040. The anticipated v/c ratio is 1.19 compared to the link v/c ratio of southbound I-405 immediately upstream of this branch connector of 1.46. Consequently, the upstream freeway would not be able to deliver the demand volume forecast for the branch connector; the volume that the upstream freeway can deliver (i.e., approximately 100/146 of the demand forecast) would result in less than a capacity volume on the GP branch connector. Under an HOV2+ free policy, the Express Lane direct connector is anticipated to operate below capacity in 2020. HOV lane v/c ratios for Alternative 1 change by less than 0.10 north and south of Fairview Road based on the data presented in Table O-7 of Appendix L. The change includes HOV traffic associated with SR-73; since the change is extremely small, the HOV volume on the direct connector would be small providing the opportunity to achieve the forecast volume by allowing single occupant vehicles to use the direct connector for a toll.

Where the southbound direct connector to SR-73 diverges from the Express Lanes, a single southbound Express Lane remains to serve traffic continuing south on I-405. Based on the 2020 HOV volumes shown for Alternatives 1 and 2 in Figures 3.1.6-11 and 3.1.6-12, the AM and PM peak hour demand volumes on that single Express Lane under an HOV2+ free policy would be 2,270 and 1,815 respectively. The latter of these values exceeds the capacity of the single Express Lane and will result in queuing at the diverge. As noted above, Measure T-12 included in Section 3.1.6-4 Avoidance, Minimization, and/or Mitigation Measures provides a process to address this potential operation challenge.

Arterials, Intersections, and Interchanges. As noted above under the heading “Traffic Forecasting Model,” a single set of future traffic volumes would be used for analyzing the project condition

at the freeway interchanges and along arterials. Consequently, the interchange and arterial analysis and conclusions are the same for Alternatives 1 and 3.

**Design Options for Alternative 3 (Preferred Alternative)**

The Preferred Alternative includes two design options: one with no braided ramps in the southbound direction at the Magnolia Street and Warner Avenue interchanges and the other with no braided ramps in the northbound direction at the Magnolia Street and Warner Avenue interchanges.

*No Braided Ramps Southbound at the Magnolia/Warner Interchange.* The design option that has no braided ramps in the southbound direction at the Magnolia Street and Warner Avenue interchanges could affect the configuration of the proposed interchange improvements at the intersection of Magnolia Street and the southbound I-405 ramps. The design option that has no braided ramps in the southbound direction has substantially less ramp meter storage on the southbound I-405 on-ramp from Magnolia Street than the design with the braided ramps. Although the design option without the braided ramps is anticipated to have sufficient storage to contain queues within the ramp (see Traffic Study, Table 3.8.6), if the storage is found to be insufficient the southbound approach of Magnolia Street to the southbound I-405 ramps could be restriped to provide two exclusive through lanes and one exclusive right-turn lane into the ramp; the exclusive right-turn lane would effectively provide additional ramp storage. LOS at the intersection would be the same or better at the intersection than under the design option with the braided ramps, as shown in Table 3.1.6-23.

An auxiliary lane on the freeway mainline is included in this design option as a replacement for the braided ramps. Operation of the freeway mainline is similar with or without the braided ramps. Additional traffic details for the design option without the braided ramps and a comparison of traffic operations with and without the braided ramp design under Alternative 3 (Preferred Alternative) are provided in Appendix L5.

**Table 3.1.6-23: Comparison of Intersection Operations  
at Magnolia Street and the Southbound I-405 Ramps  
with 2 and 3 Through Lanes on Southbound Magnolia Street**

Southbound Magnolia Street Configuration	2020		2040	
	AM	PM	AM	PM
2 Exclusive Through Lanes and 1 Shared Through/Right Lane*	A	B	B	C
2 Exclusive Through Lanes and 1 Exclusive Right Turn Lane	A	B	A	B

\*Data from Traffic Study Tables 3.8.4 and 3.8.5.

*No Braided Ramps Northbound at the Magnolia/Warner Interchange.* Operationally, the ramps and their volumes entering and exiting the I-405 northbound mainline under the design option with no braided ramps in the northbound direction at the Magnolia Street and Warner Avenue interchanges are the same as those with the braided ramps. The only operational difference between this design option and the braided ramp design presented in the Draft EIR/EIS is that the traffic volumes using the Warner Avenue on-ramp and the Magnolia Street off-ramp from northbound I-405 would weave across each other on a C-D road that would replace the braided ramps; if these ramps are braided there is no weaving maneuver.

Weaving analysis was conducted for the volumes weaving on the C-D road proposed in this design option. The HCS weaving analysis worksheets are presented in Appendix L6. The worksheets for year 2020 show that the weaving section is anticipated to operate at LOS B and C during the AM and PM peak hours, respectively. The worksheets for year 2040 show that the weaving section is anticipated to operate at LOS B and D during the AM and PM peak hours, respectively.

### **Pedestrian and Bicycle Facilities**

Under all of the proposed build alternatives, there would be pedestrian sidewalks and crosswalks along both sides of all arterials crossing I-405 within the proposed project limits except on the west side of Harbor Boulevard, the west side of Euclid Street, the south side of Edinger Avenue, the west side of Bolsa Chica Road, and the east side of Seal Beach Boulevard. Pedestrian facilities (i.e. pedestrian sidewalk and crosswalks) were considered at these locations. Providing sidewalks on the west side of Harbor Boulevard and south side of Edinger Avenue is not included in the project due to existing and proposed ramp geometry at these locations. No work is proposed on Euclid Street beneath the I-405 undercrossing bridge. Along the west side of Bolsa Chica Road, the road abuts the Bolsa Chica Channel for several miles, and there are no land uses with pedestrian access. Similarly, along the east side of Seal Beach Boulevard, the road abuts the NAVWPNSTA Seal Beach to which there is no pedestrian access. Where feasible, pedestrian facilities have been included in the project. Pedestrian facilities along both sides of the street are proposed for 13 of the 17 arterials crossing I-405 that do not currently have pedestrian facilities on both sides of the arterial at the crossing or on the approaches to the crossing. Under all of the build alternatives, the existing pedestrian crossing of I-405 at Heil Avenue would be replaced by the proposed project with a longer pedestrian bridge meeting current ADA standards. The current pedestrian crossing would remain open for use until the new bridge is constructed.

The existing Class 1 bicycle facilities along the east bank of the Santa Ana River and along the San Gabriel River, as well as the six existing Class 2 bicycle facilities would be retained under all of the build alternatives. Bicycle facilities in the project corridor planned by municipalities, but not currently existing, include Class 2 bikeways along the following arterials crossing I-405:

McFadden Avenue;

Edinger Avenue;

Newland Street;

Westminster Avenue; and

Bolsa Chica Road.

All three build alternatives would provide pavement to accommodate standard Class 2 bikeways on all of the above-mentioned arterials. Pavement striping for the purposes of bike lanes along these arterials within the project limits would not occur as part of the proposed project; however, it would occur when the municipalities implement longer continuous segments of the planned Class 2 bikeways.

## **Los Angeles County**

### **Traffic Forecasting Model**

Traffic forecasts for the study area within Los Angeles County were developed for each of the four alternatives under study using OCTAM Version 3.3. Traffic forecasts were prepared for each freeway segment and each study intersection. The forecast years are Opening Year 2020 and Design Year 2040. Forecast AM and PM peak-hour traffic volumes on the freeway mainline and ramps are shown for each alternative for years 2020 and 2040 in Figures 3.1.6-18 through 3.1.6-25. Forecast AM and PM peak-hour traffic volumes for each of the study intersections are shown for each alternative for years 2020 and 2040 in Figures 3.1.6-26 through 3.1.6-33.

Traffic data and the results of operational analysis are presented below for the No Build Alternative and three build alternatives for the freeway mainline and the interchange areas. Analysis and data are presented for the expected Opening Year 2020 and the Design Year 2040.

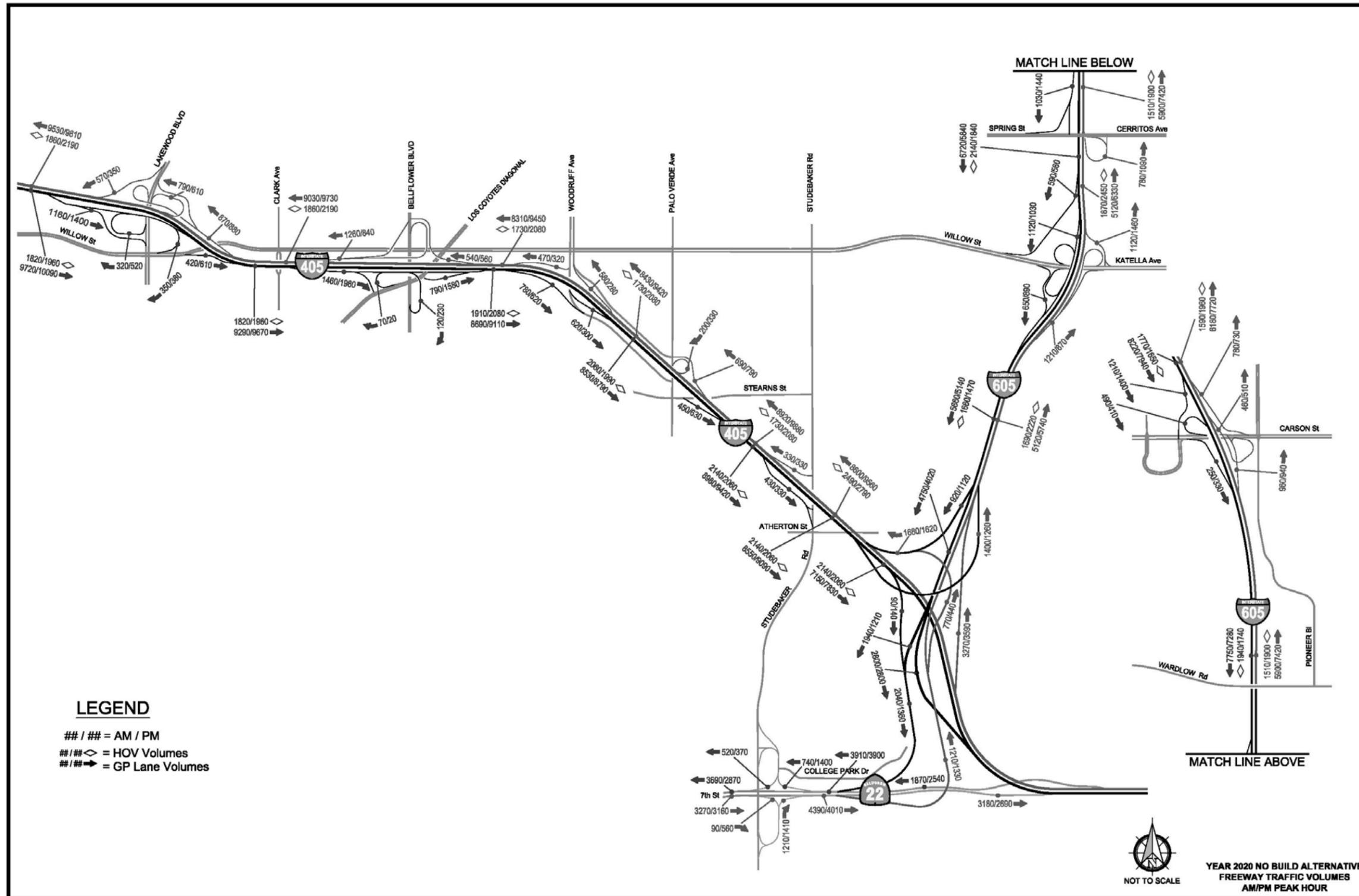


Figure 3.1.6-18: 2020 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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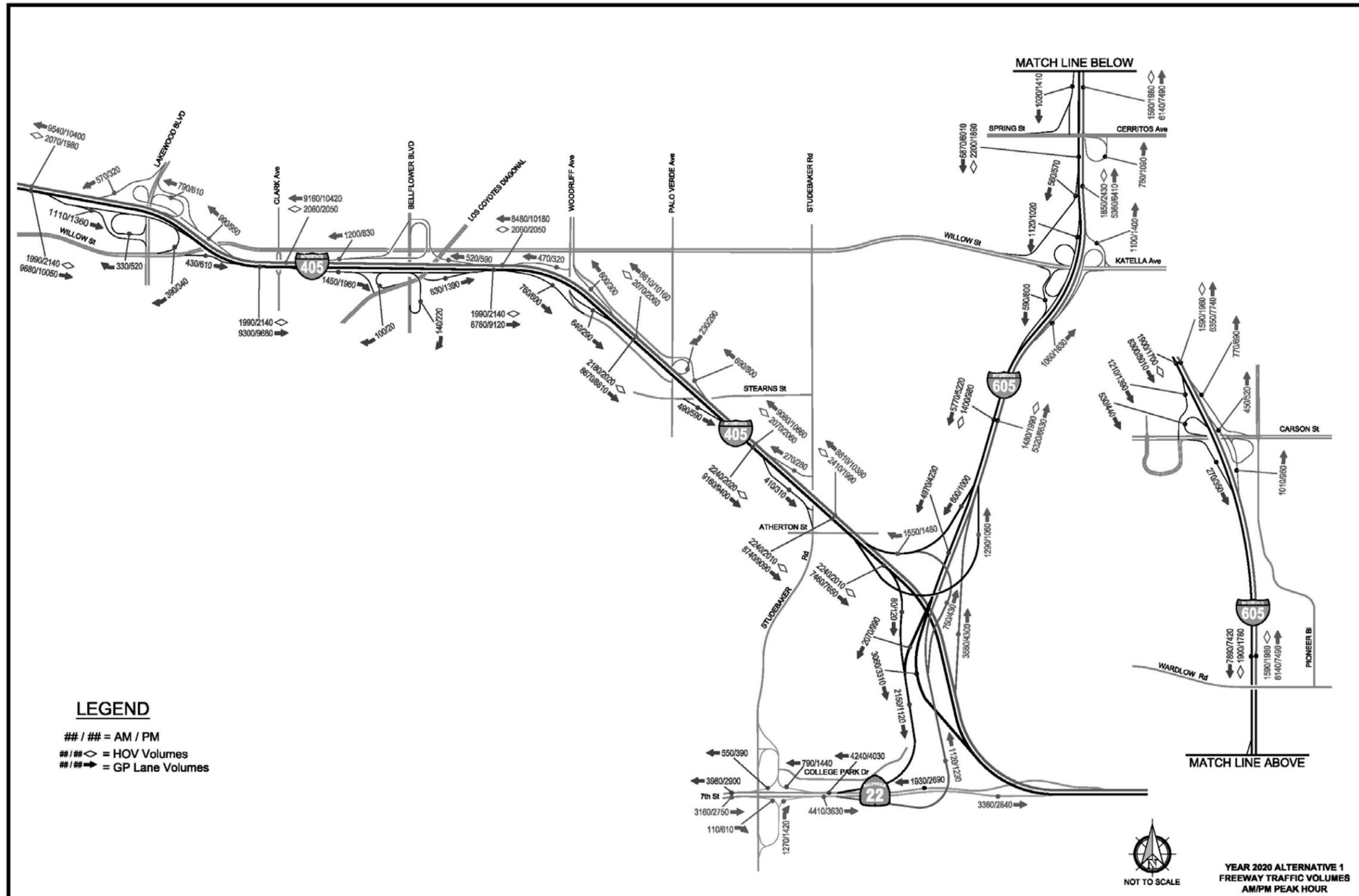


Figure 3.1.6-19: 2020 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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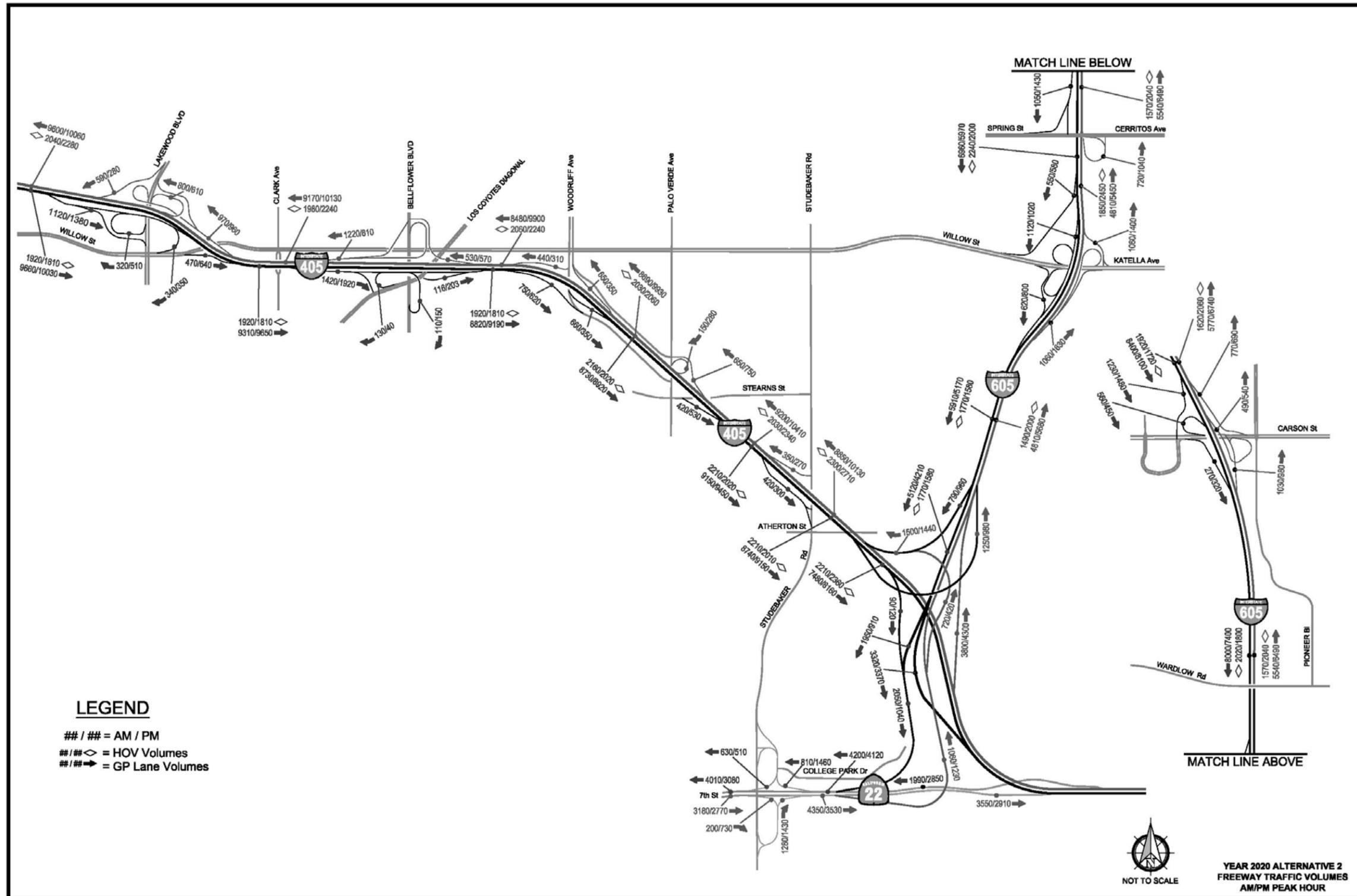


Figure 3.1.6-20: 2020 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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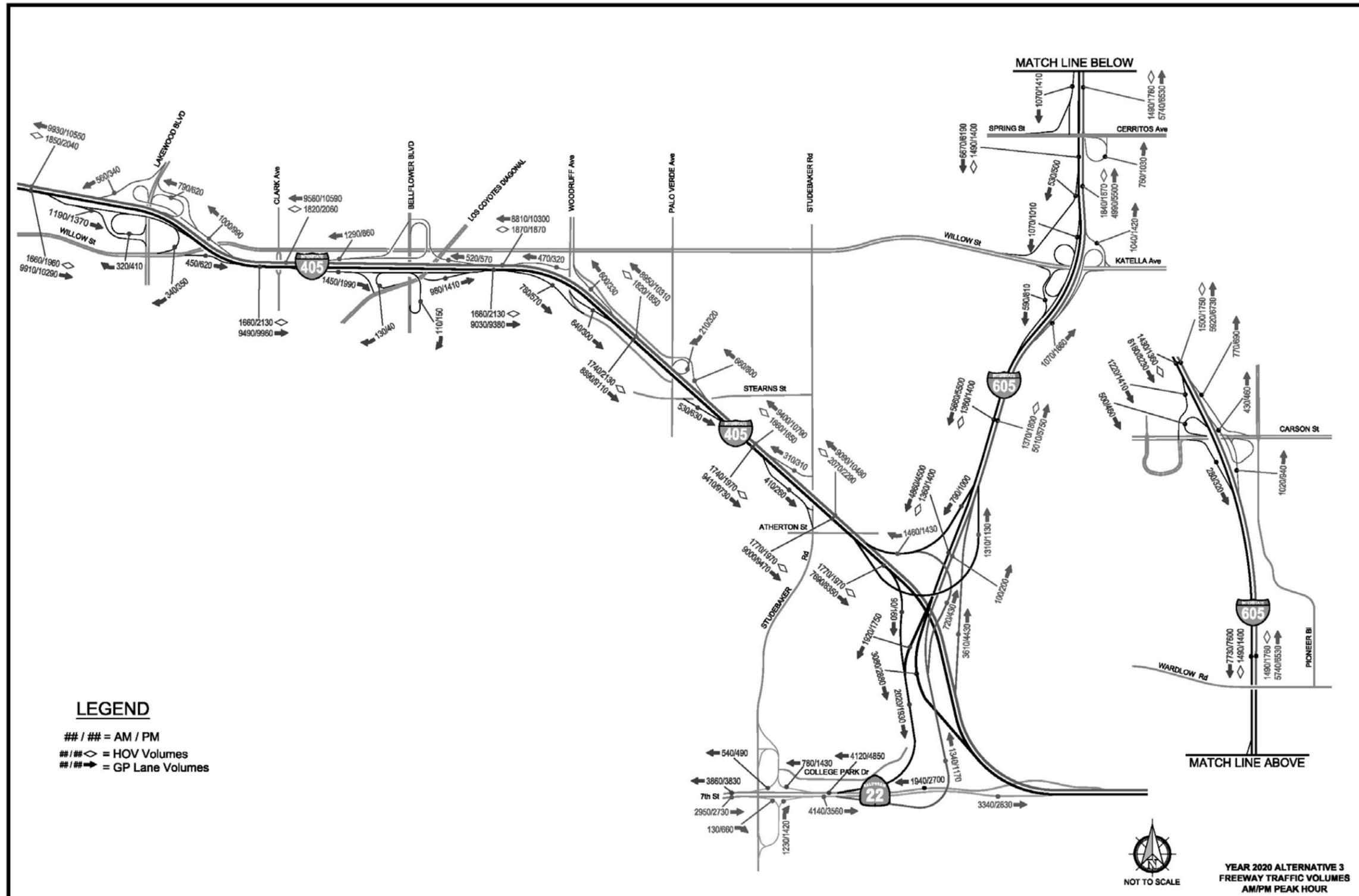


