4.7 TRANSPORTATION AND CIRCULATION

This section presents traffic impacts of the TSM/Expanded Bus Service, Full Build, and Reduced Build Alternatives compared to the future baseline 2020 No Build. The information presented is summarized from the *SR-22/West Orange County Connection Traffic/Circulation Impact Report* (May 2001) and *Traffic/Circulation Report Reduced Build Alternative Addendum* (May 2001). The following discussion presents corridor and localized impacts. The corridor impacts discussion focuses on macro-impacts, such as VKT(VMT), VHT, travel times, average speeds, whereas, the localized impacts discussion focuses on micro-impacts, such as freeway and intersection level of service (LOS) and volume/capacity (V/C) ratios. The following information in this section describes the mobility benefits and impacts of each alternative in the context of the first goal listed in Section 1.0 of this document: improve mobility in the SR-22/West Orange County Connection study area. Objectives related to this goal include increasing travel choices in the corridor and reducing peak-period travel times.

The planning horizon for the SR-22/West Orange County Connection project is 2020. For the purposes of traffic analysis, the HOV requirement is assumed to be three or more persons per vehicle (3+) in the Year 2020. This assumption is consistent with other future planning efforts and is made based on the analysis of travel forecasts, which predict that Orange County's HOV lanes will be congested during peak periods in 2020 with an occupancy requirement of two or more persons per vehicle (2+). Consequently, travel demand forecasts conducted for all four alternatives presume that the full Orange County HOV network would be operating under a 3+ occupancy requirement.

It is important to note, however, that the policy decision to change the HOV vehicle occupancy requirement from 2+ to 3+ has not been made. The current vehicle occupancy requirement for HOV lanes in Orange County is two or more persons per vehicle. For the Full Build And Reduced Build Alternatives, it is anticipated that HOV lanes on SR-22 would be open and operate under a 2+ occupancy requirement until such time that a policy decision is made to change the HOV network from 2+ to 3+.

4.7.1 Corridor Impacts

A. CORRIDOR TRAVEL TIME SAVINGS

Table 4.7-1 shows the forecast daily and annual corridor travel time savings for all travelers whose trips would either begin or end in the SR-22 corridor in the year 2020. These savings would result from transportation system improvements included in each alternative and are compared with the baseline No Build Alternative. This measure provides an overall assessment of the mobility improvement offered by each alternative.

Table 4.7-1
SR-22 CORRIDOR TRAVEL TIME SAVINGS

Daily Travel Time Savings (compared to No Build Alternative)			**Annual Travel Time Savings (compared to No Build Alternative)**		
TSM/Expanded Bus Service Alternative	Full Build Alternative	Reduced Build Alternative	TSM/Expanded Bus Service Alternative	Full Build Alternative	Reduced Build Alternative
12,190 hours	28,660 hours	19,130 hours	3,658,000 hours	8,597,000 hours	5,740,000 hours

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
Note: annual travel time savings has been rounded to the nearest 1000

TSM/Expanded Bus Service Alternative. The TSM/Expanded Bus Service Alternative would produce a daily travel time savings for corridor travelers of 12,190 hours and an annual savings of 3,658,000 hours compared to the No Build Alternative. This would represent a 0.5-percent reduction in total corridor travel time for travelers whose trips would either begin or end in the SR-22

corridor. These savings would be generated based upon the arterial street improvements included in this alternative and the shift of travelers from auto to transit.

Full Build Alternative. The Full Build Alternative would produce the largest travel time savings of the three alternatives, 28,660 daily hours and 8,597,000 annual hours as compared to the No Build Alternative. This would represent a 1.1-percent reduction in total corridor travel time for travelers whose trips would either begin or end in the SR-22 corridor. This only paints a part of the picture since more vehicles benefit from increased mobility through the corridor (see Corridor VMT below). These savings would be generated based upon the addition of HOV lanes and HOV lane connectors to the corridor, which would improve travel times for HOV lane users. In addition, a shift in vehicles to the HOV lanes would allow traffic on the SR-22 mixed-flow lanes to move somewhat faster, reducing travel times. Finally, the addition of an arterial street on the former Pacific Electric right-of-way would provide reduced travel times for some travelers.

Reduced Build Alternative. The Reduced Build Alternative would produce the second largest corridor travel time savings. It would produce daily travel time savings for corridor travelers of 19,130 hours and an annual savings of 5,740,000 hours compared to the No Build Alternative. This would represent a 0.7-percent reduction in total corridor travel time for travelers whose trips would either begin or end in the SR-22 corridor. These savings would be generated based upon the addition of HOV lanes to the corridor, which would improve travel times for HOV lane users. In addition, a shift of vehicles to the HOV lanes would allow traffic on the SR-22 mixed-flow lanes to move somewhat faster, reducing travel times. Since these features of the Reduced Build Alternative are less extensive than the Full Build Alternative, this alternative would generate smaller travel time savings.