Figure 3.1.6-21: 2020 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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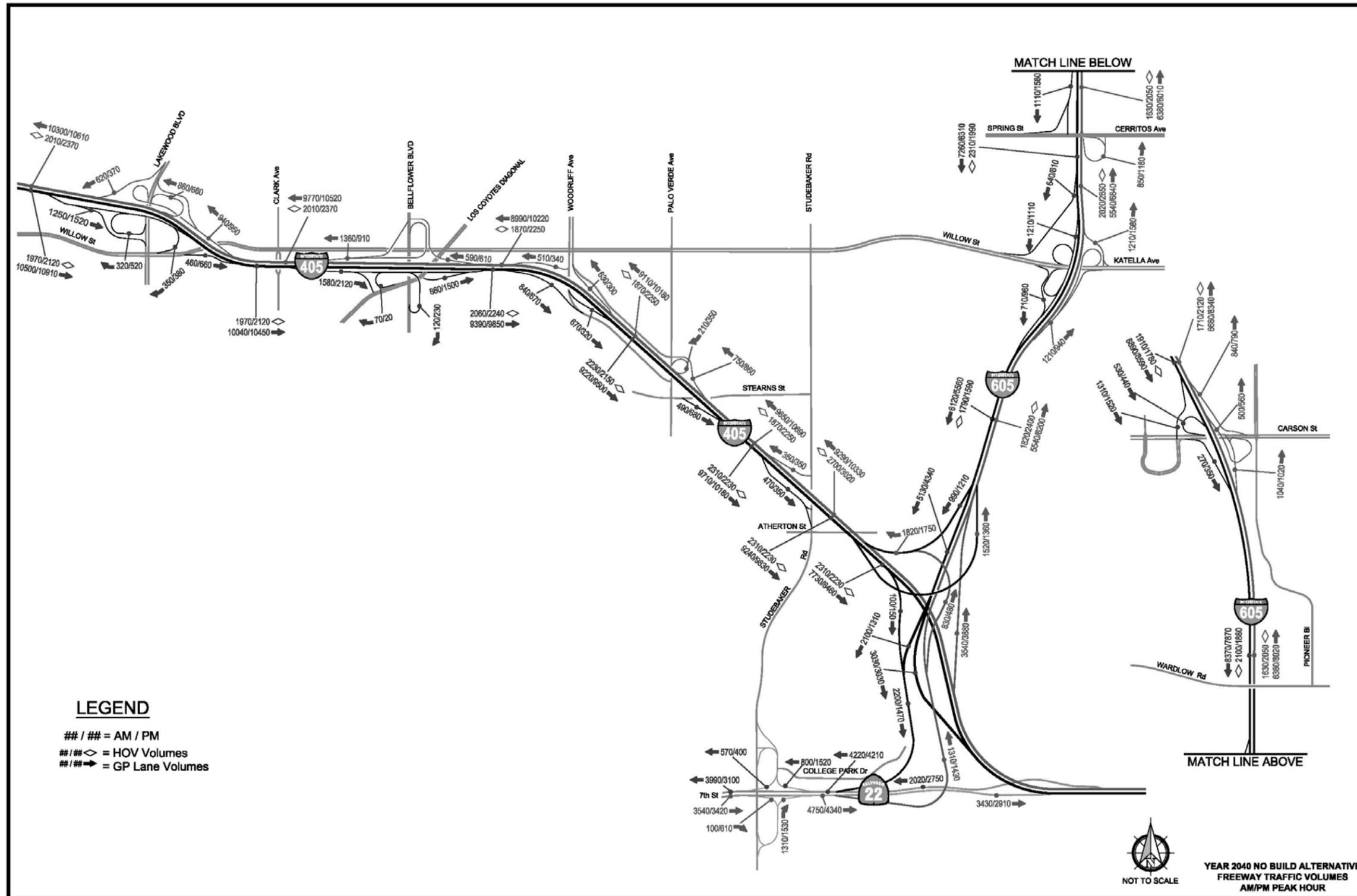


Figure 3.1.6-22: 2040 No Build Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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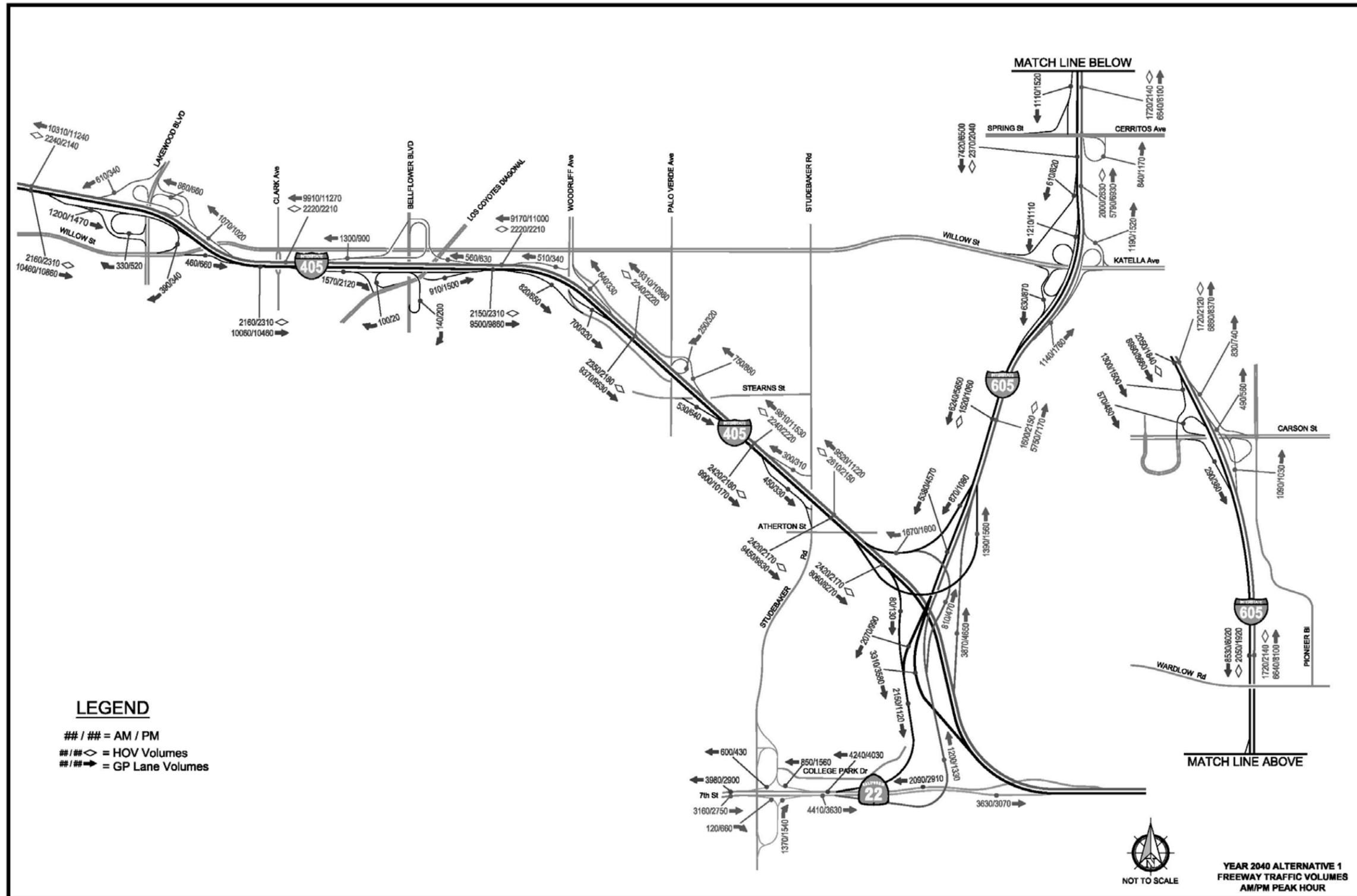


Figure 3.1.6-23: 2040 Alternative 1 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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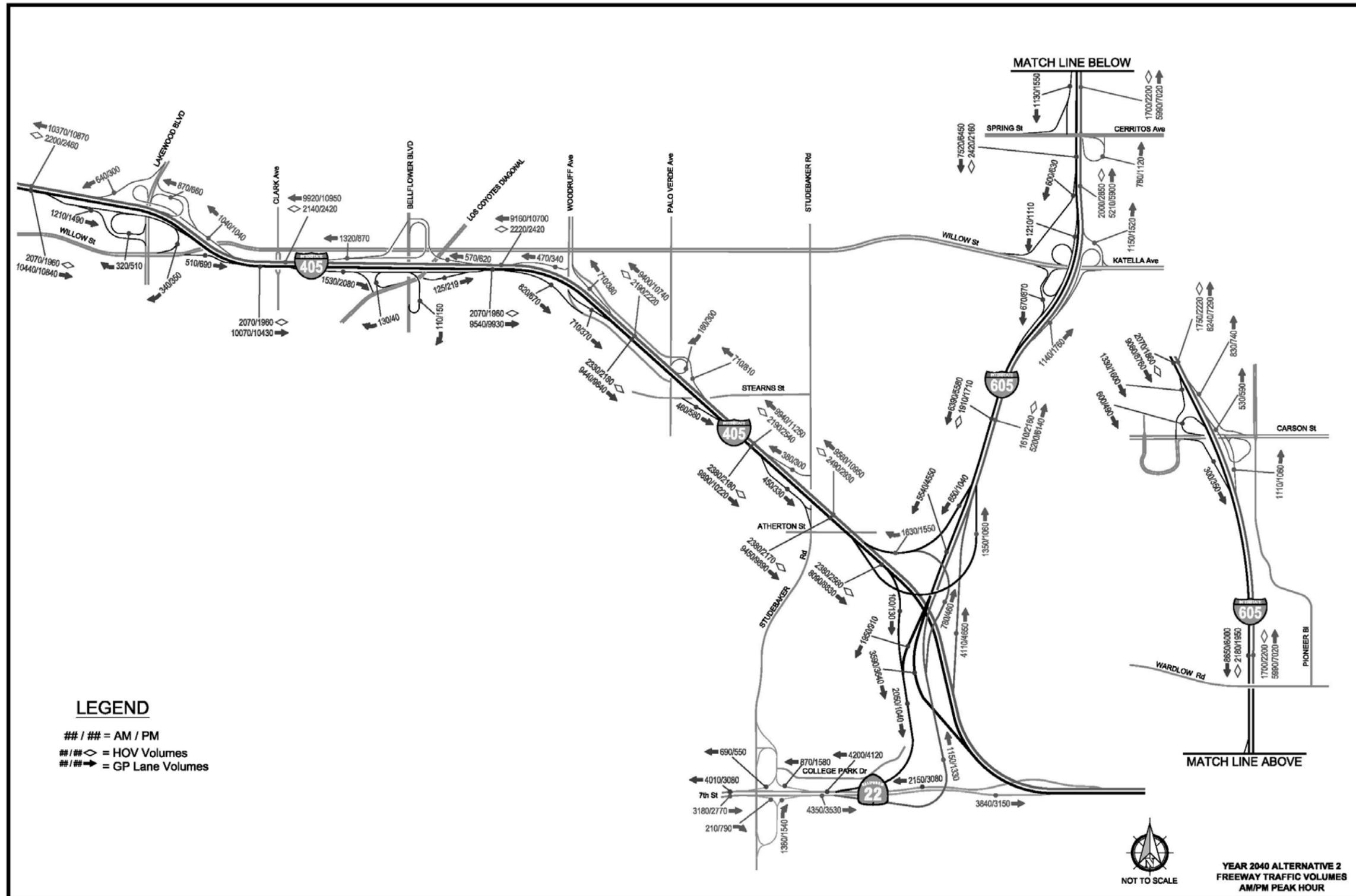


Figure 3.1.6-24: 2040 Alternative 2 Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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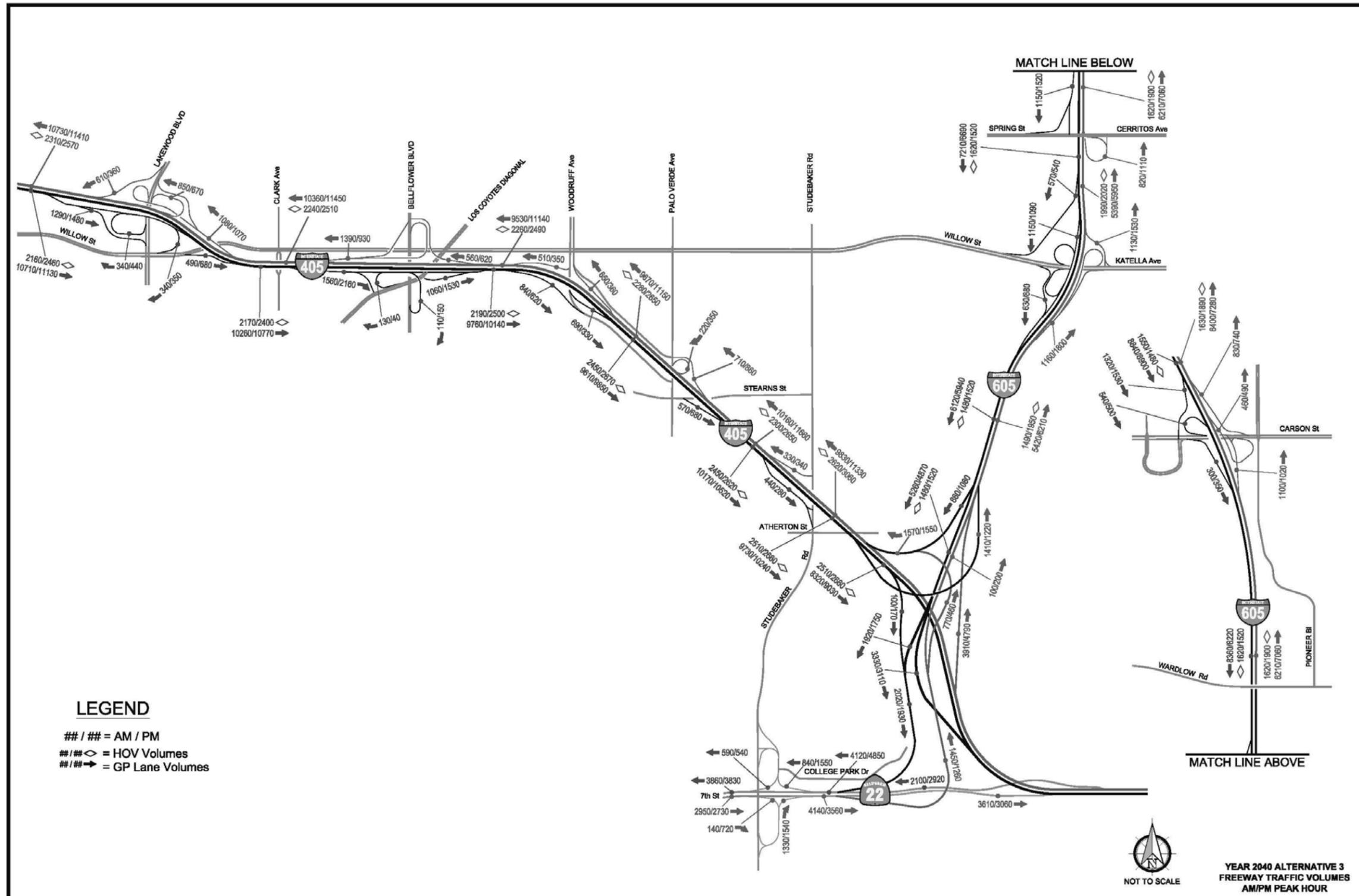


Figure 3.1.6-25: 2040 Alternative 3 (Preferred Alternative) Freeway Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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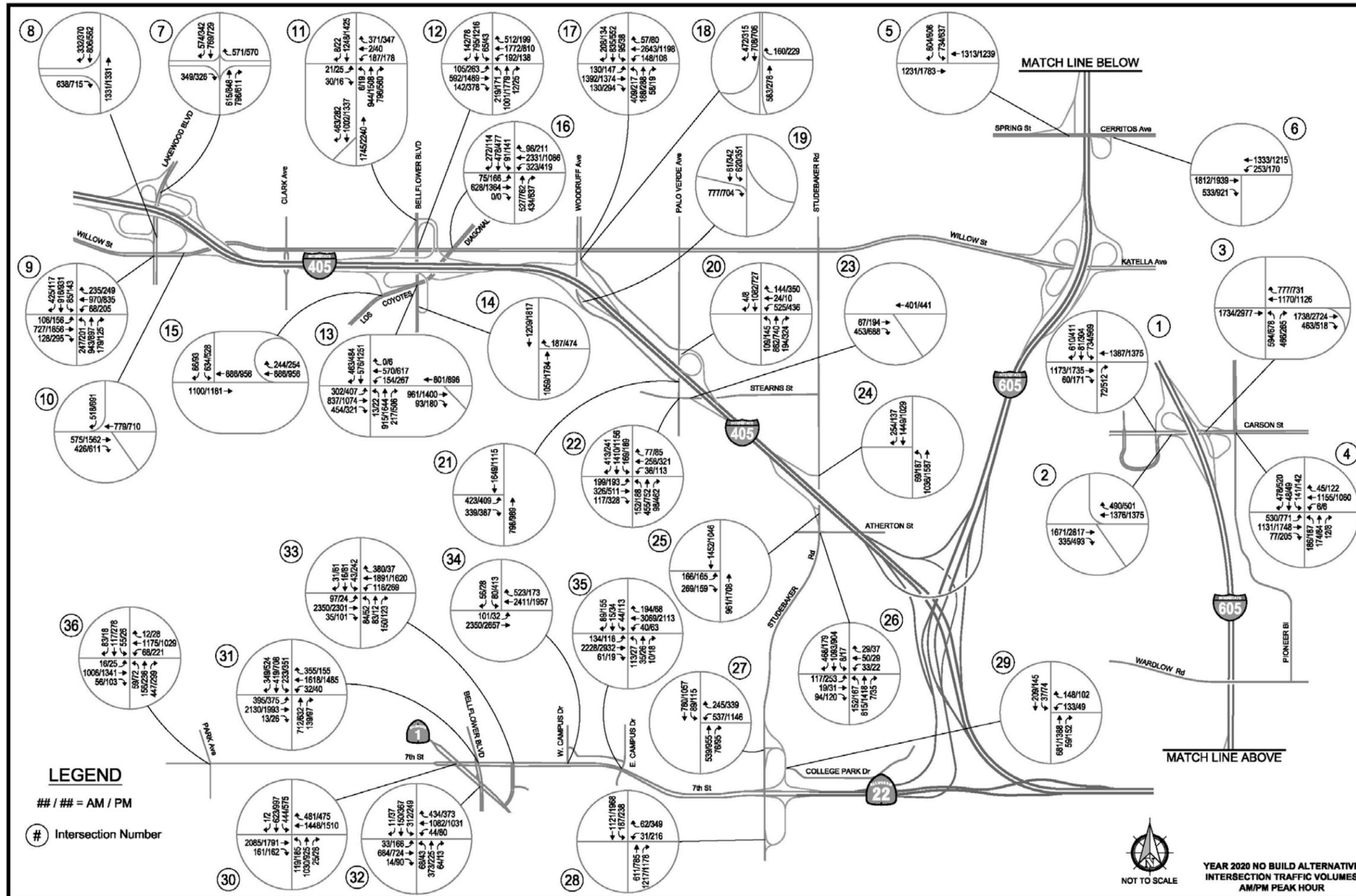


Figure 3.1.6-26: 2020 No Build Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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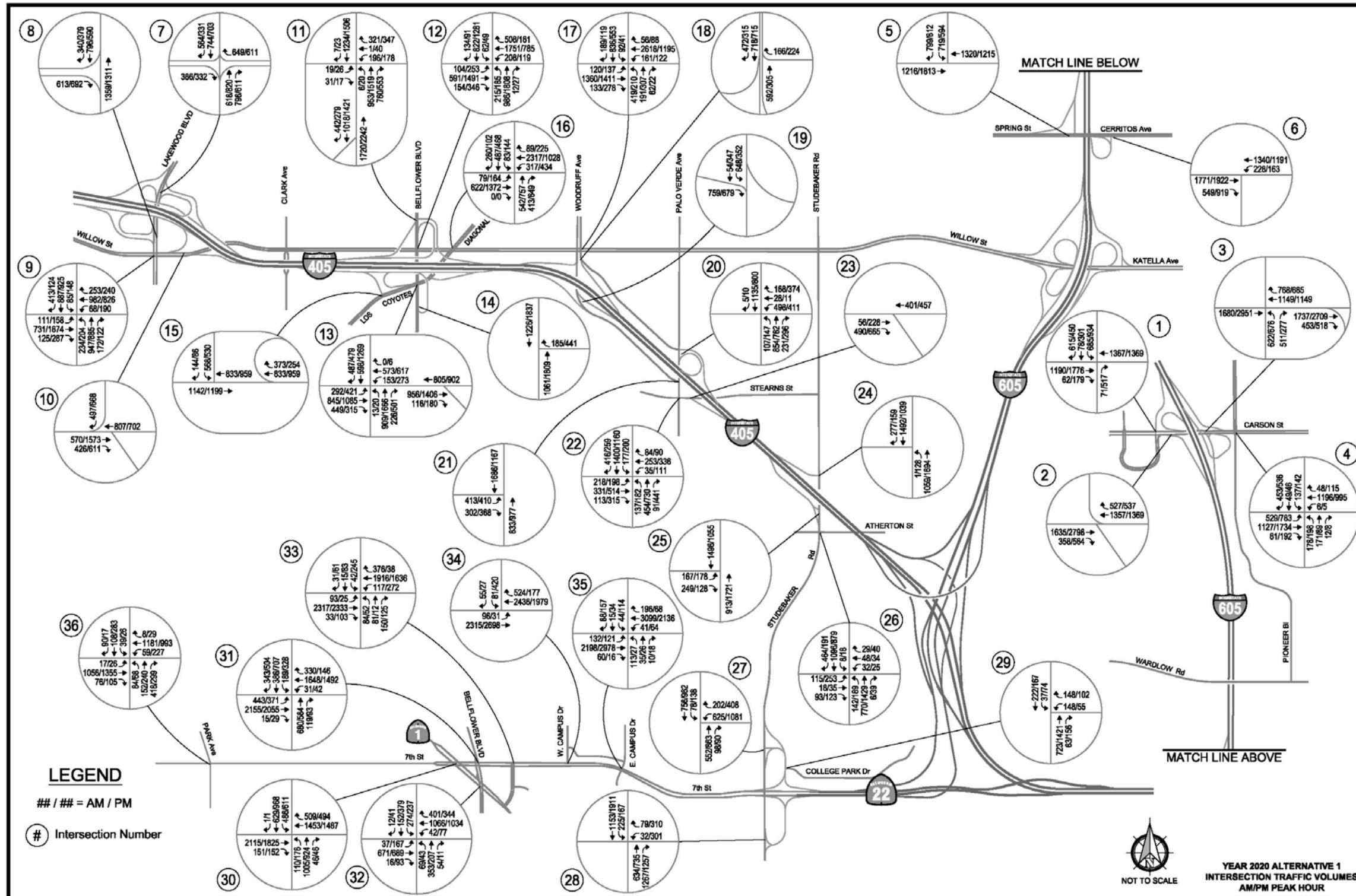


Figure 3.1.6-27: 2020 Alternative 1 Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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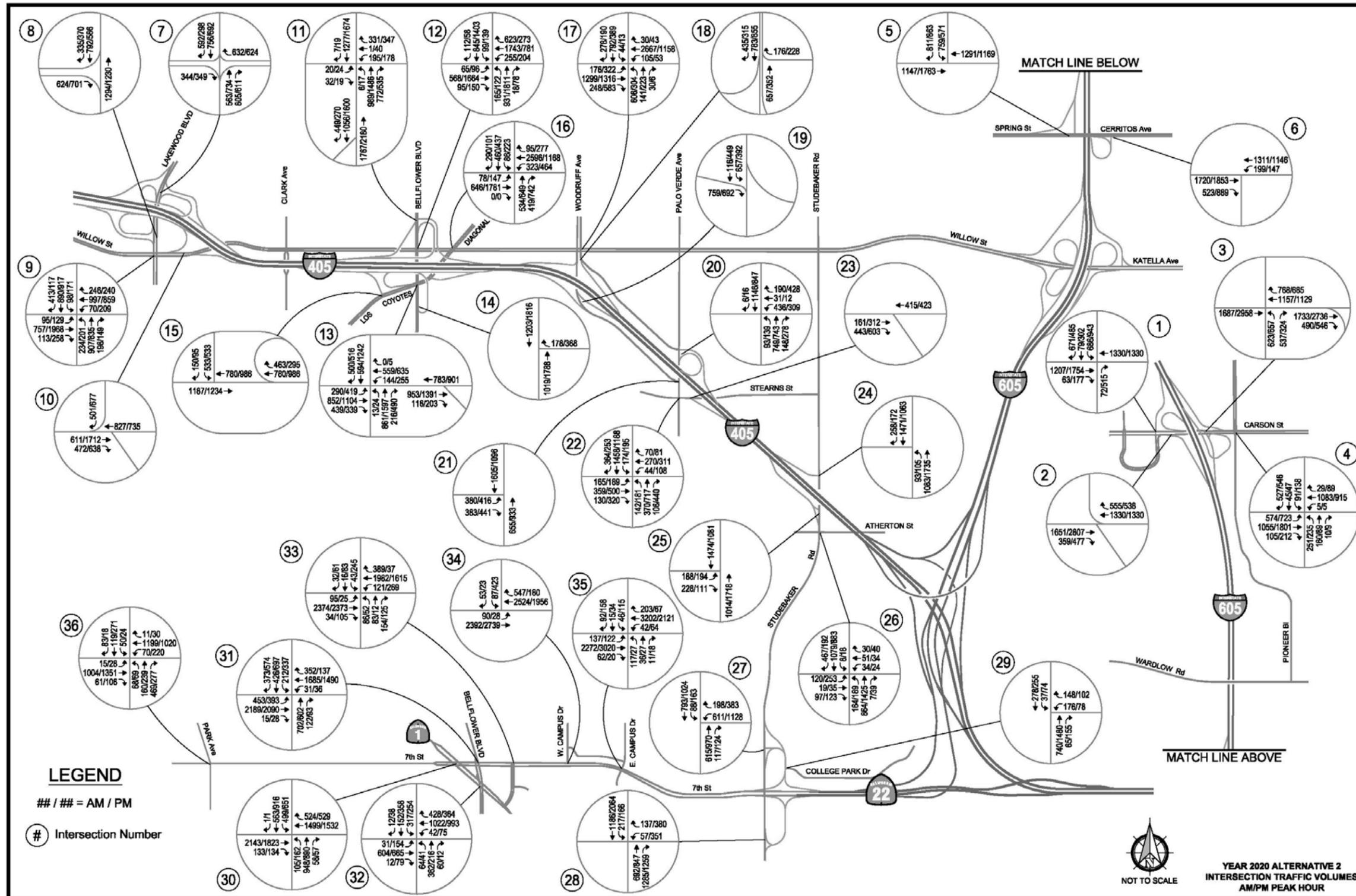


Figure 3.1.6-28: 2020 Alternative 2 Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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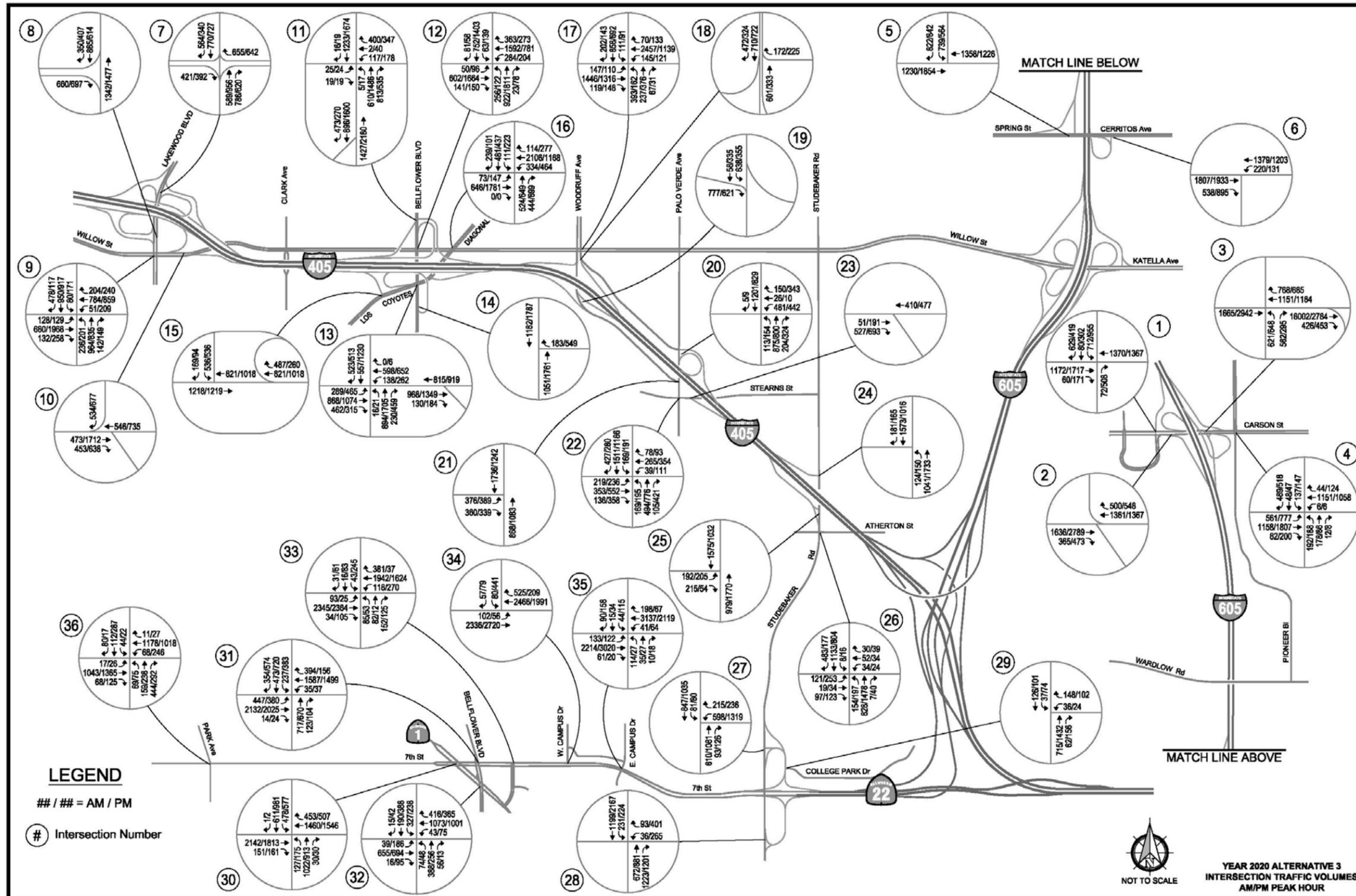


Figure 3.1.6-29: 2020 Alternative 3 (Preferred Alternative) Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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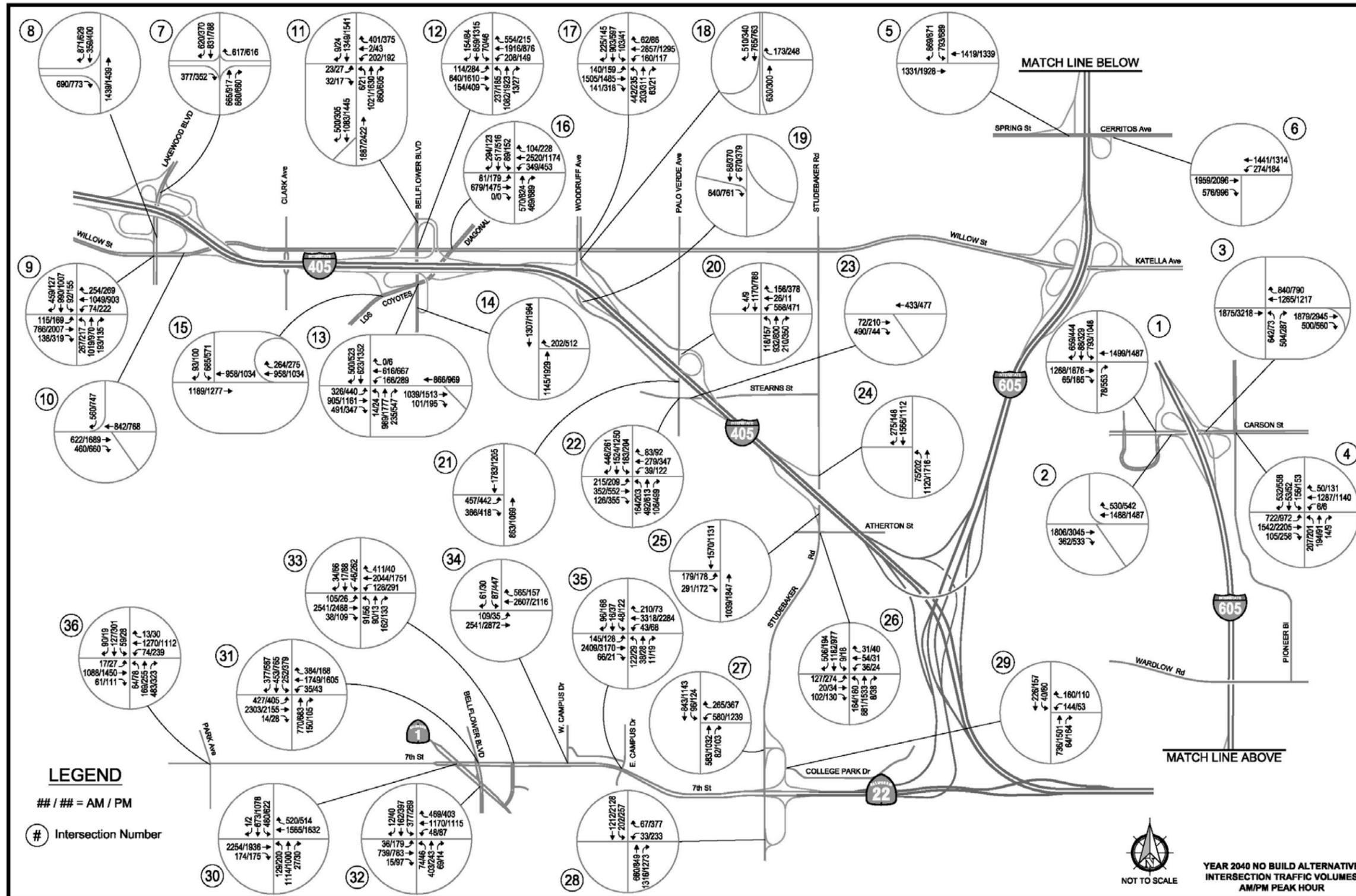


Figure 3.1.6-30: 2040 No Build Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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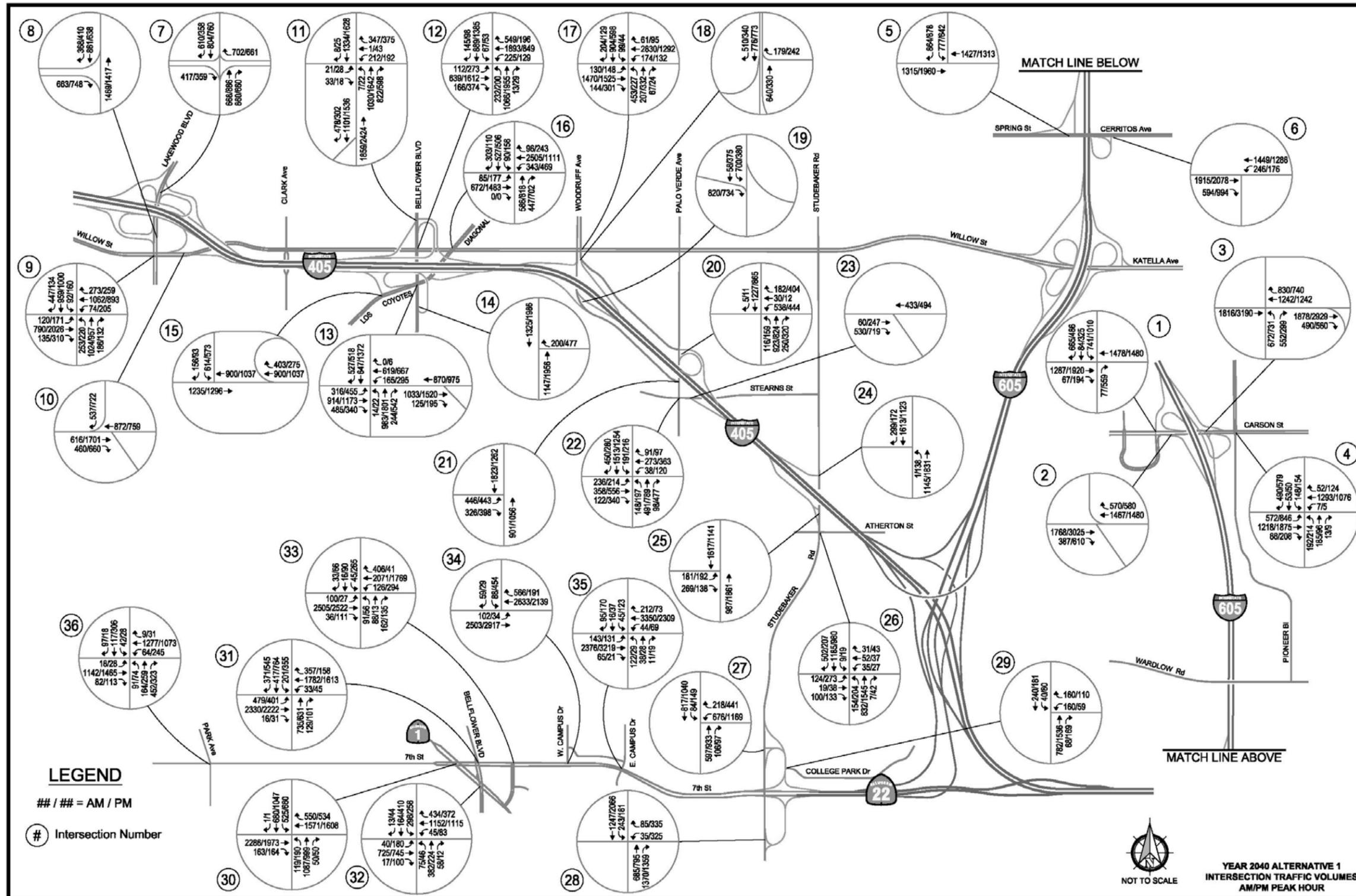


Figure 3.1.6-31: 2040 Alternative 1 Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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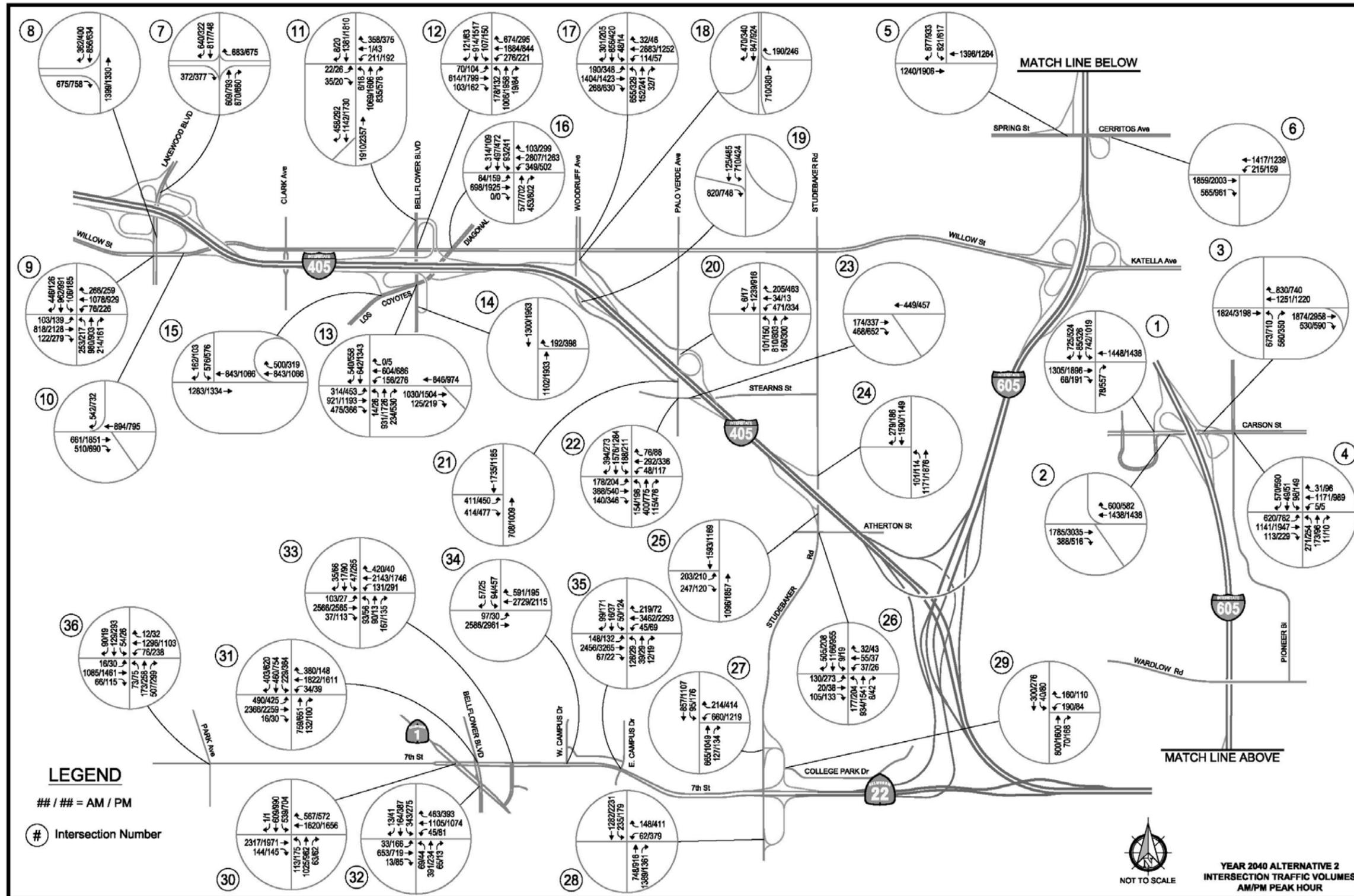


Figure 3.1.6-32: 2040 Alternative 2 Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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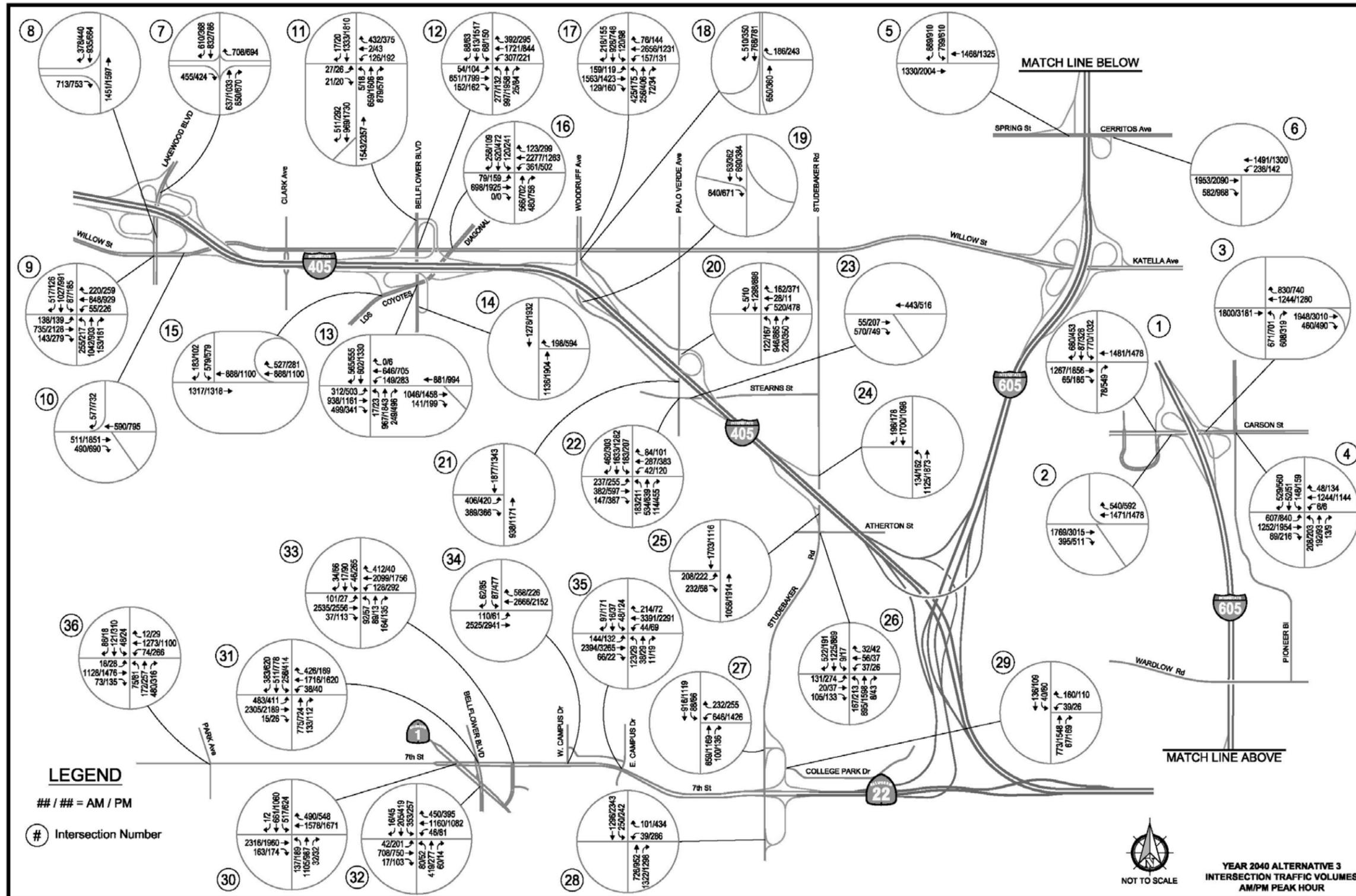


Figure 3.1.6-33: 2040 Alternative 3 (Preferred Alternative) Intersection Traffic Volumes AM/PM Peak Hours – Locations in Los Angeles County

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### **No Build Alternative**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) No Build Alternative AM/PM peak-hour traffic volumes for the freeway mainline and all interchange ramps within the study area in Los Angeles County are presented in Figures 3.1.6-18 and 3.1.6-22, respectively. The freeway mainline and all interchange ramps are assumed to be unchanged from the existing conditions. There are no committed projects within the study area in Los Angeles County.

*V/C Ratio and LOS.* Table 3.1.6-13 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2020 for the GP lanes of the freeway mainline. Under no-build conditions in year 2020, the I-405 freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS D and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.90 to 1.16** and **0.98 to 1.29** during the PM peak hour.

The I-605 mainline is anticipated to operate at LOS C in the AM peak hour in the northbound direction and LOS E in the southbound direction in 2020. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS E in the northbound direction and LOS D in the southbound direction. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.80** in the northbound direction and **1.05** in the southbound direction. During the PM peak hour, the v/c ratios are **1.00** in the northbound direction and **0.98** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS F in the AM peak hour in the eastbound direction and LOS E in the westbound direction in 2020. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is LOS E in both directions. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour is **1.19** in the eastbound direction and **1.06** in the westbound direction. During the PM peak hour, the v/c ratio is **1.08** in the eastbound direction and **1.05** in the westbound direction.

Table 3.1.6-14 presents the v/c ratios for peak hours of the No Build Alternative in 2020 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **1.01 to 1.35** and **0.99 to 1.51** during the PM peak hour (shown in bold in the table).

Table 3.1.6-24 presents the LOS and v/c ratios for peak hours of the No Build Alternative in 2040 for the GP lanes of the freeway mainline. Under no-build conditions in year 2040, the freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS D and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E

and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.97 to 1.26** and **1.06 to 1.40** during the PM peak hour.

The I-605 mainline is anticipated to operate at LOS D in the AM peak hour in the northbound direction and LOS F in the southbound direction in 2040. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS E in both directions. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.86** in the northbound direction and **1.13** in the southbound direction. During the PM peak hour, the v/c ratios are **1.08** in the northbound direction and **1.06** in the southbound direction.

The SR-22/7<sup>th</sup> Street mainline is anticipated to operate at LOS F in the eastbound direction and LOS E in the westbound direction during the AM and PM peak hours in 2040. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour is **1.28** in the eastbound direction and **1.14** in the westbound direction. During the PM peak hour, the v/c ratios are **1.17** in the eastbound direction and **1.14** in the westbound direction.

Table 3.1.6-25 presents the v/c ratios for peak hours of the No Build Alternative in 2040 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **1.09 to 1.46** and **1.08 to 1.63** during the PM peak hour (shown in bold in the table).

A more-detailed link-by-link presentation of the No Build Alternative in 2020 and 2040 traffic conditions for GP and HOV lanes is included in Appendix L2.

Freeway Connector Volumes. Tables 3.1.6-15 and 3.1.6-26 provide the 2020 and 2040 forecast for the no-build condition, respectively, of branch connector volumes and v/c ratios on ramps within the I-405/I-605/ SR-22/7<sup>th</sup> Street interchange not presented above under the Orange County heading. Branch connectors are forecast to operate with v/c ratios ranging from **0.24 to 1.13** in 2020 and from **0.27 to 1.22** in 2040 under the no-build condition (shown in bold in the table). The branch connector from I-605 southbound/I-405 southbound to 7<sup>th</sup> Street is anticipated to operate with a v/c ratio in excess of 1.00 in 2040 during the AM peak hour.

Arterials, Intersections, and Interchanges. The No Build Alternative AM and PM peak-hour traffic volumes for arterial and interchange study locations within the study area in Los Angeles County for 2020 and 2040 are illustrated in Figures 3.1.6-26 and 3.1.6-30, respectively. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2020 no-build conditions is provided in Table 3.1.6-12 for all of the study intersections. In Table 3.1.6-12 for 2020 under no-build conditions, the study intersections are anticipated to operate at LOS D or better, except for four intersections (as shown in bold) that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both.