B. CORRIDOR VKT (VMT) AND VHT

If an alternative experiences a VKT (VMT) increase, it indicates that more vehicles would be moving through the study area. A VHT reduction and an average corridor speed increase indicates that the vehicles would be moving faster. Table 4.7-2 shows the comparative data between the No Build Alternative and the TSM/Expanded Bus Service, Full Build, and Reduced Build Alternatives.

Table 4.7-2
SR-22 CORRIDOR VKT (VMT) AND VHT SUMMARIES
YEAR 2020 – AVERAGE WEEKDAY

Alternative	Aggregate Summary of all Roadway Facilities		
	VKT (VMT)	VHT	Avg. Speed
No Build	16,155,410 (10,040,650)	311,360	51.8 km/h (32.2 mph)
TSM/Expanded Bus Service	16,273,600 (10,114,110)	309,980	52.5 km/h (32.6 mph)
Full Build	16,820,740 (10,453,790)	312,660	53.7 km/h (33.4 mph)
Reduced Build	16,591,190 (10,311,130)	310,880	53.4 km/h (33.2 mph)

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
km/h: kilometers per hour; mph: miles per hour

Although the corridor-wide average speed differential between the No Build Alternative and any of the other alternatives may appear small, it can be noted that the data in Table 4.7-2 are aggregated over the entire corridor for a 24-hour period and includes all freeways and arterials within

the defined study area. The aggregation process has diluted some substantial speed benefits gained during peak hours, in certain corridor areas, as shown in Table 4.7-3..

No Build Alternative. The No Build Alternative is used as the baseline to which the other alternatives are compared. This alternative has the highest VKT (VMT) at 16,155,410 (10,040,650), highest VHT at 311,360. The ratio of VKT (VMT) and VHT indicates an average speed of 51.8 km/h (32.2 mph) for this alternative.

TSM/Expanded Bus Service Alternative. As seen in Table 4.7-2, this alternative would result in 118,190 additional VKT (73,460 VMT). In addition, the VHT would be reduced by 1,380 hours compared to the No Build Alternative. The ratio of VKT (VMT) and VHT indicates an average speed of 52.5 km/h (32.6 mph) for this alternative.

Full Build Alternative. This alternative would result in greater VKT (VMT) and VHT compared to the No Build Alternative; VKT (VMT) would increase by approximately 665,000 (413,000), while VHT would increase by approximately 1,300 over the No Build Alternative. The ratio of VKT (VMT) and VHT indicates an average speed of 53.7 km/h (33.4 mph) for this alternative.

Reduced Build Alternative. The Reduced Build Alternative would result in an additional travel activity of 435,000-VKT (270,000-VMT), and a reduction of 480 VHT over the No Build Alternative. The ratio of VKT (VMT) and VHT indicates an average speed of 53.4 km/h (33.2 mph) for this alternative.

C. PEAK PERFORMANCE AND SCREENLINE ANALYSIS

Table 4.7-3 provides a comparison of forecast year PM peak-period speeds along major segments of the SR-22 freeway between the alternatives. As seen in table 4.7-3, implementing the TSM/Expanded Bus Service, Full Build or Reduced Build would achieve higher PM peak-period, peak direction travel speeds.

Table 4.7-3 YEAR 2020 PM PEAK PERIOD PERFORMANCE PEAK DIRECTION SPEED

SR-22 Segments	No Build	TSM/Expanded Bus Service	Full Build	Reduced Build
Between Orange Crush & City Drive	32 km/h (20 mph)	21 km/h (13 mph)	85 km/h (53 mph)	85 km/h (53 mph)
Between City Drive & Haster Street	43 km/h (27mph)	43 km/h (27mph)	82 km/h (51 mph)	77 km/h (48 mph)
Between Haster Street & Harbor Blvd.	48 km/h (30mph)	48 km/h (30 mph)	71 km/h (44 mph)	64 km/h (40 mph)
Between Harbor Blvd. & Euclid	50 km/h (31 mph)	50 km/h (31 mph)	72 km/h (45 mph)	61 km/h (38 mph)
Between Euclid & Brookhurst Avenue	55 km/h (34 mph)	56 km/h (35 mph)	69 km/h (43 mph)	63 km/h (39 mph)
Between Brookhurst and Magnolia	58 km/h (36 mph)	63 km/h (39 mph)	74 km/h (46 mph)	69 km/h (43 mph)
Between Magnolia & Beach Blvd.	68 km/h (42 mph)	69 km/h (43 mph)	80 km/h (50 mph)	77 km/h (48 mph)

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
* km/h: kilometers per hour; mph: miles per hour

No Build Alternative. The No Build Alternative PM Peak period provide the baseline to which the other alternatives are compared. The No Build Alternative results in the lowest PM peak period, peak direction speeds in 2020.