Table 3.1.6-24: Mainline GP Lane Density, LOS, and Volume-to-Capacity Ratio for Year 2040 – Locations in Los Angeles County

Segment	Direction	Existing 2009						No Build – 2040*						Alternative 1 – 2040*						Alternative 2 – 2040*						Alternative 3 – 2040*					
		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		
		V/C	Den	LOS	V/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS	D/C	Den	LOS
I-405 Mainline I-605 to Studebaker Road	NB	0.98	38.2	E	0.81	26.9	D	1.26	**	F	1.40	**	F	1.29	**	F	1.52	**	F	1.29	**	F	1.48	**	F	1.33	**	F	1.53	**	F
	SB	0.85	26.6	D	0.84	31.9	D	1.00	33.7	D	1.06	44.1	E	1.02	35.1	E	1.06	44.1	E	1.02	35.1	E	1.07	44.7	E	1.05	37.2	E	1.11	**	F
I-405 Mainline Studebaker Road to Lakewood Boulevard	NB***	0.94	52.4	F	0.90	38.1	E	0.97	57.0	F	1.10	50.2	F	0.99	58.3	F	1.19	55.1	F	0.99	57.9	F	1.16	51.5	F	1.03	60.9	F	1.20	56.1	F
	SB***	0.95	42.0	E	0.90	61.6	F	1.09	50.1	F	1.13	78.5	F	1.09	49.9	F	1.13	78.5	F	1.09	50.3	F	1.13	78.3	F	1.11	51.3	F	1.16	81.2	F
I-605 Mainline I-405 to Carson Street	NB	0.81	26.3	C	0.97	35.7	E	0.86	28.3	D	1.08	44.4	E	0.90	29.8	D	1.09	**	F	0.81	26.2	D	0.95	34.7	D	0.84	27.4	D	0.95	35.0	D
	SB	1.09	41.1	E	1.00	36.1	E	1.13	**	F	1.06	40.6	E	1.15	**	F	1.08	42.4	E	1.17	**	F	1.08	42.2	E	1.13	**	F	1.11	**	F
SR-22/ 7 <sup>th</sup> Street Mainline Studebaker Road to I-405/ I-605	EB	0.86	26.1	D	1.05	35.6	E	1.28	**	F	1.17	**	F	1.19	**	F	0.98	31.8	D	1.18	**	F	0.95	30.4	D	1.12	41.3	E	0.96	30.8	D
	WB	1.00	33.0	D	0.71	21.1	C	1.14	43.4	E	1.14	43.1	E	1.15	43.9	E	1.09	38.8	E	1.14	42.9	E	1.11	40.9	E	1.11	40.9	E	1.31	**	F

NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound; Den – Density; LOS – Level of Service; V/C – Volume-to-Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio.

\* – For future conditions, the D/C ratio is used instead of the V/C ratio.

\*\* – Density is not calculated under HCM because volume exceeds the range of the density algorithm.

\*\*\* – Density and LOS is based on weaving analysis.

Table 3.1.6-25: Mainline HOV Volume-to-Capacity Ratio for Year 2040 – Locations in Los Angeles County

Segment	Direction	Existing 2009		No Build 2040*		Alternative 1 2040*		Alternative 2 2040*		Alternative 3 2040*	
		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
I-405 HOV I-605 to Studebaker Road	NB	0.84	0.87	<b>1.46</b>	<b>1.63</b>	<b>1.41</b>	1.16	<b>1.35</b>	<b>1.58</b>	1.42	<b>1.65</b>
	SB	0.50	0.95	1.25	1.21	1.31	1.17	1.29	<b>1.17</b>	1.36	1.44
I-405 HOV Studebaker Road to Lakewood Boulevard	NB	<b>1.06</b>	0.74	<b>1.09</b>	1.28	1.21	1.20	1.20	1.37	<b>1.25</b>	1.43
	SB	0.50	<b>1.04</b>	1.25	1.21	1.31	1.25	1.29	1.18	1.32	1.44
I-605 HOV I-405 to Carson Street	NB	<b>0.45</b>	<b>0.38</b>	<b>1.09</b>	1.43	<b>1.08</b>	<b>1.42</b>	<b>1.08</b>	1.43	1.08	1.09
	SB	0.63	0.43	1.25	<b>1.08</b>	1.28	<b>1.10</b>	1.31	<b>1.17</b>	<b>0.88</b>	<b>0.82</b>

NB – Northbound; SB – Southbound; EB – Eastbound; WB – Westbound; V/C – Volume-to-Capacity Ratio

Bolded V/C and D/C (demand volume-to-capacity) ratios indicate the minimum and maximum values as discussed in the text.

\* – For future conditions, the D/C ratio is used instead of the V/C ratio.

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Table 3.1.6-26: 2040 Branch Connector Volumes and Volume-to-Capacity Ratios – Locations in Los Angeles County

Branch Connector	Existing 2009				No Build – 2040*				Alternative 1 – 2040*				Alternative 2 – 2040*				Alternative 3 – 2040*			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	Volume	V/C	Volume	V/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C	Volume	D/C
I-605 SB to I-405 NB	848	0.47	1,096	0.61	990	0.55	1,210	0.67	870	0.48	1,080	0.60	850	0.47	1,040	0.58	860	0.48	1,080	0.60
I-605 SB/7 <sup>th</sup> Street to I-405 NB	1,555	0.43	1,864	0.52	1,820	0.51	1,750	0.49	1,670	0.46	1,600	0.44	1,630	0.45	1,550	0.43	1,570	0.44	1,550	0.43
I-405 SB to I-605 NB	1,376	0.38	1,305	0.36	1,520	0.42	1,360	0.38	1,390	0.39	1,560	0.43	1,350	0.38	1,060	0.29	1,410	0.39	1,220	0.34
I-605 SB/I-405 SB to 7 <sup>th</sup> Street	1,460	<b>0.81</b>	622	0.35	2,200	<b>1.22</b>	1,470	0.82	2,150	<b>1.19</b>	1,120	0.62	2,050	<b>1.14</b>	1,040	0.58	2,020	<b>1.12</b>	1,930	1.07
7 <sup>th</sup> Street to I-605 NB/I-405 NB	1,100	<b>0.31</b>	1,300	0.36	1,310	0.36	1,430	0.40	1,200	0.33	1,330	0.37	510	0.14	380	<b>0.11</b>	1,450	0.40	1,260	0.35
7 <sup>th</sup> Street to I-405 NB	707	0.39	768	0.43	830	0.46	480	<b>0.27</b>	810	0.45	470	<b>0.26</b>	780	0.43	460	0.26	770	0.43	460	<b>0.26</b>

V/C – Volume-to-Capacity Ratio based on branch connector capacity of 1,800 vehicles per lane for GP branch connector lanes.

D/C – Demand Volume-to-Capacity Ratio based on branch connector capacity of 1,800 vehicles per lane for GP branch connector lanes.

Bolded V/C and D/C ratios indicate the minimum and maximum values as discussed in the text.

\* – For future conditions, the D/C ratio is used instead of the V/C ratio.

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Table 3.1.6-12 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2020 under no-build conditions during peak hours, except for five intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2040 no-build conditions is provided in Table 3.1.6-12 for all of the study intersections. In Table 3.1.6-12 for 2040 under no-build conditions, the study intersections are anticipated to operate at LOS D or better, except for nine intersections (as shown in bold) that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both.

Table 3.1.6-12 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2040 under no-build conditions during peak hours, except for 10 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both.

A comparison of vehicle queuing (higher of AM or PM peak-hour 95<sup>th</sup> percentile queues) in year 2040 with available storage (in feet) was conducted at all arterial interchange study intersections and is summarized in Table 3.1.6-16. Table 3.1.6-16 shows that 90 percent of off-ramps with traffic control at their arterial intersections are anticipated to have adequate turning lane storage under no-build conditions in 2040. Table 3.1.6-16 also shows that 64 percent of arterials are anticipated to have adequate turning lane storage at ramp intersections, and 45 percent of turning lanes at arterial/arterial intersections are anticipated to have adequate storage under no-build conditions in 2040.

### **Alternative 1**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) Alternative 1 AM/PM peak-hour traffic volumes for the freeway mainline and all interchange ramps within the study area in Los Angeles County are presented in Figures 3.1.6-19 and 3.1.6-23, respectively. The freeway mainline and all interchange ramps are assumed to be unchanged from the existing conditions.

*V/C Ratio and LOS.* Table 3.1.6-13 presents the LOS and v/c ratios for peak hours of Alternative 1 in 2020 for the GP lanes of the freeway mainline. Under Alternative 1 in year 2020, the I-405 freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS D and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.92 to 1.19** and **0.98 to 1.40** during the PM peak hour.

The I-605 mainline is anticipated to operate at LOS D in the AM peak hour in the northbound direction and LOS E in the southbound direction in 2020. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS E in both directions. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.83** in the northbound direction and **1.07** in the southbound direction. During the PM peak hour, the v/c ratios are **1.01** in the northbound direction and **1.00** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS F in the AM peak hour in the eastbound direction and LOS E in the westbound direction in 2020. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is LOS D in the eastbound direction and LOS E in the westbound direction. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **1.19** in the eastbound direction and **1.15** in the westbound direction. During the PM peak hour, the v/c ratios are **0.98** in the eastbound direction and **1.09** in the westbound direction.

Table 3.1.6-14 presents the v/c ratios for peak hours of Alternative 1 in 2020 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **1.00 to 1.30** and **1.02 to 1.31** during the PM peak hour (shown in bold in the table).

Table 3.1.6-24 presents the LOS and v/c ratios for peak hours of Alternative 1 in 2040 for the GP lanes of the freeway mainline. Under Alternative 1 conditions in year 2040, the freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS E and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.99 to 1.29** and **1.06 to 1.52** during the PM peak hour.

The I-605 mainline is anticipated to operate at LOS D in the AM peak hour in the northbound direction and LOS F in the southbound direction in 2040. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E in the southbound direction. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.90** in the northbound direction and **1.15** in the southbound direction. During the PM peak hour, the v/c ratios are **1.09** in the northbound direction and **1.08** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS F in the eastbound direction and LOS E in the westbound direction during the AM peak hour in 2040. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS D in the eastbound direction and LOS E in the westbound direction. The v/c ratios in the GP lanes of the

SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **1.19** in the eastbound direction and **1.15** in the westbound direction. During the PM peak hour, the v/c ratios are **0.98** in the eastbound direction and **1.09** in the westbound direction.

Table 3.1.6-25 presents the v/c ratios for peak hours of Alternative 1 in 2040 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **1.08 to 1.41** and **1.10 to 1.42** during the PM peak hour.

A more-detailed link-by-link presentation of Alternative 1 traffic conditions in 2020 and 2040 for GP and HOV lanes is included in Appendix L2.

Freeway Connector Volumes. Tables 3.1.6-15 and 3.1.6-26 provide the 2020 and 2040 forecast for Alternative 1, respectively, of branch connector volumes and v/c ratios on ramps within the I-405/I-605/SR-22/ 7<sup>th</sup> Street interchange not presented above under the Orange County heading. Branch connectors are forecast to operate with v/c ratios ranging from **0.24 to 1.19** in 2020 and from **0.26 to 1.19** in 2040 under Alternative 1. The branch connector from I-605 southbound/I-405 southbound to 7<sup>th</sup> Street is anticipated to operate with a v/c ratio in excess of 1.00 in 2040 during the AM peak hour.

In no instance would additional lanes on branch connectors be feasible. Ramp metering was considered as a means to improve connector operations, but it was not included in the project because it would further reduce the capacity of the branch connectors.

Arterials, Intersections, and Interchanges. Alternative 1 AM and PM peak-hour traffic volumes for arterial and interchange study locations within the study area in Los Angeles County for 2020 and 2040 are illustrated in Figures 3.1.6-27 and 3.1.6-31, respectively. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2020 Alternative 1 conditions is provided in Table 3.1.6-12 for all of the study intersections. The Alternative 1 condition appears in Table 3.1.6-12 under the “Alternative 1 Traffic on No Build Geometry” heading, where forecast Alternative 1 traffic is evaluated on no-build lanes and traffic control. In 2020 under Alternative 1, the study intersections are anticipated to operate at LOS D or better, except for four intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both (shown in bold in the table); these same four intersections are anticipated to operate at LOS E or F under no-build conditions in 2020.

Table 3.1.6-12 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2020 under Alternative 1 during peak hours, except for six intersections that are anticipated to operate over capacity during either the AM or PM peak hour

or both. Five of these intersections are anticipated to operate over capacity under the no-build condition in 2020.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2040 Alternative 1 conditions is provided in Table 3.1.6-12 for all of the study intersections. In 2040 under Alternative 1, the study intersections are anticipated to operate at LOS D or better, except for 10 intersections that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both (shown in bold in the table). Nine of these 10 intersections are anticipated to operate at LOS E or F under the no-build conditions in 2040.

Table 3.1.6-12 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2040 under Alternative 1 during peak hours, except for 10 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. The same 10 intersections are anticipated to operate over capacity under the no-build condition in 2040.

As highlighted in Table 3.1.6-12, the project contributes to adverse cumulative effects on the following four study intersections in 2040:

Los Coyotes Diagonal and Bellflower Boulevard (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.13 with LOS E and under Alternative 1 projected D/C ratio is 1.15 with LOS E)

SR-22 Westbound Ramp and College Park Drive (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.16 with LOS F and under Alternative 1 projected D/C ratio is 1.19 with LOS F)

7<sup>th</sup> Street and Pacific Coast Highway (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.02 with LOS E and under Alternative 1 projected D/C ratio is 1.04 with LOS E) 7<sup>th</sup> Street and West Campus Drive (2040 PM peak hour under No Build Alternative projected D/C ratio is 0.87 with LOS E and under Alternative 1 projected D/C ratio is 0.89 with LOS E)

As highlighted in Table 3.1.6-12, the project contributes to adverse cumulative effects on the following two study intersections in 2020, the first of which also has an adverse cumulative effect in 2040 and the second of which does not:

SR-22 Westbound Ramp and College Park Drive (2020 PM peak hour under No Build Alternative projected D/C ratio is 1.07 with LOS F and under Alternative 1 projected D/C ratio is 1.10 with LOS F)

7<sup>th</sup> Street and Bellflower Boulevard (2020 AM peak hour under No Build Alternative projected D/C ratio is 1.04 with LOS E and under Alternative 1 projected D/C ratio is 1.06 with LOS E)

Measures to Lessen Traffic Impacts at Intersections. Traffic measures listed in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures, are proposed to address the project contributions to adverse cumulative effects at the intersections identified above.

Table 3.1.6-27 provides a summary of the LOS analysis and v/c ratios for all of the study intersections during AM and PM peak hours anticipated in 2020 under Alternative 1 with all improvements, including the proposed traffic measures identified in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures. LOS and v/c ratios with all improvements, including proposed traffic measures, appear in the table under the heading “Alternative 1 Traffic on Alternative 1 Geometry including Traffic Measures.” Table 3.1.6-27 shows that, with all improvements including proposed traffic measures, Alternative 1 does not contribute to adverse cumulative effects on any study intersection in 2020.

Table 3.1.6-27 provides a summary of the LOS analysis and v/c ratios for all of the study intersections during AM and PM peak hours anticipated in 2040 under Alternative 1 with all improvements, including the measures identified in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures. Table 3.1.6-27 shows that, with all improvements including proposed traffic measures, Alternative 1 does not contribute to adverse cumulative effects on any study intersection in 2040.

No additional ROW is anticipated to implement the proposed measures. Noise and air quality impacts of construction would be temporary and not anticipated to be an adverse effect. It is anticipated that all of the proposed measures could be implemented without the necessity of closing travel lanes during weekday peak hours. It may be necessary to narrow lanes. Short-term off-peak, nighttime, and weekend lane closures may be necessary. As noted in the traffic measures listed in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures, the agencies implementing the measures would bear responsibility for necessary clearances and permits.

As stated in Section 3.1.6.4 (Measures T-10 and T-11), if the implementing agencies decide not to move forward with these improvements, cumulative impacts would remain adverse.

### **Alternative 2**

Freeway Mainline. The Opening Year (2020) and Design Year (2040) Alternative 2 AM/PM peak-hour traffic volumes for the freeway mainline and all interchange ramps within the study area in

Los Angeles County are presented in Figures 3.1.6-20 and 3.1.6-24, respectively. The freeway mainline and all interchange ramps are assumed to be unchanged from the existing conditions.

*V/C Ratio and LOS.* Table 3.1.6-13 presents the LOS and v/c ratios for peak hours of Alternative 2 in 2020 for the GP lanes of the freeway mainline. Under Alternative 2 in year 2020, the I-405 freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS D and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.92 to 1.20** and **0.99 to 1.37** during the PM peak hour.

The I-605 mainline is anticipated to operate at LOS C in the AM peak hour in the northbound direction and LOS E in the southbound direction in 2020. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS D in the northbound direction and LOS E in the southbound direction. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.75** in the northbound direction and **1.08** in the southbound direction. During the PM peak hour, the v/c ratios are **0.88** in the northbound direction and **1.00** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS F in the AM peak hour in the eastbound direction and LOS E in the westbound direction in 2020. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is LOS D in the eastbound direction and LOS E in the westbound direction. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **1.18** in the eastbound direction and **1.14** in the westbound direction. During the PM peak hour, the v/c ratios are **0.95** in the eastbound direction and **1.11** in the westbound direction.

Table 3.1.6-14 presents the v/c ratios for peak hours of Alternative 2 in 2020 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **1.00 to 1.24** and **1.08 to 1.46** during the PM peak hour.

Table 3.1.6-24 presents the LOS and v/c ratios for peak hours of Alternative 2 in 2040 for the GP lanes of the freeway mainline. Under Alternative 2 conditions in year 2040, the freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS E and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **1.02 to 1.29** and **1.07 to 1.48** during the PM peak hour.

Table 3.1.6-27: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Traffic Measures for Alternative 1 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009									Year 2020									Year 2040													
					Existing Traffic						No Build Traffic on No Build Geometry			Alternative 1 Traffic on Alternative 1 Geometry including Traffic Measures			No Build-Alternative 1 Adverse Effect	No Build Traffic on No Build Geometry			Alternative 1 Traffic on Alternative 1 Geometry including Traffic Measures			No Build-Alternative 1 Adverse Effect												
					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													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.56	18.7	B	0.67	20.1	C	N	0.62	22.4	C	0.73	24.5	C	0.61	18.8	B	0.73	20.8	C	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.38	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.41	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.35	--	--	0.36	--	--	--	0.35	--	--	0.36	--	--	0.38	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.59	20.3	C	0.76	16.6	B	N	0.63	23.6	C	0.82	23.2	C	0.63	21.8	C	0.82	18.4	B	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.30	--	--	0.35	--	--	--	0.33	--	--	0.37	--	--	0.33	--	--	0.37	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--
4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.79	30.7	C	0.87	31.6	C	N	0.86	35.1	D	0.92	43.9	D	0.87	34.7	C	0.90	41.4	D	N	
Spring Street/Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.0	B	0.64	10.3	B	N	0.74	15.4	B	0.71	12.0	B	0.73	15.2	B	0.70	11.4	B	N
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.73	9.3	A	0.78	8.1	A	N	0.82	11.6	B	0.86	9.8	A	0.79	10.3	B	0.85	9.5	A	N
Lakewood Boulevard/Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.43	--	--	0.41	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.44	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.22	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.24	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.26	--	--	0.22	--	--	--	0.25	--	--	0.23	--	--	0.28	--	--	0.24	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.53	--	--	0.41	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.44	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.25	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.27	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.41	--	--	0.46	--	--	--	0.46	--	--	0.52	--	--	0.44	--	--	0.50	--	--	--
9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	<b>0.92</b>	<b>66.2</b>	<b>E</b>	0.75	31.2	C	0.89	43.0	D	0.74	28.9	C	0.96	46.5	D	N	0.81	33.6	C	0.93	48.4	D	0.79	33.1	C	0.93	48.7	D	N	
	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.48	--	--	--	
Bellflower Boulevard/Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.51	10.4	B	0.53	10.9	B	N	0.55	11.6	B	0.58	11.3	B	0.55	11.3	B	0.58	11.3	B	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.37	--	--	--	0.57	--	--	0.40	--	--	0.55	--	--	0.40	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.29	--	--	0.19	--	--	--	0.33	--	--	0.20	--	--	0.32	--	--	0.20	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	<b>0.84</b>	<b>81.2</b>	<b>F</b>	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	1.00	50.1	D	1.00	51.2	D	N	<b>1.09</b>	<b>67.3</b>	<b>E</b>	<b>1.09</b>	<b>70.6</b>	<b>E</b>	<b>1.09</b>	<b>68.2</b>	<b>E</b>	<b>1.10</b>	<b>68.1</b>	<b>E</b>	N
		Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	<b>0.97</b>	<b>72.8</b>	<b>E</b>	0.65	26.4	C	1.00	42.1	D	0.64	27.5	C	1.06	44.6	D	N	0.70	26.9	C	<b>1.13</b>	<b>56.8</b>	<b>E</b>	0.71	25.7	C	1.14	53.7	D	N
	13	Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.12	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.13	--	--	--
		I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.29	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.32	--	--	--
	14	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.3	B	0.47	14.0	B	N	0.56	10.6	B	0.51	16.8	B	0.56	10.8	B	0.51	14.7	B	N
Los Coyotes Diagonal		I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.25	--	--	0.17	--	--	--	0.18	--	--	0.18	--	--	0.27	--	--	0.18	--	--	--	
Woodruff Avenue at I-405	15	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	<b>0.74</b>	<b>102.8</b>	<b>F</b>	0.78	44.4	D	1.02	35.1	D	0.77	31.7	C	1.04	36.7	D	N	0.87	48.8	D	1.18	45.4	D	0.86	36.4	D	1.20	50.4	D	N
	16	Willow Street	Woodruff Avenue	Sig	<b>1.07</b>	<b>86.8</b>	<b>F</b>	0.77	30.4	C	<b>1.33</b>	<b>147.9</b>	<b>F</b>	0.87	40.4	D	<b>1.32</b>	<b>146.2</b>	<b>F</b>	0.88	40.9	D	N	<b>1.44</b>	<b>180.5</b>	<b>F</b>	0.94	51.5	D	<b>1.43</b>	<b>179.2</b>	<b>F</b>	0.94	53.1	D	N
		I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.39	--	--	0.20	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.22	--	--	--
	17	I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.21	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--
I-405 SB Direct Off-Ramp		Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.45	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.49	--	--	--	
Palo Verde Avenue / Stearns Street at I-405	18	I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.23	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.25	--	--	--
		I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.78	17.0	B	0.63	12.0	B	N	0.95	21.2	C	0.70	12.6	B	0.96	20.6	C	0.73	13.1	B	N
	19	I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.15	--	--	0.20	--	--	--	0.14	--	--	0.23	--	--	0.17	--	--	0.21	--	--	--
		Woodruff Avenue	Palo Verde Avenue	Sig	<b>0.87</b>	<b>86.6</b>	<b>F</b>	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	12.9	B	0.68	10.2	B	N	0.91	15.9	B	0.72	11.3	B	0.91	15.4	B	0.74	11.2	B	N
20	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.86	18.5	B	0.85	21.0	C	N	0.94	22.0	C	0.92	24.4	C	0.94	21.7	C	0.93	25.1	C	N	
21	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.33	--	--	0.44	--	--	--	0.33	--	--	0.50	--	--	0.35	--	--	0.48	--	--	--	

**Table 3.1.6-27: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Traffic Measures for Alternative 1 – Locations in Los Angeles County**

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 1 Adverse Effect	Year 2040																		
					Existing Traffic						No Build Traffic on No Build Geometry			Alternative 1 Traffic on Alternative 1 Geometry including Traffic Measures				No Build Traffic on No Build Geometry			Alternative 1 Traffic on Alternative 1 Geometry including Traffic Measures															
					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													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	No Build-Alternative 1 Adverse Effect			
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.51	1.2	A	0.50	3.1	A	N	0.55	2.8	A	0.51	4.9	A	0.55	1.4	A	0.54	3.2	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop Sig*	0.15	13.8	B	0.04	10.8	B	<b>0.86</b>	<b>68.4</b>	<b>F</b>	0.34	16.2	C	<b>1.03</b>	<b>113.3</b>	<b>F</b>	0.51	24.8	C	N	<b>1.02</b>	<b>98.3</b>	<b>F</b>	0.33	15.7	C	<b>1.24</b>	<b>170.6</b>	<b>F</b>	0.53	25.2	D	N
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.54	10.3	B	0.79	14.8	B	N	0.60	10.7	B	0.85	15.7	B	0.58	11.1	B	0.86	16.9	B	N
Studebaker Road at SR-22/7 <sup>th</sup> Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.53	13.0	B	0.76	27.3	C	N	0.50	13.1	B	0.86	30.4	C	0.52	13.5	B	0.82	29.1	C	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	28.9	C	0.96	28.6	C	N	0.99	30.4	C	1.03	37.1	D	1.05	43.5	D	1.06	40.4	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop Sig*	0.39	18.8	C	<b>0.65</b>	<b>59.9</b>	<b>F</b>			N/A						N/A				N			N/A										N
7 <sup>th</sup> Street	30	7 <sup>th</sup> Street	Pacific Coast Highway	Sig	<b>0.95</b>	<b>92.9</b>	<b>F</b>	<b>1.03</b>	<b>82.6</b>	<b>F</b>	0.94	49.2	D	0.95	35.9	D	0.96	36.7	D	0.95	38.7	D	N	<b>1.02</b>	<b>65.8</b>	<b>E</b>	<b>1.03</b>	<b>58.7</b>	<b>E</b>	1.09	54.9	D	1.00	52.3	D	N
	31	7 <sup>th</sup> Street	Bellflower Boulevard	Sig	<b>1.01</b>	<b>73.6</b>	<b>E</b>	<b>0.91</b>	<b>90.3</b>	<b>F</b>	<b>1.04</b>	<b>68.9</b>	<b>E</b>	0.98	47.9	D	0.90	31.3	C	0.80	33.7	C	N	<b>1.13</b>	<b>82.4</b>	<b>F</b>	<b>1.06</b>	<b>63.0</b>	<b>E</b>	0.98	37.5	D	0.91	33.0	C	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.52	33.5	C	0.56	30.5	C	N	0.57	39.1	D	0.82	32.1	C	0.56	35.4	D	0.61	31.1	C	N
	33	7 <sup>th</sup> Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.71	10.8	B	0.94	29.2	C	N	0.77	25.7	C	1.02	50.8	D	0.77	11.5	B	1.01	48.2	D	N
	34	7 <sup>th</sup> Street	W. Campus Drive	Sig	<b>0.83</b>	<b>112.9</b>	<b>F</b>	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.74	18.3	B	0.77	24.5	C	N	0.85	53.1	D	<b>0.87</b>	<b>58.5</b>	<b>E</b>	0.80	15.4	B	0.83	39.2	D	N
	35	7 <sup>th</sup> Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.04	39.7	D	0.87	16.6	B	N	<b>1.12</b>	<b>55.8</b>	<b>E</b>	0.96	16.7	B	<b>1.13</b>	<b>60.6</b>	<b>E</b>	0.95	19.2	B	N
36	7 <sup>th</sup> Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.76	14.4	B	0.83	20	B	N	0.82	17.1	B	0.86	23.7	C	0.82	16.4	B	0.87	24.8	C	N	

- Notes:
- LOS – Level of Service; V/C – Volume-to- Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
  - \* = Intersection is not signalized under existing or No Build conditions.
    - At the I-405 SB Direct Off-Ramp intersection with Studebaker Road, the signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric.
    - The proposed traffic measure includes installation of a signal at the SR-22 WB On-/Off-Ramp intersection with College Park Drive. To determine if the measure addresses the adverse effect, a comparison is made between the proposed signalized intersection and the no-build condition assuming a traffic signal. The traffic signal is assumed for the no-build condition because stop-controlled analysis does not provide an overall intersection metric to determine if the adverse effect at the intersection has been addressed.
  - Bold indicates an intersection forecast to operate at LOS E or F.
  - Shaded cells indicate an adverse effect.
  - = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  - Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
  - For future conditions, the D/C ratio is used instead of the V/C ratio.

The I-605 mainline is anticipated to operate at LOS D in the AM peak hour in the northbound direction and LOS F in the southbound direction in 2040. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS D in the northbound direction and LOS E in the southbound direction. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.81** in the northbound direction and **1.17** in the southbound direction. During the PM peak hour, the v/c ratios are **0.95** in the northbound direction and **1.08** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS F in the eastbound direction and LOS E in the westbound direction during the AM peak hour in 2040. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS D in the eastbound direction and LOS E in the westbound direction. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **1.18** in the eastbound direction and **1.14** in the westbound direction. During the PM peak hour, the v/c ratios are **0.95** in the eastbound direction and **1.11** in the westbound direction.

Table 3.1.6-25 presents the v/c ratios for peak hours of Alternative 2 in 2040 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **1.08 to 1.35** and **1.17 to 1.58** during the PM peak hour.

A more-detailed link-by-link presentation of Alternative 2 traffic conditions in 2020 and 2040 for GP and HOV lanes is included in Appendix L2.

Freeway Connector Volumes. Tables 3.1.6-15 and 3.1.6-26 provide the 2020 and 2040 forecast for Alternative 2, respectively, of branch connector volumes and v/c ratios on ramps within the I-405/I-605/SR-22/ 7<sup>th</sup> Street interchange not presented above under the Orange County heading. Branch connectors are forecast to operate with v/c ratios ranging from **0.23 to 1.14** in 2020 and from **0.11 to 1.14** in 2040 under Alternative 2. The branch connector from I-605 southbound/I-405 southbound to 7<sup>th</sup> Street is anticipated to operate with a v/c ratio in excess of **1.00** in 2040 during the AM peak hour.

In no instance would additional lanes on branch connectors be feasible. Ramp metering was considered as a means to improve connector operations, but it was not included in the project because it would further reduce the capacity of the branch connectors.

Arterials, Intersections, and Interchanges. Alternative 2 AM and PM peak-hour traffic volumes for arterial and interchange study locations within the study area in Los Angeles County for 2020 and 2040 are illustrated in Figures 3.1.6-28 and 3.1.6-32, respectively. A summary of the LOS

analysis and v/c ratios for AM and PM peak hours for 2020 Alternative 2 conditions is provided in Table 3.1.6-28 for all of the study intersections. Alternative 2 conditions appear in Table 3.1.6-28 under the “Alternative 2 Traffic on No Build Geometry” heading, where forecast Alternative 2 traffic is evaluated on no-build lanes and traffic control. In Table 3.1.6-28 for 2020 under Alternative 2, the study intersections are anticipated to operate at LOS D or better, except for six intersections (as shown in bold) that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both. These six intersections include the four intersections that are anticipated to operate at LOS E or F under no-build conditions in 2020.

Table 3.1.6-28 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2020 under Alternative 2 during peak hours, except for seven intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. These seven intersections include the five intersections that are anticipated to operate over capacity under the no-build condition in 2020.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2040 Alternative 2 conditions is provided in Table 3.1.6-28 for all of the study intersections. In Table 3.1.6-28 for 2040 under Alternative 2, the study intersections are anticipated to operate at LOS D or better, except for 10 intersections (as shown in bold) that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both. Nine of these 10 intersections are anticipated to operate at LOS E or F under no-build conditions in 2040.

Table 3.1.6-28 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2040 under Alternative 2 during peak hours, except for 12 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. These 12 intersections include the 10 intersections that are anticipated to operate over capacity under the no-build condition in 2040.

As highlighted in Table 3.1.6-28, the project contributes to adverse cumulative effects on the following nine study intersections under Alternative 2 in 2040:

Willow Street and Bellflower Boulevard (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.09 with LOS E and under Alternative 2 projected D/C ratio is 1.25 with LOS F)

Willow Street and Los Coyotes Diagonal (2040 AM peak hour under No Build Alternative projected D/C ratio is 0.87 with LOS D and under Alternative 2 projected D/C ratio is 0.99 with LOS E; 2040 PM peak hour under No Build Alternative projected D/C ratio is 1.18 with LOS D, and under Alternative 2 projected D/C ratio is 1.41 with LOS F)

Table 3.1.6-28: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 2 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 2 Adverse Effect	Year 2040																		
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 2 Traffic on No Build Geometry			No Build Traffic on No Build Geometry				Alternative 2 Traffic on No Build Geometry																		
					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																
		V/C	Avg Delay (sec)		LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)		LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	No Build-Alternative 2 Adverse Effect					
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.58	19.1	B	0.67	20.3	C	N	0.62	22.4	C	0.73	24.5	C	0.63	19.3	B	0.73	21.0	C	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.37	--	--	0.36	--	--	--	0.35	--	--	0.36	--	--	0.40	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.60	20.1	C	0.75	16.5	B	N	0.63	23.6	C	0.82	23.2	C	0.65	21.9	C	0.81	18.1	B	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.33	--	--	0.36	--	--	--	0.33	--	--	0.37	--	--	0.35	--	--	0.39	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--
4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.78	34.4	C	0.84	31.2	C	N	0.86	35.1	D	0.92	43.9	D	0.86	41.9	D	0.93	39.0	D	N	
Spring Street/Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.5	B	0.57	9.8	A	N	0.74	15.4	B	0.71	12.0	B	0.74	15.7	B	0.62	10.8	B	N
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.69	7.9	A	0.74	7.7	A	N	0.82	11.6	B	0.86	9.8	A	0.75	8.7	A	0.81	8.6	A	N
Lakewood Boulevard/Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.42	--	--	0.42	--	--	--	0.41	--	--	0.41	--	--	0.46	--	--	0.45	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.39	--	--	0.20	--	--	--	0.41	--	--	0.25	--	--	0.43	--	--	0.21	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.23	--	--	0.23	--	--	--	0.25	--	--	0.23	--	--	0.25	--	--	0.25	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.54	--	--	0.41	--	--	--	0.57	--	--	0.44	--	--	0.58	--	--	0.44	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.22	--	--	0.25	--	--	--	0.24	--	--	0.27	--	--	0.24	--	--	0.27	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.42	--	--	0.47	--	--	--	0.46	--	--	0.52	--	--	0.45	--	--	0.51	--	--	--
9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	<b>0.92</b>	<b>66.2</b>	<b>E</b>	0.75	31.2	C	0.89	43.0	D	0.75	28.3	C	0.90	44.3	D	N	0.81	33.6	C	0.93	48.4	D	0.79	32.2	C	1.02	52.0	D	N	
	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	0.37	--	--	0.50	--	--	0.36	--	--	0.49	--	--	--	
10	Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.31	--	--	0.43	--	--	--	0.31	--	--	0.44	--	--	0.34	--	--	0.46	--	--	--	
Bellflower Boulevard/Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.52	10.5	B	0.53	11.6	B	N	0.55	11.6	B	0.58	11.3	B	0.57	11.3	B	0.58	12.2	B	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.36	--	--	N	0.57	--	--	0.40	--	--	0.56	--	--	0.39	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.30	--	--	0.18	--	--	N	0.33	--	--	0.20	--	--	0.32	--	--	0.19	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	<b>0.84</b>	<b>81.2</b>	<b>F</b>	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	0.98	39.0	D	<b>1.16</b>	<b>78.7</b>	<b>E</b>	<b>Y</b>	<b>1.09</b>	<b>67.3</b>	<b>E</b>	<b>1.09</b>	<b>70.6</b>	<b>E</b>	1.05	55.0	D	<b>1.25</b>	<b>106.3</b>	<b>F</b>	<b>Y</b>
	13	Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	<b>0.97</b>	<b>72.8</b>	<b>E</b>	0.65	26.4	C	1.00	42.1	D	0.62	27.4	C	1.03	41.2	D	N	0.70	26.9	C	<b>1.13</b>	<b>56.8</b>	<b>E</b>	0.67	27.7	C	1.13	54.2	D	N
		Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.14	--	--	--	0.07	--	--	0.13	--	--	0.08	--	--	0.15	--	--	--
	14	I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.25	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.27	--	--	--
15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.4	B	0.48	14.1	B	N	0.56	10.6	B	0.51	16.8	B	0.56	11.0	B	0.52	14.8	B	N	
	Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.31	--	--	0.20	--	--	--	0.18	--	--	0.18	--	--	0.33	--	--	0.21	--	--	--	
16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	<b>0.74</b>	<b>102.8</b>	<b>F</b>	0.78	44.4	D	1.02	35.1	D	0.88	54.7	D	<b>1.25</b>	<b>79.6</b>	<b>E</b>	<b>Y</b>	0.87	48.8	D	1.18	45.4	D	<b>0.99</b>	<b>60.7</b>	<b>E</b>	<b>1.41</b>	<b>101.4</b>	<b>F</b>	<b>Y</b>	
Woodruff Avenue at I-405	17	Willow Street	Woodruff Avenue	Sig	<b>1.07</b>	<b>86.8</b>	<b>F</b>	0.77	30.4	C	<b>1.33</b>	<b>147.9</b>	<b>F</b>	0.87	40.4	D	<b>1.41</b>	<b>203.6</b>	<b>F</b>	0.88	54.3	D	<b>Y</b>	<b>1.44</b>	<b>180.5</b>	<b>F</b>	0.94	51.5	D	<b>1.53</b>	<b>242.2</b>	<b>F</b>	<b>0.95</b>	<b>81.3</b>	<b>F</b>	<b>Y</b>
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.44	--	--	0.23	--	--	--	0.42	--	--	0.20	--	--	0.47	--	--	0.25	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.29	--	--	0.21	--	--	--	0.34	--	--	0.23	--	--	0.31	--	--	0.23	--	--	--
	19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.46	--	--	--	0.56	--	--	0.51	--	--	0.55	--	--	0.50	--	--	--
I-405 SB Direct On-Ramp		Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.44	--	--	0.26	--	--	--	0.45	--	--	0.25	--	--	0.47	--	--	0.28	--	--	--	
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.69	15.3	B	0.59	11.8	B	N	0.95	21.2	C	0.70	12.6	B	0.82	17.4	B	0.72	13.3	B	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.10	--	--	0.19	--	--	--	0.14	--	--	0.23	--	--	0.11	--	--	0.20	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	<b>0.87</b>	<b>86.6</b>	<b>F</b>	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.82	13.8	B	0.70	11.3	B	N	0.91	15.9	B	0.72	11.3	B	0.89	15.9	B	0.76	12.1	B	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.83	17.9	B	0.83	20.2	C	N	0.94	22.0	C	0.92	24.4	C	0.91	20.3	C	0.92	23.9	C	N
23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.29	--	--	0.40	--	--	--	0.33	--	--	0.50	--	--	0.31	--	--	0.43				

**Table 3.1.6-28: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 2 – Locations in Los Angeles County**

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						Year 2040						No Build-Alternative 2 Adverse Effect													
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 2 Traffic on No Build Geometry			No Build Traffic on No Build Geometry			Alternative 2 Traffic on No Build Geometry																			
					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	AM Peak Hour		PM Peak Hour														
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS				
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.54	3.3	A	0.52	2.7	A	N	0.55	2.8	A	0.51	4.9	A	0.58	3.6	A	0.56	2.8	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop Sig*	0.15	13.8	B	0.04	10.8	B	<b>0.86</b>	<b>68.4</b>	F	0.34	16.2	C	<b>0.90</b>	<b>61.5</b>	F	0.61	31.4	D	N	<b>1.02</b>	<b>98.3</b>	F	0.33	15.7	C	<b>1.04</b>	<b>81.3</b>	F	0.65	33.1	D	N
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.59	8.5	A	0.79	15.0	B	N	0.60	10.7	B	0.85	15.7	B	0.65	9.5	A	0.86	17.1	B	N
Studebaker Road at SR-22/7th Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.49	13.0	B	0.83	28.9	C	N	0.50	13.1	B	0.86	30.4	C	0.54	13.4	B	0.89	31.8	C	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	30.9	C	0.98	30.1	C	N	0.99	30.4	C	1.03	37.1	D	1.06	45.2	D	1.09	43.9	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop Sig*	0.39	18.8	C	<b>0.65</b>	<b>59.9</b>	F	0.43	21.3	C	<b>0.61</b>	<b>88.7</b>	F	0.62	28.6	D	<b>1.14</b>	<b>172.9</b>	F	Y	0.51	25.3	D	<b>0.84</b>	<b>152.1</b>	F	<b>0.75</b>	<b>38.1</b>	E	<b>1.59</b>	<b>311.8</b>	F	Y
7th Street	30	7th Street	Pacific Coast Highway	Sig	<b>0.95</b>	<b>92.9</b>	F	<b>1.03</b>	<b>82.6</b>	F	0.94	49.2	D	0.95	35.9	D	0.96	51.2	D	0.99	39.9	D	N	<b>1.02</b>	<b>65.8</b>	E	<b>1.03</b>	<b>58.7</b>	E	<b>1.04</b>	<b>70.0</b>	E	<b>1.07</b>	<b>64.9</b>	E	Y
	31	7th Street	Bellflower Boulevard	Sig	<b>1.01</b>	<b>73.6</b>	E	<b>0.91</b>	<b>90.3</b>	F	<b>1.04</b>	<b>68.9</b>	E	0.98	47.9	D	<b>1.09</b>	<b>74.9</b>	E	0.98	46.3	D	Y	<b>1.13</b>	<b>82.4</b>	F	<b>1.06</b>	<b>63.0</b>	E	<b>1.18</b>	<b>92.7</b>	F	<b>1.06</b>	<b>60.9</b>	E	Y
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.51	39.7	D	0.64	19.3	B	N	0.57	39.1	D	0.82	32.1	C	0.55	40.2	D	0.74	31.4	C	N
	33	7th Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.73	24.0	C	0.96	24.8	C	N	0.77	25.7	C	1.02	50.8	D	0.79	25.4	C	<b>1.04</b>	<b>55.7</b>	E	Y
	34	7th Street	W. Campus Drive	Sig	<b>0.83</b>	<b>112.9</b>	F	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.82	45.2	D	0.83	41.7	D	N	0.85	53.1	D	<b>0.87</b>	<b>58.5</b>	E	<b>0.89</b>	<b>68.4</b>	E	<b>0.90</b>	<b>66.0</b>	E	Y
	35	7th Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.07	46.4	D	0.90	16.1	B	N	<b>1.12</b>	<b>55.8</b>	E	0.96	16.7	B	<b>1.17</b>	<b>68.7</b>	E	0.99	19.0	B	Y
	36	7th Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.71	15.8	B	0.81	19.2	B	N	0.82	17.1	B	0.86	23.7	C	0.77	18.0	B	0.86	23.4	C	N

- Notes:
1. LOS – Level of Service; V/C – Volume-to- Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
  2. \* = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
  3. Bold indicates an intersection forecast to operate at LOS E or F.
  4. Shaded cells indicate an adverse effect.
  5. -- = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
  7. For future conditions, the D/C ratio is used instead of the V/C ratio.

Willow Street and Woodruff Avenue (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.44 with LOS F and under Alternative 2 projected D/C ratio is 1.53 with LOS F)

SR-22 Westbound Ramp and College Park Drive (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.16 with LOS F and under Alternative 2 projected D/C ratio is 1.24 with LOS F)

7<sup>th</sup> Street and Pacific Coast Highway (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.02 with LOS E and under Alternative 2 projected D/C ratio is 1.04 with LOS E; 2040 PM peak hour under No Build Alternative projected D/C ratio is 1.03 with LOS E and under Alternative 2 projected D/C ratio is 1.07 with LOS E)

7<sup>th</sup> Street and Bellflower Boulevard (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.13 with LOS F and under Alternative 2 projected D/C ratio is 1.18 with LOS F)

7<sup>th</sup> Street and Channel Drive (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.02 with LOS D and under Alternative 2 projected D/C ratio is 1.04 with LOS E)

7<sup>th</sup> Street and West Campus Drive (2040 AM peak hour under No Build Alternative projected D/C ratio is 0.85 with LOS D and under Alternative 2 projected D/C ratio is 0.89 with LOS E; 2040 PM peak hour under No Build Alternative projected D/C ratio is 0.87 with LOS E and under Alternative 2 projected D/C ratio is 0.90 with LOS E)

7<sup>th</sup> Street and East Campus Drive (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.12 with LOS E and under Alternative 2 projected D/C ratio is 1.17 with LOS E)

Table 3.1.6-28 shows that the project also contributes to adverse cumulative effects under Alternative 2 on the five study intersections listed below in 2020:

Willow Street and Bellflower Boulevard

Willow Street and Los Coyotes Diagonal

Willow Street and Woodruff Avenue

SR-22 Westbound Ramp and College Park Drive

7<sup>th</sup> Street and Bellflower Boulevard

Measures to Lessen Traffic Impacts at Intersections. Traffic measures listed in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures, are proposed to address the project's contributions to adverse cumulative effects at the intersections identified above.

Table 3.1.6-29 provides a summary of the LOS analysis and v/c ratios for all of the study intersections during AM and PM peak hours anticipated in 2020 under Alternative 2 with all improvements, including the proposed traffic measures identified in Section 3.1.6.4, Avoidance,

Minimization, and/or Mitigation Measures. LOS and v/c ratios with all improvements, including proposed traffic measures, appear in the table under the heading “Alternative 2 Traffic on Alternative 2 Geometry including Traffic Measures.” Table 3.1.6-29 shows that, with all improvements including proposed traffic measures, Alternative 2 does not contribute to adverse cumulative effects on any study intersection in 2020.

Table 3.1.6-29 provides a summary of the LOS analysis and v/c ratios for all of the study intersections during AM and PM peak hours anticipated in 2040 under Alternative 2 with all improvements, including the proposed traffic measures identified in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures. Table 3.1.6-29 shows that, with all improvements including proposed traffic measures, Alternative 2 does not contribute to adverse cumulative effects on any study intersection in 2040.

No additional ROW is anticipated to implement the proposed measures. Noise and air quality impacts of construction would be temporary and not anticipated to be an adverse effect. It is anticipated that all of the proposed measures could be implemented without the necessity of closing travel lanes during weekday peak hours. It may be necessary to narrow lanes. Short-term off-peak, nighttime, and weekend lane closures may be necessary. As noted in the traffic measures listed in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures, the agencies implementing the measures would bear responsibility for necessary clearances and permits.

As stated in Section 3.1.6.4 (Measures T-10 and T-11), if the implementing agencies decide not to move forward with these improvements, cumulative impacts would remain adverse. Alternative 3 (Preferred Alternative)

Freeway Mainline. The Opening Year (2020) and Design Year (2040) Alternative 3 AM/PM peak-hour traffic volumes for the freeway mainline and all interchange ramps within the study area in Los Angeles County are presented in Figures 3.1.6-21 and 3.1.6-25, respectively. The freeway mainline and all interchange ramps are assumed to be unchanged from the existing conditions.

*V/C Ratio and LOS.* Table 3.1.6-13 presents the LOS and v/c ratios for peak hours of Alternative 3 in 2020 for the GP lanes of the freeway mainline. Under Alternative 3 in year 2020, the freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS D and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in the northbound direction and LOS E and F in the southbound direction. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is **0.95 to 1.23** and **1.02 to 1.42** during the PM peak hour.

Table 3.1.6-29: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Traffic Measures for Alternative 2 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009									Year 2020									Year 2040														
					Existing Traffic						No Build Traffic on No Build Geometry			Alternative 2 Traffic on Alternative 2 Geometry including Traffic Measures			No Build-Alternative 2 Adverse Effect	No Build Traffic on No Build Geometry			Alternative 2 Traffic on Alternative 2 Geometry including Traffic Measures			No Build-Alternative 2 Adverse Effect													
					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														
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS				
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.58	19.1	B	0.67	20.3	C	N	0.62	22.4	C	0.73	24.5	C	0.63	19.3	B	0.73	21.0	C	N	
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	N	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.37	--	--	0.36	--	--	--	N	0.35	--	--	0.36	--	--	0.40	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.60	20.1	C	0.75	16.5	B	N	0.63	23.6	C	0.82	23.2	C	0.65	21.9	C	0.81	18.1	B	N	
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.33	--	--	0.36	--	--	--	N	0.33	--	--	0.37	--	--	0.35	--	--	0.39	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	N	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--
4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.78	34.4	C	0.84	31.2	C	N	0.86	35.1	D	0.92	43.9	D	0.86	41.9	D	0.93	39.0	D	N		
Spring Street/Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.68	14.5	B	0.57	9.8	A	N	0.74	15.4	B	0.71	12.0	B	0.74	15.7	B	0.62	10.8	B	N	
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.69	7.9	A	0.74	7.7	A	N	0.82	11.6	B	0.86	9.8	A	0.75	8.7	A	0.81	8.6	A	N	
Lakewood Boulevard/Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.42	--	--	0.42	--	--	--	N	0.41	--	--	0.41	--	--	0.46	--	--	0.45	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.39	--	--	0.20	--	--	--	N	0.41	--	--	0.25	--	--	0.43	--	--	0.21	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.23	--	--	0.23	--	--	--	N	0.25	--	--	0.23	--	--	0.25	--	--	0.25	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.54	--	--	0.41	--	--	--	N	0.57	--	--	0.44	--	--	0.58	--	--	0.44	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.22	--	--	0.25	--	--	--	N	0.24	--	--	0.27	--	--	0.24	--	--	0.27	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.42	--	--	0.47	--	--	--	N	0.46	--	--	0.52	--	--	0.45	--	--	0.51	--	--	--
10	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	<b>0.92</b>	<b>66.2</b>	<b>E</b>	0.75	31.2	C	0.89	43.0	D	0.75	28.3	C	0.90	44.3	D	N	0.81	33.6	C	0.93	48.4	D	0.79	32.2	C	1.02	52.0	D	N		
	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.33	--	--	0.45	--	--	--	N	0.37	--	--	0.50	--	--	0.36	--	--	0.49	--	--	--	
	Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.31	--	--	0.43	--	--	--	N	0.31	--	--	0.44	--	--	0.34	--	--	0.46	--	--	--	
	Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.31	--	--	0.43	--	--	--	N	0.31	--	--	0.44	--	--	0.34	--	--	0.46	--	--	--	
Bellflower Boulevard/Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.52	10.5	B	0.53	11.6	B	N	0.55	11.6	B	0.58	11.3	B	0.57	11.3	B	0.58	12.2	B	N	
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.51	--	--	0.36	--	--	--	N	0.57	--	--	0.40	--	--	0.56	--	--	0.39	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.30	--	--	0.18	--	--	--	N	0.33	--	--	0.20	--	--	0.32	--	--	0.19	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	<b>0.84</b>	<b>81.2</b>	<b>F</b>	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	<b>1.02</b>	<b>78.0</b>	<b>E</b>	0.99	43.8	D	N	<b>1.09</b>	<b>67.3</b>	<b>E</b>	<b>1.09</b>	<b>70.6</b>	<b>E</b>	<b>1.07</b>	<b>56.6</b>	<b>E</b>	1.08	53.1	D	N	
		Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	<b>0.97</b>	<b>72.8</b>	<b>E</b>	0.65	26.4	C	1.00	42.1	D	0.62	27.4	C	1.03	41.2	D	N	0.70	26.9	C	<b>1.13</b>	<b>56.8</b>	<b>E</b>	0.67	27.7	C	1.13	54.2	D	N	
	13	Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.08	--	--	0.14	--	--	--	N	0.07	--	--	0.13	--	--	0.08	--	--	0.15	--	--	--
		I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.25	--	--	--	N	0.13	--	--	0.34	--	--	0.13	--	--	0.27	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.52	10.4	B	0.48	14.1	B	N	0.56	10.6	B	0.51	16.8	B	0.56	11.0	B	0.52	14.8	B	N	
Los Coyotes Diagonal		I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.31	--	--	0.20	--	--	--	N	0.18	--	--	0.18	--	--	0.33	--	--	0.21	--	--	--	
Woodruff Avenue at I-405	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	<b>0.74</b>	<b>102.8</b>	<b>F</b>	0.78	44.4	D	1.02	35.1	D	0.86	30.7	C	1.09	44.1	D	N	0.87	48.8	D	1.18	45.4	D	0.86	46.1	D	<b>1.17</b>	<b>71.7</b>	<b>E</b>	N	
	17	Willow Street	Woodruff Avenue	Sig	<b>1.07</b>	<b>86.8</b>	<b>F</b>	0.77	30.4	C	<b>1.33</b>	<b>147.9</b>	<b>F</b>	0.87	40.4	D	<b>1.22</b>	<b>136.3</b>	<b>F</b>	0.77	37.4	D	N	<b>1.44</b>	<b>180.5</b>	<b>F</b>	0.94	51.5	D	<b>1.38</b>	<b>167.9</b>	<b>F</b>	<b>0.85</b>	<b>64.1</b>	<b>E</b>	N	
	18	I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.44	--	--	0.23	--	--	--	N	0.42	--	--	0.20	--	--	0.47	--	--	0.25	--	--	--
		I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.29	--	--	0.21	--	--	--	N	0.34	--	--	0.23	--	--	0.31	--	--	0.23	--	--	--
19	I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.51	--	--	0.46	--	--	--	N	0.56	--	--	0.51	--	--	0.55	--	--	0.50	--	--	--	
	I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.44	--	--	0.26	--	--	--	N	0.45	--	--	0.25	--	--	0.47	--	--	0.28	--	--	--	
Palo Verde Avenue/Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.69	15.3	B	0.59	11.8	B	N	0.95	21.2	C	0.70	12.6	B	0.82	17.4	B	0.72	13.3	B	N	
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.10	--	--	0.19	--	--	--	N	0.14	--	--	0.23	--	--	0.11	--	--	0.20	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	<b>0.87</b>	<b>86.6</b>	<b>F</b>	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.82	13.8	B	0.70	11.3	B	N	0.91	15.9	B	0.72	11.3	B	0.89	15.9	B	0.76	12.1	B	N	
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.83	17.9	B	0.83	20.2	C	N	0.94	22.0	C	0.92	24.4	C	0.91	20.3	C	0.92	23.9	C	N	
23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--																															

**Table 3.1.6-29: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Traffic Measures for Alternative 2 – Locations in Los Angeles County**

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 2 Adverse Effect	Year 2040						No Build-Alternative 2 Adverse Effect												
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 2 Traffic on Alternative 2 Geometry including Traffic Measures			No Build Traffic on No Build Geometry				Alternative 2 Traffic on Alternative 2 Geometry including Traffic Measures																		
					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	AM Peak Hour		PM Peak Hour													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.54	3.3	A	0.52	2.7	A	N	0.55	2.8	A	0.51	4.9	A	0.58	3.6	A	0.56	2.8	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop Sig*	0.15	13.8	B	0.04	10.8	B	<b>0.86</b>	<b>68.4</b>	<b>F</b>	0.34	16.2	C	<b>0.90</b>	<b>61.5</b>	<b>F</b>	0.61	31.4	D	N	<b>1.02</b>	<b>98.3</b>	<b>F</b>	0.33	15.7	C	<b>1.04</b>	<b>81.3</b>	<b>F</b>	0.65	33.1	D	N
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.59	8.5	A	0.79	15.0	B	N	0.60	10.7	B	0.85	15.7	B	0.65	9.5	A	0.86	17.1	B	N
Studebaker Road at SR-22/7 <sup>th</sup> Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.49	13.0	B	0.83	28.9	C	N	0.50	13.1	B	0.86	30.4	C	0.54	13.4	B	0.89	31.8	C	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.97	30.9	C	0.98	30.1	C	N	0.99	30.4	C	1.03	37.1	D	1.06	45.2	D	1.09	43.9	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop Sig*	0.39	18.8	C	<b>0.65</b>	<b>59.9</b>	<b>F</b>	N/A			N/A			N	N/A			N/A			N	0.71	15.5	B	<b>1.16</b>	<b>147.2</b>	<b>F</b>	0.48	12.6	B	0.70	30.1	C
7 <sup>th</sup> Street	30	7 <sup>th</sup> Street	Pacific Coast Highway	Sig	<b>0.95</b>	<b>92.9</b>	<b>F</b>	<b>1.03</b>	<b>82.6</b>	<b>F</b>	0.94	49.2	D	0.95	35.9	D	0.94	37.9	D	0.96	39.4	D	N	<b>1.02</b>	<b>65.8</b>	<b>E</b>	<b>1.03</b>	<b>58.7</b>	<b>E</b>	1.02	42.9	D	1.04	48.5	D	N
	31	7 <sup>th</sup> Street	Bellflower Boulevard	Sig	<b>1.01</b>	<b>73.6</b>	<b>E</b>	<b>0.91</b>	<b>90.3</b>	<b>F</b>	<b>1.04</b>	<b>68.9</b>	<b>E</b>	0.98	47.9	D	0.93	32.9	C	0.87	32.8	C	N	<b>1.13</b>	<b>82.4</b>	<b>F</b>	<b>1.06</b>	<b>63.0</b>	<b>E</b>	1.01	42.8	D	0.95	39.3	D	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.54	34.3	C	0.58	25.7	C	N	0.57	39.1	D	0.82	32.1	C	0.58	36.7	D	0.63	30.9	C	N
	33	7 <sup>th</sup> Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.75	10.0	B	0.82	15.2	B	N	0.77	25.7	C	1.02	50.8	D	0.81	14.1	B	0.88	18.8	B	N
	34	7 <sup>th</sup> Street	W. Campus Drive	Sig	<b>0.83</b>	<b>112.9</b>	<b>F</b>	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.76	15.3	B	0.78	35.0	C	N	0.85	53.1	D	<b>0.87</b>	<b>58.5</b>	<b>E</b>	0.77	7.8	A	0.83	8.3	A	N
	35	7 <sup>th</sup> Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.02	35.6	D	0.88	16.3	B	N	<b>1.12</b>	<b>55.8</b>	<b>E</b>	0.96	16.7	B	1.11	51.8	D	0.97	25.8	C	N
36	7 <sup>th</sup> Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.71	15.8	B	0.81	19.2	B	N	0.82	17.1	B	0.86	23.7	C	0.77	18.0	B	0.86	23.4	C	N	

- Notes:
- LOS – Level of Service; V/C – Volume-to- Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio
  - \* = Intersection is not signalized under existing or No Build conditions.
    - At the I-405 SB Direct Off-Ramp intersection with Studebaker Road, the signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric.
    - The proposed traffic measure includes installation of a signal at the SR-22 WB On-/Off-Ramp intersection with College Park Drive. To determine if the measure addresses the adverse effect, a comparison is made between the proposed signalized intersection and the no-build condition assuming a traffic signal. The traffic signal is assumed for the no-build condition because stop-controlled analysis does not provide an overall intersection metric to determine if the adverse effect at the intersection has been addressed.
  - Bold indicates an intersection forecast to operate at LOS E or F.
  - Shaded cells indicate an adverse effect.
  - = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  - Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
  - For future conditions, the D/C ratio is used instead of the V/C ratio.

The I-605 mainline is anticipated to operate at LOS C in the AM peak hour in the northbound direction and LOS E in the southbound direction in 2020. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS D in the northbound direction and LOS E in the southbound direction. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.78** in the northbound direction and **1.04** in the southbound direction. During the PM peak hour, the v/c ratios are **0.88** in the northbound direction and **1.03** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS E in the AM peak hour in both directions in 2020. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is LOS D in the eastbound direction and LOS F in the westbound direction. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **1.12** in the eastbound direction and **1.11** in the westbound direction. During the PM peak hour, the v/c ratios are **0.96** in the eastbound direction and **1.31** in the westbound direction.

Table 3.1.6-14 presents the v/c ratios for peak hours of Alternative 3 in 2020 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **0.81 to 1.12** and **0.76 to 1.24** during the PM peak hour.

Table 3.1.6-24 presents the LOS and v/c ratios for peak hours of Alternative 3 in 2040 for the GP lanes of the freeway mainline. Under Alternative 3 conditions in year 2040, the freeway mainline between I-605 and Lakewood Boulevard is anticipated to operate at LOS F in the AM peak hour in the northbound direction and LOS E and F in the southbound direction. In the PM peak hour, the I-405 freeway mainline is anticipated to operate at LOS F in both directions. The range of v/c ratios in the GP lanes of the I-405 freeway mainline during the AM peak hour is 1.03 to 1.33 and 1.11 to 1.53 during the PM peak hour.

The I-605 mainline is anticipated to operate at LOS D in the AM peak hour in the northbound direction and LOS F in the southbound direction in 2040. In the PM peak hour, the I-605 freeway mainline is anticipated to operate at LOS D in the northbound direction and LOS F in the southbound direction. The v/c ratios in the GP lanes of the I-605 freeway mainline during the AM peak hour are **0.84** in the northbound direction and **1.13** in the southbound direction. During the PM peak hour, the v/c ratios are **0.95** in the northbound direction and **1.11** in the southbound direction.

The SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS E in both directions during the AM peak hour in 2040. In the PM peak hour, the SR-22/7<sup>th</sup> Street freeway mainline is anticipated to operate at LOS D in the eastbound direction and LOS F in the westbound

direction. The v/c ratios in the GP lanes of the SR-22/7<sup>th</sup> Street freeway mainline during the AM peak hour are **1.12** in the eastbound direction and **1.11** in the westbound direction. During the PM peak hour, the v/c ratios are **0.96** in the eastbound direction and **1.31** in the westbound direction.

Table 3.1.6-25 presents the v/c ratios for peak hours of Alternative 3 in 2040 for the HOV (carpool) lanes. The range of v/c ratios in the HOV lanes during the AM peak hour is **0.88 to 1.42** and **0.82 to 1.65** during the PM peak hour.

A more-detailed link-by-link presentation of Alternative 3 traffic conditions in 2020 and 2040 for GP and HOV lanes is included in Appendix L2.

Freeway Connector Volumes. Tables 3.1.6-15 and 3.1.6-26 provide the 2020 and 2040 forecast for Alternative 3, respectively, of branch connector volumes and v/c ratios on ramps within the I-405/I-605/SR-22/ 7<sup>th</sup> Street interchange not presented above under the Orange County heading. Branch connectors are forecast to operate with v/c ratios ranging from **0.24 to 1.12** in 2020 and from **0.26 to 1.12** in 2040 under Alternative 3. The branch connector from I-605 southbound/I-405 southbound to 7<sup>th</sup> Street is anticipated to operate with a v/c ratio in excess of 1.00 in 2040 during the AM peak hour.

In no instance would additional lanes on branch connectors be feasible. Ramp metering was considered as a means to improve connector operations, but it was not included in the project because it would further reduce the capacity of the branch connectors.

Arterials, Intersections, and Interchanges. Alternative 3 AM and PM peak-hour traffic volumes for arterial and interchange study locations within the study area in Los Angeles County for 2020 and 2040 are illustrated in Figures 3.1.6-29 and 3.1.6-33, respectively. A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2020 Alternative 3 conditions is provided in Table 3.1.6-30 for all of the study intersections. Alternative 3 conditions appear in Table 3.1.6-30 under the “Alternative 3 Traffic on No Build Geometry” heading, where forecast Alternative 3 traffic is evaluated on no-build lanes and traffic control. In Table 3.1.6-30 for 2020 under Alternative 3, the study intersections are anticipated to operate at LOS D or better, except for six intersections (as shown in bold) that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both. These six intersections include the four intersections that are anticipated to operate at LOS E or F under no-build conditions in 2020.

Table 3.1.6-30: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 3 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 3 Adverse Effect	Year 2040																		
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 3 Traffic on No Build Geometry			No Build Traffic on No Build Geometry				Alternative 3 Traffic on No Build Geometry																		
					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	AM Peak Hour		PM Peak Hour													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	No Build-Alternative 3 Adverse Effect			
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.64	11.1	B	0.74	13.0	B	N	0.62	22.4	C	0.73	24.5	C	0.69	11.7	B	0.80	14.1	B	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.33	--	--	0.37	--	--	--	0.35	--	--	0.36	--	--	0.36	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.61	20.9	C	0.75	17.6	B	N	0.63	23.6	C	0.82	23.2	C	0.66	22.9	C	0.81	19.4	B	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.28	--	--	0.30	--	--	--	0.33	--	--	0.37	--	--	0.31	--	--	0.33	--	--	--
		4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.76	31.7	C	0.83	31.8	C	N	0.86	35.1	D	0.92	43.9	D	0.84	37.3	D	0.92	44.5	D
Spring Street/Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.70	14.4	B	0.60	9.8	A	N	0.74	15.4	B	0.71	12.0	B	0.75	15.5	B	0.64	10.7	B	N
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.74	6.1	A	0.75	4.9	A	N	0.82	11.6	B	0.86	9.8	A	0.80	7.1	A	0.81	6.0	A	N
Lakewood Boulevard/Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.44	--	--	0.43	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.46	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.23	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.25	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.28	--	--	0.26	--	--	--	0.25	--	--	0.23	--	--	0.30	--	--	0.28	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.52	--	--	0.41	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.45	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.27	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.29	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.44	--	--	0.46	--	--	--	0.46	--	--	0.52	--	--	0.48	--	--	0.50	--	--	--
	10	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	<b>0.92</b>	<b>66.2</b>	<b>E</b>	0.75	31.2	C	0.89	43.0	D	0.72	31.1	C	0.96	44.3	D	N	0.81	33.6	C	0.93	48.4	D	0.77	32.4	C	1.02	52.0	D	N
		Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.36	--	--	0.45	--	--	--	0.37	--	--	0.50	--	--	0.38	--	--	0.49	--	--	--
Bellflower Boulevard/Los Coyotes Diagonal at I-405	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.41	9.1	A	0.53	11.1	B	N	0.55	11.6	B	0.58	11.3	B	0.45	9.7	A	0.58	11.7	B	N
		I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.54	--	--	0.36	--	--	--	0.57	--	--	0.40	--	--	0.59	--	--	0.39	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.32	--	--	0.18	--	--	--	0.33	--	--	0.20	--	--	0.34	--	--	0.19	--	--	--
	12	Willow Street	Bellflower Boulevard	Sig	<b>0.84</b>	<b>81.2</b>	<b>F</b>	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	0.86	32.9	C	<b>1.15</b>	<b>76.5</b>	<b>E</b>	<b>Y</b>	<b>1.09</b>	<b>67.3</b>	<b>E</b>	<b>1.09</b>	<b>70.6</b>	<b>E</b>	0.93	37.7	D	<b>1.25</b>	<b>105.9</b>	<b>F</b>	<b>Y</b>
		Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	<b>0.97</b>	<b>72.8</b>	<b>E</b>	0.65	26.4	C	1.00	42.1	D	0.64	25.8	C	1.12	50.2	D	N	0.70	26.9	C	<b>1.13</b>	<b>56.8</b>	<b>E</b>	0.69	26.0	C	<b>1.22</b>	<b>65.5</b>	<b>E</b>	<b>Y</b>
	13	Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.09	--	--	0.12	--	--	--	0.07	--	--	0.13	--	--	0.09	--	--	0.13	--	--	--
		I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.37	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.40	--	--	--
	15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.53	10.2	B	0.52	9.8	A	N	0.56	10.6	B	0.51	16.8	B	0.58	11.4	B	0.56	10.2	B	N
Los Coyotes Diagonal		I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.32	--	--	0.17	--	--	--	0.18	--	--	0.18	--	--	0.35	--	--	0.19	--	--	--	
Woodruff Avenue at I-405	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	<b>0.74</b>	<b>102.8</b>	<b>F</b>	0.78	44.4	D	1.02	35.1	D	0.75	40.9	D	<b>1.26</b>	<b>66.5</b>	<b>E</b>	<b>Y</b>	0.87	48.8	D	1.18	45.4	D	0.86	42.0	D	<b>1.41</b>	<b>92.7</b>	<b>F</b>	<b>Y</b>
	17	Willow Street	Woodruff Avenue	Sig	<b>1.07</b>	<b>86.8</b>	<b>F</b>	0.77	30.4	C	<b>1.33</b>	<b>147.9</b>	<b>F</b>	0.87	40.4	D	<b>1.30</b>	<b>137.0</b>	<b>F</b>	0.87	37.1	D	N	<b>1.44</b>	<b>180.5</b>	<b>F</b>	0.94	51.5	D	<b>1.40</b>	<b>166.5</b>	<b>F</b>	0.88	42.2	D	N
		I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.40	--	--	0.22	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.24	--	--	--
	18	I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.22	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--
		I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.52	--	--	0.41	--	--	--	0.56	--	--	0.51	--	--	0.56	--	--	0.45	--	--	--
	19	I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.24	--	--	--	0.45	--	--	0.25	--	--	0.46	--	--	0.26	--	--	--
I-405 NB Direct Off-Ramp		Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.84	17.0	B	0.69	11.8	B	N	0.95	21.2	C	0.70	12.6	B	1.02	22.9	C	0.80	14.0	B	N	
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.14	--	--	0.22	--	--	--	0.14	--	--	0.23	--	--	0.15	--	--	0.23	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	<b>0.87</b>	<b>86.6</b>	<b>F</b>	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	13.8	B	0.69	9.7	A	N	0.91	15.9	B	0.72	11.3	B	0.92	16.9	B	0.75	10.3	B	N
	22	Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.94	22.1	C	0.92	22.9	C	N	0.94	22.0	C	0.92	24.4	C	1.02	30.8	C	1.02	29.9	C	N
	23	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.35	--	--	0.46	--	--	--	0.33	--	--	0.50	--	--	0.38	--	--	0.50	--	--	--

**Table 3.1.6-30: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination for Alternative 3 – Locations in Los Angeles County**

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 3 Adverse Effect	Year 2040																		
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 3 Traffic on No Build Geometry			No Build Traffic on No Build Geometry				Alternative 3 Traffic on No Build Geometry																		
					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	AM Peak Hour		PM Peak Hour													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	No Build-Alternative 3 Adverse Effect			
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.63	4.1	A	0.52	4.0	A	N	0.55	2.8	A	0.51	4.9	A	0.68	4.5	A	0.56	3.9	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop Sig*	0.15	13.8	B	0.04	10.8	B	<b>0.86</b>	<b>68.4</b>	F	0.34	16.2	C	<b>1.04</b>	<b>80.0</b>	F	0.44	20.4	C	N	<b>1.02</b>	<b>98.3</b>	F	0.33	15.7	C	<b>1.20</b>	<b>116.8</b>	F	0.45	20.1	C	N
	26	Atherton St	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.57	8.8	A	0.81	14.6	B	N	0.60	10.7	B	0.85	15.7	B	0.62	9.7	A	0.88	17.1	B	N
Studebaker Road at SR-22/7 <sup>th</sup> Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.51	12.8	B	0.87	30.2	C	N	0.50	13.1	B	0.86	30.4	C	0.55	13.2	B	0.94	35.2	D	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.93	25.8	C	0.97	29.0	C	N	0.99	30.4	C	1.03	37.1	D	1.02	37.5	D	1.10	44.4	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop Sig*	0.39	18.8	C	<b>0.65</b>	<b>59.9</b>	F	0.43	21.3	C	<b>0.61</b>	<b>88.7</b>	F	0.12	19.7	C	<b>0.32</b>	<b>92.6</b>	F	N	0.51	25.3	D	<b>0.84</b>	<b>152.1</b>	F	0.15	22.8	C	<b>0.45</b>	<b>158.2</b>	F	N
7 <sup>th</sup> Street	30	7 <sup>th</sup> Street	Pacific Coast Highway	Sig	<b>0.95</b>	<b>92.9</b>	F	<b>1.03</b>	<b>82.6</b>	F	0.94	49.2	D	0.95	35.9	D	0.92	35.7	D	0.96	36.9	D	N	<b>1.02</b>	<b>65.8</b>	E	<b>1.03</b>	<b>58.7</b>	E	<b>1.04</b>	<b>55.9</b>	E	1.04	49.7	D	Y
	31	7 <sup>th</sup> Street	Bellflower Boulevard	Sig	<b>1.01</b>	<b>73.6</b>	E	<b>0.91</b>	<b>90.3</b>	F	<b>1.04</b>	<b>68.9</b>	E	0.98	47.9	D	<b>1.09</b>	<b>66.4</b>	E	1.01	49.6	D	Y	<b>1.13</b>	<b>82.4</b>	F	<b>1.06</b>	<b>63.0</b>	E	<b>1.17</b>	<b>72.3</b>	E	<b>1.10</b>	<b>57.0</b>	E	Y
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.54	30.2	C	0.75	22.1	C	N	0.57	39.1	D	0.82	32.1	C	0.58	26.9	C	0.88	26.8	C	N
	33	7 <sup>th</sup> Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.75	8.2	A	0.95	25.4	C	N	0.77	25.7	C	1.02	50.8	D	0.77	10.2	B	1.04	39.1	D	N
	34	7 <sup>th</sup> Street	W. Campus Drive	Sig	<b>0.83</b>	<b>112.9</b>	F	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.80	34.6	C	0.86	47.4	D	N	0.85	53.1	D	<b>0.87</b>	<b>58.5</b>	E	<b>0.87</b>	<b>60.0</b>	E	<b>0.93</b>	<b>71.3</b>	E	Y
	35	7 <sup>th</sup> Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	1.05	45.2	D	0.90	16.0	B	N	<b>1.12</b>	<b>55.8</b>	E	0.96	16.7	B	<b>1.14</b>	<b>59.3</b>	E	0.99	18.9	B	Y
	36	7 <sup>th</sup> Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.77	15.1	B	0.85	21.6	C	N	0.82	17.1	B	0.86	23.7	C	0.84	17.5	B	0.85	27.6	C	N

- Notes:
1. LOS – Level of Service; V/C – Volume-to- Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
  2. \* = Intersection is not signalized under existing or No Build conditions. The signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric. The number of LOS E or F locations and the number of locations with V/C or D/C greater than 1.00 identified in the text does not include the signalized row because the existing and no-build operation is based on the current stop control.
  3. Bold indicates an intersection forecast to operate at LOS E or F.
  4. Shaded cells indicate an adverse effect.
  5. -- = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
  7. For future conditions, the D/C ratio is used instead of the V/C ratio.

Table 3.1.6-30 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2020 under Alternative 3 during peak hours, except for seven intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. These seven intersections include the five intersections that are anticipated to operate over capacity under the no-build condition in 2020.

A summary of the LOS analysis and v/c ratios for AM and PM peak hours for 2040 Alternative 3 conditions is provided in Table 3.1.6-30 for all of the study intersections. In Table 3.1.6-30 for 2040 under Alternative 3, the study intersections are anticipated to operate at LOS D or better, except for 10 intersections (as shown in bold) that are anticipated to operate at LOS E or F during either the AM or PM peak hour or both. Nine of these 10 intersections are anticipated to operate at LOS E or F under no-build conditions in 2040.

Table 3.1.6-30 shows that the study intersections are anticipated to operate under capacity (i.e., v/c less than or equal to 1.00) in 2040 under Alternative 3 during peak hours, except for 12 intersections that are anticipated to operate over capacity during either the AM or PM peak hour or both. These 12 intersections include the 10 intersections that are anticipated to operate over capacity under the no-build condition in 2040.

As highlighted in Table 3.1.6-30, the project contributions to adverse cumulative effects on the following seven study intersections under Alternative 3 in 2040 are discussed below:

Willow Street and Bellflower Boulevard (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.09 with LOS E and under Alternative 3 projected D/C ratio is 1.25 with LOS F)

Los Coyotes Diagonal and Bellflower Boulevard (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.13 with LOS E and under Alternative 3 projected D/C ratio is 1.22 with LOS E)

Willow Street and Los Coyotes Diagonal (2040 PM peak hour under No Build Alternative projected D/C ratio is 1.18 with LOS D and under Alternative 3 projected D/C ratio is 1.41 with LOS F)

7<sup>th</sup> Street and Pacific Coast Highway (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.02 with LOS E and under Alternative 3 projected D/C ratio is 1.04 with LOS E)

7<sup>th</sup> Street and Bellflower Boulevard (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.13 with LOS F and under Alternative 3 projected D/C ratio is 1.17 with LOS E; 2040 PM peak hour under No Build Alternative projected D/C ratio is 1.06 with LOS E and under Alternative 3 projected D/C ratio is 1.10 with LOS E)

7<sup>th</sup> Street and West Campus Drive (2040 AM peak hour under No Build Alternative projected D/C ratio is 0.85 with LOS D and under Alternative 3 projected D/C ratio is 0.87 with LOS E; 2040 PM peak hour under No Build Alternative projected D/C ratio is 0.87 with LOS E and under Alternative 3 projected D/C ratio is 0.93 with LOS E)

7<sup>th</sup> Street and East Campus Drive (2040 AM peak hour under No Build Alternative projected D/C ratio is 1.12 with LOS E and under Alternative 3 projected D/C ratio is 1.14 with LOS E)

Table 3.1.6-30 shows that the project would also contribute to adverse cumulative effects under Alternative 3 on the three study intersections listed below in 2020:

Willow Street and Bellflower Boulevard

Willow Street and Los Coyotes Diagonal

7<sup>th</sup> Street and Bellflower Boulevard

Measures to Lessen Traffic Impacts at Intersections. Traffic measures listed in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures, are proposed to address the project contributions to adverse cumulative effects at the intersections identified above.

Table 3.1.6-31 provides a summary of the LOS analysis and v/c ratios for all of the study intersections during AM and PM peak hours anticipated in 2020 under Alternative 3 with all improvements, including the proposed traffic measures identified in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures. LOS and v/c ratios with all improvements, including proposed traffic measures, appear in the table under the heading “Alternative 3 Traffic on Alternative 3 Geometry including Traffic Measures.” Table 3.1.6-31 shows that, with all improvements including proposed traffic measures, Alternative 3 does not contribute to adverse cumulative effects on any study intersection in 2020.

Table 3.1.6-31 provides a summary of the LOS analysis and v/c ratios for all of the study intersections during AM and PM peak hours anticipated in 2040 under Alternative 3 with all improvements, including the proposed traffic measures identified in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures. Table 3.1.6-31 shows that, with all improvements including proposed traffic measures, Alternative 3 does not contribute to adverse cumulative effects on any study intersection in 2040.

Table 3.1.6-31: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Traffic Measures for Alternative 3 – Locations in Los Angeles County

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009									Year 2020									Year 2040													
					Existing Traffic						No Build Traffic on No Build Geometry			Alternative 3 Traffic on Alternative 3 Geometry including Traffic Measures						No Build Traffic on No Build Geometry			Alternative 3 Traffic on Alternative 3 Geometry including Traffic Measures													
					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				
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	No Build-Alternative 3 Adverse Effect	
Carson Street at I-605	1	Carson Street	I-605 SB Off-Ramp	Sig	0.58	21.9	C	0.61	17.8	B	0.57	22.3	C	0.68	23.8	C	0.64	11.1	B	0.74	13.0	B	N	0.62	22.4	C	0.73	24.5	C	0.69	11.7	B	0.80	14.1	B	N
	2	Carson Street	I-605 SB Direct On-Ramp	None	0.15	--	--	0.25	--	--	0.22	--	--	0.33	--	--	0.24	--	--	0.32	--	--	--	0.24	--	--	0.36	--	--	0.26	--	--	0.34	--	--	--
		Carson Street	I-605 SB Loop On-Ramp	None	0.24	--	--	0.20	--	--	0.33	--	--	0.33	--	--	0.33	--	--	0.37	--	--	--	0.35	--	--	0.36	--	--	0.36	--	--	0.39	--	--	--
	3	Carson Street	I-605 NB Off-Ramp	Sig	0.55	14.8	B	0.66	12.4	B	0.59	21.8	C	0.76	20.6	C	0.61	20.9	C	0.75	17.6	B	N	0.63	23.6	C	0.82	23.2	C	0.66	22.9	C	0.81	19.4	B	N
		Carson Street	I-605 NB Loop On-Ramp	None	0.23	--	--	0.45	--	--	0.31	--	--	0.35	--	--	0.28	--	--	0.30	--	--	--	0.33	--	--	0.37	--	--	0.31	--	--	0.33	--	--	--
		Carson Street	I-605 NB Direct On-Ramp	None	0.40	--	--	0.32	--	--	0.52	--	--	0.49	--	--	0.51	--	--	0.46	--	--	--	0.56	--	--	0.53	--	--	0.55	--	--	0.49	--	--	--
4	Carson Street	Pioneer Boulevard	Sig	0.76	48.1	D	0.76	35.1	D	0.79	31.1	C	0.84	33.7	C	0.76	31.7	C	0.83	31.8	C	N	0.86	35.1	D	0.92	43.9	D	0.84	37.3	D	0.92	44.5	D	N	
Spring Street/Cerritos Avenue at I-605	5	Spring Street/Cerritos Avenue	I-605 SB Off-Ramp	Sig	0.79	26.2	C	0.60	18.4	B	0.68	14.2	B	0.65	10.9	B	0.70	14.4	B	0.60	9.8	A	N	0.74	15.4	B	0.71	12.0	B	0.75	15.5	B	0.64	10.7	B	N
	6	Spring Street/Cerritos Avenue	I-605 NB On-Ramp	Sig	0.84	13.5	B	0.81	11.1	B	0.76	10.5	B	0.79	8.2	A	0.74	6.1	A	0.75	4.9	A	N	0.82	11.6	B	0.86	9.8	A	0.80	7.1	A	0.81	6.0	A	N
Lakewood Boulevard/Willow Street at I-405	7	I-405 NB Direct Off-Ramp	Lakewood Boulevard	None	0.35	--	--	0.34	--	--	0.38	--	--	0.38	--	--	0.44	--	--	0.43	--	--	--	0.41	--	--	0.41	--	--	0.47	--	--	0.46	--	--	--
		I-405 NB Direct On-Ramp	Lakewood Boulevard	None	0.22	--	--	0.21	--	--	0.38	--	--	0.23	--	--	0.38	--	--	0.23	--	--	--	0.41	--	--	0.25	--	--	0.41	--	--	0.25	--	--	--
		I-405 NB Loop Off-Ramp	Lakewood Boulevard	None	0.19	--	--	0.18	--	--	0.23	--	--	0.22	--	--	0.28	--	--	0.26	--	--	--	0.25	--	--	0.23	--	--	0.30	--	--	0.28	--	--	--
		I-405 NB Loop On-Ramp	Lakewood Boulevard	None	0.50	--	--	0.38	--	--	0.53	--	--	0.41	--	--	0.52	--	--	0.41	--	--	--	0.57	--	--	0.44	--	--	0.57	--	--	0.45	--	--	--
	8	I-405 SB Loop On-Ramp	Lakewood Boulevard	None	0.19	--	--	0.23	--	--	0.22	--	--	0.25	--	--	0.23	--	--	0.27	--	--	--	0.24	--	--	0.27	--	--	0.25	--	--	0.29	--	--	--
		I-405 SB Direct Off-Ramp	Lakewood Boulevard	None	0.40	--	--	0.31	--	--	0.43	--	--	0.48	--	--	0.44	--	--	0.46	--	--	--	0.46	--	--	0.52	--	--	0.48	--	--	0.50	--	--	--
9	Willow Street	Lakewood Boulevard	Sig	0.76	31.1	C	<b>0.92</b>	<b>66.2</b>	<b>E</b>	0.75	31.2	C	0.89	43.0	D	0.72	31.1	C	0.96	44.3	D	N	0.81	33.6	C	0.93	48.4	D	0.77	32.4	C	1.02	52.0	D	N	
	10	Willow Street	I-405 SB Loop Off-Ramp	None	0.32	--	--	0.30	--	--	0.35	--	--	0.46	--	--	0.36	--	--	0.45	--	--	--	0.37	--	--	0.50	--	--	0.38	--	--	0.49	--	--	--
		Willow Street	I-405 SB Direct On-Ramp	None	0.26	--	--	0.38	--	--	0.28	--	--	0.41	--	--	0.30	--	--	0.43	--	--	--	0.31	--	--	0.44	--	--	0.33	--	--	0.46	--	--	--
	11	I-405 NB Off-Ramp	Bellflower Boulevard	Sig	0.41	9.3	A	0.48	11.9	B	0.51	10.8	B	0.53	10.6	B	0.41	9.1	A	0.53	11.1	B	N	0.55	11.6	B	0.58	11.3	B	0.45	9.7	A	0.58	11.7	B	N
Bellflower Boulevard/Los Coyotes Diagonal at I-405	12	I-405 NB Loop On-Ramp	Bellflower Boulevard	None	0.49	--	--	0.35	--	--	0.53	--	--	0.37	--	--	0.54	--	--	0.36	--	--	--	0.57	--	--	0.40	--	--	0.59	--	--	0.39	--	--	--
		I-405 NB Direct On-Ramp	Bellflower Boulevard	None	0.28	--	--	0.18	--	--	0.31	--	--	0.19	--	--	0.32	--	--	0.18	--	--	--	0.33	--	--	0.20	--	--	0.34	--	--	0.19	--	--	--
	13	Willow Street	Bellflower Boulevard	Sig	<b>0.84</b>	<b>81.2</b>	<b>F</b>	0.92	40.1	D	1.01	48.8	D	1.01	54.4	D	0.92	33.2	C	1.10	48.8	D	N	<b>1.09</b>	<b>67.3</b>	<b>E</b>	<b>1.09</b>	<b>70.6</b>	<b>E</b>	0.99	45.9	D	1.08	54.1	D	N
		Los Coyotes Diagonal	Bellflower Boulevard	Sig	0.63	31.3	C	<b>0.97</b>	<b>72.8</b>	<b>E</b>	0.65	26.4	C	1.00	42.1	D	0.64	25.8	C	1.12	50.2	D	N	0.70	26.9	C	<b>1.13</b>	<b>56.8</b>	<b>E</b>	0.70	22.8	C	1.10	53.5	D	N
	14	Los Coyotes Diagonal	I-405 SB Direct On-Ramp	None	0.06	--	--	0.09	--	--	0.06	--	--	0.12	--	--	0.09	--	--	0.12	--	--	--	0.07	--	--	0.13	--	--	0.09	--	--	0.13	--	--	--
		I-405 SB Loop Off-Ramp	Bellflower Boulevard	None	0.12	--	--	0.26	--	--	0.12	--	--	0.32	--	--	0.12	--	--	0.37	--	--	--	0.13	--	--	0.34	--	--	0.13	--	--	0.40	--	--	--
15	Los Coyotes Diagonal	I-405 SB Direct Off-Ramp	Sig	0.44	14.4	B	0.45	13.4	B	0.52	10.0	B	0.47	16.0	B	0.53	10.2	B	0.52	9.8	A	N	0.56	10.6	B	0.51	16.8	B	0.58	11.4	B	0.56	10.2	B	N	
	Los Coyotes Diagonal	I-405 SB Loop On-Ramp	None	0.14	--	--	0.13	--	--	0.16	--	--	0.17	--	--	0.32	--	--	0.17	--	--	--	0.18	--	--	0.18	--	--	0.35	--	--	0.19	--	--	--	
Woodruff Avenue at I-405	16	Willow Street	Los Coyotes Diagonal	Sig	0.72	51.5	D	<b>0.74</b>	<b>102.8</b>	<b>F</b>	0.78	44.4	D	1.02	35.1	D	0.71	32.5	C	0.96	25.4	C	N	0.87	48.8	D	1.18	45.4	D	0.73	42.2	D	<b>1.19</b>	<b>62.2</b>	<b>E</b>	N
	17	Willow Street	Woodruff Avenue	Sig	<b>1.07</b>	<b>86.8</b>	<b>F</b>	0.77	30.4	C	<b>1.33</b>	<b>147.9</b>	<b>F</b>	0.87	40.4	D	<b>1.30</b>	<b>137.0</b>	<b>F</b>	0.87	37.1	D	N	<b>1.44</b>	<b>180.5</b>	<b>F</b>	0.94	51.5	D	<b>1.40</b>	<b>166.5</b>	<b>F</b>	0.88	42.2	D	--
		I-405 NB Direct Off-Ramp	Woodruff Avenue	None	0.15	--	--	0.17	--	--	0.39	--	--	0.19	--	--	0.40	--	--	0.22	--	--	--	0.42	--	--	0.20	--	--	0.43	--	--	0.24	--	--	--
	18	I-405 NB Direct On-Ramp	Woodruff Avenue	None	0.25	--	--	0.20	--	--	0.31	--	--	0.21	--	--	0.31	--	--	0.22	--	--	--	0.34	--	--	0.23	--	--	0.34	--	--	0.23	--	--	--
		I-405 SB Direct Off-Ramp	Woodruff Avenue	None	0.48	--	--	0.38	--	--	0.52	--	--	0.47	--	--	0.52	--	--	0.41	--	--	--	0.56	--	--	0.51	--	--	0.56	--	--	0.45	--	--	--
19	I-405 SB Direct On-Ramp	Woodruff Avenue	None	0.27	--	--	0.19	--	--	0.41	--	--	0.23	--	--	0.43	--	--	0.24	--	--	--	0.45	--	--	0.25	--	--	0.46	--	--	0.26	--	--	--	
Palo Verde Avenue / Stearns Street at I-405	20	I-405 NB Direct Off-Ramp	Palo Verde Avenue	Sig	0.54	11.3	B	0.45	13.7	B	0.78	17.7	B	0.61	11.8	B	0.84	17.0	B	0.69	11.8	B	N	0.95	21.2	C	0.70	12.6	B	1.02	22.9	C	0.80	14.0	B	N
		I-405 NB Loop On-Ramp	Palo Verde Avenue	None	0.11	--	--	0.20	--	--	0.13	--	--	0.22	--	--	0.14	--	--	0.22	--	--	--	0.14	--	--	0.23	--	--	0.15	--	--	0.23	--	--	--
	21	Woodruff Avenue	Palo Verde Avenue	Sig	<b>0.87</b>	<b>86.6</b>	<b>F</b>	0.59	21.3	C	0.84	13.6	B	0.66	10.3	B	0.84	13.8	B	0.69	9.7	A	N	0.91	15.9	B	0.72	11.3	B	0.92	16.9	B	0.75	10.3	B	N
		Stearns Street	Palo Verde Avenue	Sig	0.73	19.4	B	0.75	25.2	C	0.86	18.9	B	0.83	20.5	C	0.94	22.1	C	0.92	22.9	C	N	0.94	22.0	C	0.92	24.4	C	1.02	30.8	C	1.02	29.9	C	N
22	Stearns Street	I-405 SB Direct On-Ramp	None	0.28	--	--	0.39	--	--	0.30	--	--	0.46	--	--	0.35	--	--	0.46	--	--	--	0.33	--	--	0.50	--	--	0.38	--	--	0.50	--	--	--	

**Table 3.1.6-31: Years 2020 and 2040 Peak-Hour Intersections LOS and Adverse Effect Determination after Traffic Measures for Alternative 3 – Locations in Los Angeles County**

Interchange Location	Intersection #	Intersection Location		Traffic Control	Year 2009						Year 2020						No Build-Alternative 3 Adverse Effect	Year 2040						No Build-Alternative 3 Adverse Effect												
					Existing Traffic			No Build Traffic on No Build Geometry			Alternative 3 Traffic on Alternative 3 Geometry including Traffic Measures			No Build Traffic on No Build Geometry				Alternative 3 Traffic on Alternative 3 Geometry including Traffic Measures																		
					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	AM Peak Hour		PM Peak Hour													
					V/C	Avg Delay (sec)	LOS	V/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS		D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS	D/C	Avg Delay (sec)	LOS			
Studebaker Road at I-405	24	I-405 NB Direct On-Ramp	Studebaker Road	Sig	0.50	4.0	A	0.55	4.3	A	0.51	2.6	A	0.47	4.7	A	0.63	4.1	A	0.52	4.0	A	N	0.55	2.8	A	0.51	4.9	A	0.68	4.5	A	0.56	3.9	A	N
	25	I-405 SB Direct Off-Ramp	Studebaker Road	Stop Sig*	0.15	13.8	B	0.04	10.8	B	<b>0.86</b>	<b>68.4</b>	<b>F</b>	0.34	16.2	C	<b>1.04</b>	<b>80.0</b>	<b>F</b>	0.44	20.4	C	N	<b>1.02</b>	<b>98.3</b>	<b>F</b>	0.33	15.7	C	<b>1.20</b>	<b>116.8</b>	<b>F</b>	0.45	20.1	C	N
	26	Atherton Street	Studebaker Road	Sig	0.46	9.2	A	0.74	23.3	C	0.54	9.3	A	0.78	13.8	B	0.57	8.8	A	0.81	14.6	B	N	0.60	10.7	B	0.85	15.7	B	0.62	9.7	A	0.88	17.1	B	N
Studebaker Road at SR-22/7 <sup>th</sup> Street	27	SR-22 WB On-/Off-Ramp	Studebaker Road	Sig	0.49	16.0	B	0.74	22.1	C	0.46	12.8	B	0.79	28.0	C	0.51	12.8	B	0.87	30.2	C	N	0.50	13.1	B	0.86	30.4	C	0.55	13.2	B	0.94	35.2	D	N
	28	SR-22 EB On-/Off-Ramp	Studebaker Road	Sig	0.72	17.6	B	0.82	17.1	B	0.91	21.3	C	0.93	25.8	C	0.93	25.8	C	0.97	29.0	C	N	0.99	30.4	C	1.03	37.1	D	1.02	37.5	D	1.10	44.4	D	N
	29	SR-22 WB On-/Off-Ramp	College Park Drive	Stop Sig*	0.39	18.8	C	<b>0.65</b>	<b>59.9</b>	<b>F</b>	N/A			N/A			N	N/A			N/A			N	0.71	15.5	B	<b>1.16</b>	<b>147.2</b>	<b>F</b>	0.66	13.3	B	<b>1.17</b>	<b>88.0</b>	<b>F</b>
7 <sup>th</sup> Street	30	7 <sup>th</sup> Street	Pacific Coast Highway	Sig	<b>0.95</b>	<b>92.9</b>	<b>F</b>	<b>1.03</b>	<b>82.6</b>	<b>F</b>	0.94	49.2	D	0.95	35.9	D	0.91	34.8	C	0.95	38.6	D	N	<b>1.02</b>	<b>65.8</b>	<b>E</b>	<b>1.03</b>	<b>58.7</b>	<b>E</b>	0.99	51.8	D	0.99	50.3	D	N
	31	7 <sup>th</sup> Street	Bellflower Boulevard	Sig	<b>1.01</b>	<b>73.6</b>	<b>E</b>	<b>0.91</b>	<b>90.3</b>	<b>F</b>	<b>1.04</b>	<b>68.9</b>	<b>E</b>	0.98	47.9	D	0.93	27.1	C	0.89	33.3	C	N	<b>1.13</b>	<b>82.4</b>	<b>F</b>	<b>1.06</b>	<b>63.0</b>	<b>E</b>	1.01	40.8	D	0.92	37.8	D	N
	32	Pacific Coast Highway	Bellflower Boulevard	Sig	0.47	22.3	C	0.73	22.5	C	0.53	38.8	D	0.70	20.4	C	0.59	32.1	C	0.60	27.7	C	--	0.57	39.1	D	0.82	32.1	C	0.64	34.8	C	0.66	28.4	C	N
	33	7 <sup>th</sup> Street	Channel Drive	Sig	0.72	32.9	C	0.88	30.3	C	0.71	24.5	C	0.94	22.7	C	0.73	15.0	B	0.82	13.2	B	--	0.77	25.7	C	1.02	50.8	D	0.79	11.5	B	0.88	17.1	B	N
	34	7 <sup>th</sup> Street	W. Campus Drive	Sig	<b>0.83</b>	<b>112.9</b>	<b>F</b>	0.72	31.1	C	0.79	31.2	C	0.81	32.0	C	0.67	13.9	B	0.76	24.2	C	--	0.85	53.1	D	<b>0.87</b>	<b>58.5</b>	<b>E</b>	0.81	15.2	B	0.82	39.2	D	N
	35	7 <sup>th</sup> Street	E. Campus Drive	Sig	0.97	23.1	C	0.73	24.7	C	1.03	35.8	D	0.87	14.6	B	0.99	30.8	C	0.88	16.8	B	--	<b>1.12</b>	<b>55.8</b>	<b>E</b>	0.96	16.7	B	1.08	49.7	D	0.97	19.5	B	N
	36	7 <sup>th</sup> Street	Park Avenue	Sig	0.68	12.2	B	0.74	15.7	B	0.69	14.8	B	0.81	19.2	B	0.77	15.1	B	0.85	21.6	C	--	0.82	17.1	B	0.86	23.7	C	0.84	17.5	B	0.85	27.6	C	N

- Notes:
1. LOS – Level of Service; V/C – Volume-to- Capacity Ratio; D/C – Demand Volume-to-Capacity Ratio; N/A – Not Applicable (see Note 2)
  2. \* = Intersection is not signalized under existing or No Build conditions.
    - At the I-405 SB Direct Off-Ramp intersection with Studebaker Road, the signalized row is included only to determine if there is an adverse effect at the intersection. If a stop-controlled intersection has an LOS E or F under future conditions, then the intersection is reanalyzed as a signalized intersection to identify any adverse effects, because stop-controlled analysis does not provide an overall intersection metric.
    - The proposed traffic measure includes installation of a signal at the SR-22 WB On-/Off-Ramp intersection with College Park Drive. To determine if the measure addresses the adverse effect, a comparison is made between the proposed signalized intersection and the no-build condition assuming a traffic signal. The traffic signal is assumed for the no-build condition because stop-controlled analysis does not provide an overall intersection metric to determine if the adverse effect at the intersection has been addressed.
  3. Bold indicates an intersection forecast to operate at LOS E or F.
  4. Shaded cells indicate an adverse effect.
  5. -- = LOS and average delay are not calculated for intersections without traffic control. The adverse effect determination applies only to controlled intersections.
  6. Intersection numbers correspond to the intersection numbers shown on the intersection traffic volumes figures.
  7. For future conditions, the D/C ratio is used instead of the V/C ratio.

No additional ROW is anticipated to implement the proposed measures. Noise and air quality impacts of construction would be temporary and not anticipated to be an adverse effect. It is anticipated that all of the proposed measures could be implemented without the necessity of closing travel lanes during weekday peak hours. It may be necessary to narrow lanes. Short-term off-peak, nighttime, and weekend lane closures may be necessary. As noted in the traffic measures listed in Section 3.1.6.4, Avoidance, Minimization, and/or Mitigation Measures, the agencies implementing the measures would bear responsibility for necessary clearances and permits.

As stated in Section 3.1.6.4 (Measures T-10 and T-11), if the implementing agencies decide not to move forward with these improvements, cumulative impacts would remain adverse.

### ***Temporary Impacts***

#### **No Build Alternative**

There are no improvements proposed under the No Build Alternative; therefore, there are no temporary impacts.

#### **Build Alternatives**

Potential construction-related traffic and circulation/pedestrian and bicycle impacts would be minimized through implementation of a comprehensive TMP. A Draft TMP, which is an attachment to the Draft Project Report, has been prepared in accordance with the Caltrans Guidelines Deputy Directive 60 (DD-60) to minimize motorist delays when performing work activities on the State Highway System. The TMP is designed to minimize traffic delays that may result from lane restrictions or closures during construction operations and move motorists, pedestrians, and bicyclists through work zones quickly and safely.

An RCS, which is an appendix to the CIA, was prepared for the project. The RCS identifies potential ramp closures during construction, as well as detour routes for ramp closures.

Construction of the project would occur over approximately 48 to 54 months, depending on the build alternative chosen. As discussed in Chapter 2, Project Alternatives, the project proposes to add one or two lanes in each direction. Mainline improvements would also necessitate construction of up to 10 new structures, 18 structure replacements, and 6 structure widening/modifications at the following locations:

#### **New Structures:**

I-405/SR-73 Direct Connector Structure (Alternative 3 only)

Harbor Boulevard southbound loop on-ramp structure (Alternative 3 only)

Euclid Street southbound I-405 on-ramp from Ellis Avenue structure over the Santa Ana River  
Euclid Street southbound I-405 on-ramp from Ellis Avenue structure over the OCSD driveway  
Beach Boulevard northbound loop on-ramp (N39-N405) structure  
Beach Boulevard southbound loop on-ramp (S39-S405) structure  
East Garden Grove-Wintersburg Channel northbound bridge  
East Garden Grove-Wintersburg Channel southbound bridge

**Structure Replacements:**

Fairview Road Overcrossing (Alternative 3 only)  
Ward Street Overcrossing  
Talbert Avenue Overcrossing  
Brookhurst Street Overcrossing  
Slater Avenue Overcrossing  
Bushard Street Overcrossing  
Warner Avenue Overcrossing  
Magnolia Street Overcrossing  
Pedestrian Overcrossing near Heil Avenue  
Newland Street Overcrossing  
Edinger Avenue Overcrossing  
McFadden Avenue Overcrossing  
Bolsa Avenue Overcrossing  
Goldenwest Street Overcrossing  
Edwards Street Overcrossing  
Westminster Avenue Overcrossing  
Springdale Street Overcrossing  
Bolsa Chica Road Overcrossing

**Structure Widening/Modifications:**

Harbor Boulevard Undercrossing widening (Alternative 3 only)  
Service Road Undercrossing Box Culvert Extension  
Santa Ana River Bridge (left and right) widening  
Tieback Walls No. 2200 and 2300 at Route 405/39 Separation  
Bolsa Overhead widening (over UPRR)

Navy Overhead widening (over U.S. Navy Railroad)

Construction of the build alternatives would result in construction-related delays along the I-405, I-605, SR-22, and SR-73 freeways and interchanges, as well as on the surrounding local arterials. Temporary and short-term closures would likely be required and would occur intermittently throughout the construction duration. Full freeway lane, ramp, and arterial street closures could also be required and would likely occur during the nighttime and on weekends during various roadway and structure construction activities. Prolonged closure, ranging from 10 days to 12 months, is also anticipated to facilitate construction of certain interchange ramps, arterials, and overcrossing structures. Based on the RCS, the following 12 ramps are expected to be closed between 10 and 30 days:

Northbound ramp from C-D Road to South Coast Drive  
Northbound off-ramp from C-D Road to Fairview Road  
Northbound on-ramp from Fairview Road  
Southbound off-ramp to Fairview Road  
Northbound on-ramp from northbound Harbor Boulevard  
Southbound on-ramp from northbound Harbor Boulevard  
Southbound on-ramp from Talbert Avenue  
Southbound on-ramp from Warner Avenue  
Southbound off-ramp to Magnolia Street  
Southbound on-ramp from Bolsa Avenue  
Southbound on-ramp from Westminster Avenue  
Southbound off-ramp to Seal Beach Boulevard

Tentative detours for the ramp closures listed above are identified in the RCS, and these will be reviewed in greater detail during preparation of the Final TMP. Agreements with local agencies on detours using local streets will be needed when the Final TMP has been prepared during the project's final design.

It is anticipated that the following bridges would be fully closed for 8 to 12 months during their replacement, while the remaining bridges would remain open with a reduced number of lanes during replacement:

Ward Street Overcrossing  
Talbert Avenue Overcrossing  
Slater Avenue Overcrossing

Bushard Street Overcrossing

Newland Street Overcrossing

Edinger Avenue Overcrossing

McFadden Avenue Overcrossing

Edwards Street Overcrossing

The Draft TMP includes preliminary detour plans for fully closed bridges, which will be finalized in the Final TMP, which will also include provision for warning notices to motorists of bridges with reduced lanes and potential delays.

The Draft TMP indicates that a staged construction approach would be employed to construct the entire project due to the scale of the project and the need to maintain traffic during construction. There are numerous approaches to staging the construction of this 16-mile-long project, and the Draft TMP presents only one. Further constructibility analysis will be performed after public comment and during final design. The Final TMP will be prepared during the plans, specifications, and estimate (PS&E) phase that will require minimization of construction-related effects on traffic and circulation/pedestrian and bicyclists by applying a variety of techniques, including Public Information, Motorist Information, Incident Management, Construction Strategies, Demand Management, and Alternate Route Strategies. During the course of project construction, the Traffic Management Team will observe traffic conditions and make recommendations to the Resident Engineer concerning any changes that need to be made with respect to traffic management. The TMP Coordinator will work closely with the Traffic Management Team to develop timely recommendations to address traffic-related effects on traffic and circulation/pedestrians and bicyclists. The Final TMP will be prepared prior to project construction and will address traffic detours for roadway closures during construction. The Final TMP will also avoid and minimize construction-related traffic and circulation effects of the proposed project.

**Pedestrian and Bicycle Facilities:**

There are two Class 1 bikeways within the project limits. One, along the eastern bank of the Santa Ana River, is expected to require temporary closure during project construction, as discussed in Section 3.1.1.4.2, Parks and Recreational Facilities (Environmental Consequences). The other Class I bikeway is along the San Gabriel River, which would not be affected by the proposed project and would remain open during project construction. Class 2 bikeways along arterial streets will be closed consistent with the closures of the arterial roadways. The timing, locations, and detours for these closings will be identified in the Final TMP, which will be prepared prior to project construction. Closure of pedestrian facilities, including facilities with

ADA-compliant features, on bridges crossing the freeway and their detours will also be identified in the Final TMP.

#### **3.1.6.4 Avoidance, Minimization, and/or Mitigation Measures**

Measures are presented below for each of the adverse effects to traffic identified above. Table 3.1.6-21 presents v/c and LOS information under project conditions with mitigation for locations in Orange County. The table provides a comparison of the no-build conditions and the project with mitigations. The table shows that there are no adverse effects to traffic under project conditions when the mitigations identified below are included.

##### ***Detour Routes during Project Construction***

**T-1** A Final TMP will be prepared prior to project construction that identifies methods to avoid and minimize construction-related traffic and circulation effects and minimize impacts to pedestrian and bicycle access, including ADA-compliant features, as a result of the proposed project. During construction, the contractor shall implement the methods identified in the Final TMP.

Additional measures during project construction are presented in Section 3.1.4.1.4, Community Character and Cohesion (Avoidance, Minimization, and/or Mitigation Measures).

##### ***Slater Avenue at Brookhurst Street***

**T-2** During final design, plans shall be prepared to incorporate the following improvements at the Slater Avenue/Brookhurst Street intersection, which the contractor shall implement during construction:

Convert the southbound right-turn lane on Brookhurst Street to a fourth through lane (with right turns shared).

Convert the existing second eastbound through lane on Slater Avenue at Brookhurst Street to a shared through/right-turn lane. Retain the existing eastbound exclusive right-turn lane.

Provide increased queue storage areas for northbound right-turn, northbound left-turn, eastbound right-turn, and westbound left-turn movements.

##### ***Talbert Avenue at Brookhurst Street***

**T-3** During final design, plans shall be prepared to incorporate the following improvements at the Talbert Avenue/Brookhurst Street intersection, which the contractor shall implement during construction:

Add a third westbound through lane on Talbert Avenue. Retain the existing westbound exclusive right-turn lane.

Convert the southbound right-turn lane on Brookhurst Street to a fourth through lane (with right turns shared).

Convert the eastbound right-turn lane on Talbert Avenue to a fourth through lane (with right turns shared).

Convert the existing third northbound through lane on Brookhurst Street to a shared through/right-turn lane. Retain the existing northbound exclusive right-turn lane.

### ***Warner Avenue at Magnolia Street***

**T-4** During final design, plans shall be prepared to incorporate the following improvements at the Warner Avenue/Magnolia Street intersection, which the contractor shall implement during construction:

Convert the southbound right-turn lane on Magnolia Street at Warner Avenue to a shared through/right-turn lane. Extend the third southbound through lane on Magnolia Street south of the intersection.

Provide dual northbound left-turn lanes on Magnolia Street at Warner Avenue.

Extend the southbound dual left-turn pocket from the existing 200 ft to approximately 440 ft of queue storage.

### ***McFadden Avenue at Beach Boulevard***

**T-5** During final design, plans shall be prepared to incorporate the following improvements at the McFadden Avenue/Beach Boulevard intersection, which the contractor shall implement during construction:

Provide an exclusive northbound right-turn lane on Beach Boulevard.

Provide increased queue storage areas for eastbound right-turn and westbound left-turn movements.

### ***Center Avenue at Beach Boulevard***

**T-6** During final design, plans shall be prepared to incorporate the following improvements at the Center Avenue/Beach Boulevard intersection, which the contractor shall implement during construction:

Provide an exclusive right-turn lane and a shared through/right-turn lane on southbound Beach Boulevard.

Add a third eastbound right-turn lane on Center Avenue at Beach Boulevard.  
Increase the eastbound Center Avenue left-turn queue storage to 270 ft per lane and right-turn queue storage to 450 ft per lane.

Provide a fifth northbound through lane on Beach Boulevard.

### ***Edinger Avenue at Beach Boulevard***

**T-7** During final design, plans shall be prepared to incorporate the following improvements at the Edinger Avenue/Beach Boulevard intersection, which the contractor shall implement during construction:

Add a fourth northbound through lane on Beach Boulevard at Edinger Avenue.

Convert the existing eastbound right-turn only lane on Edinger Avenue at Beach Boulevard to a fourth through lane (with a shared right turn) and extend the lane to Parkside Lane to increase vehicle queue storage. Sign and stripe to allow two curb lanes on eastbound Edinger Avenue at Beach Boulevard as freeway access lanes (to the southbound on-ramp at Edinger Avenue).

Extend the existing southbound dual left-turn lanes on Beach Boulevard from the existing queue storage of 240 ft to an average of 300 ft per lane.

Widen the Edinger Avenue overcrossing to provide two westbound through lanes and two eastbound through lanes. The third eastbound through lane on Edinger Avenue from Beach Boulevard is dropped at the bridge overcrossing.

At the intersection of eastbound Edinger Avenue and the I-405 southbound on-ramp, provide an exclusive right-turn and a shared through/right-turn lane on eastbound Edinger Avenue, thereby allowing two lanes onto the southbound ramp.

Provide increased queue storage areas for southbound left-turn, eastbound left-turn, and westbound left-turn movements.

### ***Bolsa Avenue at Goldenwest Street***

**T-8** During final design, plans shall be prepared to incorporate the following improvements at the Bolsa Avenue/Goldenwest Street intersection, which the contractor shall implement during construction:

Widen the southbound approach on Goldenwest Street to provide an exclusive right-turn lane and a second left-turn lane. The southbound left-turn pocket is extended past the Goldenwest Street/Westminster Mall Road intersection.

Widen the northbound approach on Goldenwest Street at Bolsa Avenue to provide an exclusive right-turn lane with queue storage of approximately 430 ft.

Convert the eastbound right-turn lane on Bolsa Avenue to a fourth through lane (with right turns shared). Widen the south side of Bolsa Avenue between Goldenwest Street and the I-405 southbound on-ramp. Sign and stripe to allow two curb lanes on eastbound Bolsa Avenue at Goldenwest Street as freeway access lanes (to the I-405 southbound on-ramp from Bolsa Avenue).

Widen the westbound approach to provide extended queue storage of 750 ft for the right-turn lane and increased queue storage of 280 ft for the left-turn lanes.

### ***Garden Grove Boulevard at Bolsa Chica Road/Valley View Street***

**T-9** During final design, plans shall be prepared to incorporate the following improvements at the Garden Grove Boulevard and Bolsa Chica Road/Valley View Street intersection, which the contractor shall implement during construction:

Add a third westbound right-turn lane on Garden Grove Boulevard.

Add a third through lane on northbound Bolsa Chica Road/Valley View Street.

Extend the northbound right-turn lane on Bolsa Chica Road/Valley View Street and increase the existing queue storage of 400 ft to approximately 800 ft.

Proposed traffic measures are presented below for each of the project contributions to adverse cumulative effects in Los Angeles County identified above. Figures illustrating recommended improvements are included in Appendix L3. Tables 3.1.6-27, 3.1.6-29, and 3.1.6-31 present v/c and LOS information with proposed traffic measures under Alternatives 1, 2, and 3 conditions, respectively. The tables provide comparisons of the no-build conditions and the project condition with the proposed traffic measures. The tables show that there are no project contributions to adverse cumulative effects in Los Angeles County with implementation of the proposed traffic measures identified below.

The proposed measures include fair share contributions. OCTA/Caltrans are the project sponsors for the project. OCTA/Caltrans will contribute towards the fair share mitigation for T-10 and T-11, and OCTA will contribute for T-11. As the project sponsor, OCTA will provide a fair share amount of funding to address significant cumulative impacts to traffic. This funding will be provided to the City of Long Beach and to Caltrans.

Appendix L4 presents the data on which the fair share contribution percentages are based. The project's fair share percentage is calculated for each of the intersections identified with an adverse cumulative effect for Alternatives 1, 2, and 3. The fair share percentage calculation is adapted from the equitable share responsibility method included in the Caltrans Guide for the Preparation of Traffic Impact Studies, Appendix B. Because the Caltrans method is intended for

land development projects, the equation has been modified to be used for a roadway improvement project. The fair share percentage equation is as follows:

$$P = \frac{T}{T_B - T_E}$$

P = The equitable share for the proposed project's cumulative traffic impact expressed as a percentage.

T = Additional traffic volume entering the intersection during the peak hour assuming the project compared to the No Build Alternative in vehicles per hour, vph.

T<sub>B</sub> = The forecasted volume with the project entering the intersection during the peak hour assuming the project, vph.

T<sub>E</sub> = The existing traffic volume entering the intersection during the peak hour, vph.

For those intersections with an adverse cumulative effect in both the morning and evening peak hour, the larger T value is from the two periods and determines which period is used in the calculation. The T value for the 7<sup>th</sup> Street/Bellflower Boulevard intersection is negative for Alternative 1, rendering the calculation ineffective; therefore, the P value from the closest intersection (#30) is used as a reasonable substitute. Fair share percentage calculations are shown in Appendix L4.

### ***City of Long Beach Intersections***

**T-10** A payment shall be made by OCTA (Phase 1) and Caltrans (Phase 2) to the City of Long Beach based on a Cooperative Agreement to be negotiated and executed between OCTA/Caltrans and the City of Long Beach. The Cooperative Agreement shall identify the project's fair share of the costs for the improvements at intersections owned by the City of Long Beach based on the Preferred Alternative (PA) and in accordance with the fair share percentages for each location identified below. The Cooperative Agreement shall provide:

That the City of Long Beach's Transportation Mitigation Program will be revised to include the locations listed below under A, B, or C for the PA;

That the payment made by OCTA shall be placed into the City of Long Beach Transportation Mitigation Program and shall only be used to provide improvements to remedy impacts of the PA at the intersections listed below under A, B, or C for the PA;

The amount of the total payment to be applied to each location; and

That the proposed improvements shall be implemented by the City of Long Beach, with the City of Long Beach bearing responsibility for necessary clearances and permits.

If the implementing agency of this measure decides not to move forward with these improvements, these cumulative impacts would remain adverse.

A. If PA is Alternative 1:

- Los Coyotes Diagonal and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach.
  - Fair Share Percentage: 4.45%. (estimated total construction cost in 2013 dollars is \$250,000)

B. If PA is Alternative 2:

- Willow Street and Bellflower Boulevard intersection:
  - Add an exclusive right-turn lane to eastbound approach;
  - Add a second left-turn lane to westbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 10.41%. (estimated total construction cost in 2013 dollars is \$810,000)
- Willow Street and Los Coyotes Diagonal intersection:
  - Add a second left-turn lane to eastbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 31.57%. (estimated total construction cost in 2013 dollars is \$440,000)
- Willow Street and Woodruff Avenue intersection:
  - Add a second left-turn lane to northbound approach.
  - Fair Share Percentage: 10.40%. (estimated total construction cost in 2013 dollars is \$240,000)

C. If PA is Alternative 3:

- Willow Street and Bellflower Boulevard intersection:
  - Add an exclusive right-turn lane to eastbound approach;
  - Add a second left-turn lane to westbound approach; and
  - Add a second left-turn lane to southbound approach.

- Fair Share Percentage: 10.41%. (estimated total construction cost in 2013 dollars is \$810,000)
- Los Coyotes Diagonal and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach.
  - Fair Share Percentage: 8.32%. (estimated total construction cost in 2013 dollars is \$250,000)
- Willow Street and Los Coyotes Diagonal intersection:
  - Add a second left-turn lane to eastbound approach; and
  - Add a second left-turn lane to southbound approach.
  - Fair Share Percentage: 30.03%. (estimated total construction cost in 2013 dollars is \$440,000)

### ***State of California Intersections***

**T-11** A payment shall be made by OCTA to Caltrans based on a Traffic Mitigation Agreement Fair Share Deferment to be negotiated and executed between OCTA and Caltrans. The Traffic Mitigation Agreement Fair Share Deferment shall identify the project's fair share of the costs for the improvements at intersections owned by the State of California based on the PA and in accordance with the fair share percentages for each location identified below. The Traffic Mitigation Agreement Fair Share Deferment shall provide:

That Caltrans will establish separate accounts for each of the locations listed below under A, B, or C for the PA;

That the payment made by OCTA shall be held by Caltrans and shall only be used to provide improvements to remedy impacts of the PA at the intersections listed below under A, B, or C for the PA;

The amount of the total payment to be applied to each location;

That the amounts for different locations shall not be commingled; and

That the proposed improvements shall be implemented by Caltrans, with Caltrans bearing responsibility for necessary clearances and permits.

If the implementing agency of this measure decides not to move forward with these improvements, these cumulative impacts would remain adverse.

It should be noted that the State of California would implement a project only when enough funds have been collectively received for that specific mitigation measure.

A. If PA is Alternative 1:

- SR-22 westbound on-/off-ramp and College Park Drive intersection:
  - Add a second northbound through lane to the off-ramp approach to College Park Drive starting approximately 300 ft south of their intersection; and
  - Replace existing traffic control with a traffic signal.
  - Fair Share Percentage: 12.11%. (estimated total construction cost in 2013 dollars is \$1,570,000)
- 7<sup>th</sup> Street and Pacific Coast Highway intersection:
  - Add protected/permitted signal phasing to the eastbound and westbound approaches of Pacific Coast Highway to Bellflower Boulevard.
  - Fair Share Percentage: 11.70%. (estimated total construction cost in 2013 dollars is \$450,000)
- 7<sup>th</sup> Street and West Campus Drive intersection:
  - Add an exclusive right-turn lane to westbound approach, modifying traffic signals as needed.
  - Fair Share Percentage: 9.16%. (estimated total construction cost in 2013 dollars is \$300,000)
- 7<sup>th</sup> Street and Bellflower Boulevard intersection:
  - Add a second left-turn lane to eastbound approach, modifying signals and adjusting sidewalk as necessary.
  - Fair Share Percentage: 11.70%. (estimated total construction cost in 2013 dollars is \$640,000)

B. If PA is Alternative 2:

- SR-22 westbound on-/off-ramp and College Park Drive intersection:
  - Add a second northbound through lane to the off-ramp approach to College Park Drive starting approximately 300 ft south of their intersection; and
  - Replace existing traffic control with a traffic signal.
  - Fair Share Percentage: 33.25%. (estimated total construction cost in 2013 dollars is \$1,570,000)
- 7<sup>th</sup> Street and Pacific Coast Highway intersection:
  - Add protected/permitted signal phasing to the eastbound and westbound approaches of Pacific Coast Highway to Bellflower Boulevard.

- Fair Share Percentage: 7.84%. (estimated total construction cost in 2013 dollars is \$450,000)
  - 7<sup>th</sup> Street and Bellflower Boulevard intersection:
    - Add a second left-turn lane to eastbound approach, modifying signals and adjusting sidewalk as necessary.
    - Fair Share Percentage: 16.92%. (estimated total construction cost in 2013 dollars is \$640,000)
  - 7<sup>th</sup> Street and Channel Drive intersection:
    - Add a second left-turn lane to westbound approach, modifying signals as necessary; and
    - Provide dual southbound exclusive left-turn lanes.
    - Fair Share Percentage: 13.59%. (estimated total construction cost in 2013 dollars is \$240,000)
  - 7<sup>th</sup> Street and West Campus Drive intersection:
    - Add an exclusive right-turn lane to westbound approach, modifying traffic signals as necessary.
    - Fair Share Percentage: 27.34%. (estimated total construction cost in 2013 dollars is \$300,000)
  - 7<sup>th</sup> Street and East Campus Drive intersection:
    - Add a right-turn lane to westbound approach, modifying traffic signals as necessary and maximizing eastbound and westbound left-turn pocket lengths.
    - Fair Share Percentage: 21.30%. (estimated total construction cost in 2013 dollars is \$450,000)
- C. If PA is Alternative 3:
- 7<sup>th</sup> Street and Pacific Coast Highway intersection:
    - Add protected/permitted signal phasing to the eastbound and westbound approaches of Pacific Coast Highway to Bellflower Boulevard.
    - Fair Share Percentage: 8.08%. (estimated total construction cost in 2013 dollars is \$450,000)
  - 7<sup>th</sup> Street and Bellflower Boulevard intersection:

- Add a second left-turn lane to eastbound approach, modifying signals and adjusting sidewalk as necessary.
- Fair Share Percentage: 17.64%. (estimated total construction cost in 2013 dollars is \$640,000)
- 7<sup>th</sup> Street and Channel Drive intersection:
  - Add a second left-turn lane to westbound approach, modifying signals as necessary; and
  - Provide dual southbound exclusive left-turn lanes.
  - Fair Share Percentage: 14.01%. (estimated total construction cost in 2013 dollars is \$240,000)
- 7<sup>th</sup> Street and West Campus Drive intersection:
  - Add an exclusive right-turn lane to westbound approach, modifying traffic signals as necessary.
  - Fair Share Percentage: 25.02%. (estimated total construction cost in 2013 dollars is \$300,000)
- 7<sup>th</sup> Street and East Campus Drive intersection:
  - Add a right-turn lane to westbound approach, modifying traffic signals as necessary and maximizing eastbound and westbound left-turn pocket lengths.
  - Fair Share Percentage: 7.39%. (estimated total construction cost in 2013 dollars is \$450,000)

### ***HOV Occupancy Policy on the Express Lanes***

**T-12** To address the potential operational challenge on the express lanes (under the HOV2+ free policy), a process will be developed to address the issue by considering HOV occupancy policy which may include, but not limited to:

- adjusting to HOV3+ free with HOV2s discounted tolls
- adjusting to HOV3+ free with HOV2s full tolls
- adjusting to tolling HOV2s on individual tolling segments such as direct connectors to or from other freeways
- periodic adjustments of tolling rates to maintain operations on individual tolling segments