TSM/Expanded Bus Service Alternative. The TSM/Expanded Bus Service Alternative would result in modest PM peak period speed improvements along some of the segments of the SR-22. As seen on table 4.7-3, the implementation of this alternative would increase the speed from 32 km/h (20 mph) to 80 km/h (50 mph) and from 58 km/h (36 mph) to 53 km/h (39 mph) along a few segments.

Full Build Alternative. The Full Build Alternative would provide substantial PM peak period speed improvements over the No Build Alternative. Comparing the Full Build Alternative speeds along major segments of the SR-22 freeway demonstrates distinct speed increases (ranging from 12 km/h (8 mph) to 53 km/h (33 mph)) during the peak period.

Reduced Build Alternative. The Reduced Build Alternative would also provide substantial PM peak period speed improvements over the No Build Alternative. Comparing the Reduced Build Alternative speeds along major segments of the SR-22 freeway demonstrates distinct speed increases (raging from 8 km/h (5 mph) to 53 km/h (33 mph)) during the peak period.

The screenline analysis is summarized using traffic volume and average speed changes among the study alternatives. Table 4.7-4 displays p.m. peak-period statistics. (The screenline locations are mapped on Figure 4.7-1.) Implementing the TSM/Expanded Bus Service, Full Build, or Reduced Build Alternative would not only serve additional traffic demand, but would also achieve higher average speeds. When comparing the various screenlines, note that Screenline No. 1 crosses I-405 where it is currently six general-purpose lanes and one HOV lane in each direction, and Screenline No. 4 crosses SR-22 and I-5. At both of these screenlines, the baseline volumes are fairly high, which is because there are substantially more freeway lanes at these screenlines than there are at Screenline No. 2 and Screenline No. 3. As previously discussed in Section 3.7.1, Screenline No. 2 and Screenline No. 3 address flow on SR-22 more directly than do Screenline No. 1 and Screenline No. 4.

The modest speed increase and the more substantial volume increase combine to indicate a VHT increase at the screenline as opposed to the VHT decrease within the study area. Vehicles would be using SR-22 instead of the surface arterials, which would decrease corridor VHT, but would result in increased screenline VHT.

No Build Alternative. The No Build Alternative volume, VKT (VMT), VHT, and speed provide the baseline to which the other alternatives are compared. The No Build Alternative results in the lowest screenline volumes, VKT (VMT), and VHT. In addition, the average screenline speeds are the slowest.

TSM/Expanded Bus Service Alternative. As seen in Table 4.7-4, implementing the TSM/Expanded Bus Service Alternative would not only serve additional traffic demand, but would also generally achieve higher average speeds. At Screenline Nos. 2 and 3, the vehicles moving across the screenlines would increase by increase by three to six percent in the p.m. peak period, with average speeds increasing negligibly. The small speed benefit would be primarily a result of the induced mode shift (from auto to transit), relieving some freeway capacity, thereby resulting in reduced freeway congestion.

Full Build Alternative. The Full Build Alternative would serve substantially higher traffic volumes, During the p.m. peak period, traffic is forecast to increase by 23 percent at Screenline No. 2 and 20 percent at Screenline No. 3. During the p.m. peak, the average speeds are forecast to increase on the freeway general purpose lanes by 3 percent at Screenline No. 2 and 36 percent at Screenline No. 3. The substantial travel speed improvement would be the result of additional roadway capacity that would become available through the proposed HOV lane and the auxiliary lane improvements.

Reduced Build Alternative. At Screenlines Nos. 2 and 3, the Reduced Build Alternative would serve higher traffic volumes compared to the No Build Alternative, showing increases of eighteen and twelve percent. The average speeds in the general purpose lanes across the same two screenlines increase by eighteen and twenty-five percent on general purpose lanes. The substantial travel speed improvement would be the result of additional roadway capacity that would become available through the proposed HOV lane and the auxiliary lane improvements.

Figure 4.7-1
Screenline Locations

Table 4.7-4
YEAR 2020 PM PEAK PERIOD SCREENLINE COMPARISON
(BOTH DIRECTIONS)

Segment	Alternative	Volume	VKT (VMT)	VHT	GP Lane Speed	HOV Lane Speed	Arterial Speed
1 – West of the SR-22/I-405 Interchange	No Build	133,140	163,260 101,470	4,290	37.89 km/h 23.5 mph	97.2 km/h 60.4 mph	32.7 km/h 20.3 mph
	TSM/Expanded Bus Service	134,700	165,770 103,030	4,330	37.9 km/h 23.6 mph	96.9 km/h 60.2 mph	33.7 km/h 21.0 mph
	Full Build	139,870	172,360 107,120	4,340	38.5 km/h 23.9 mph	101.8 km/h 63.3 mph	33.7 km/h 20.9 mph
	Reduced Build	139,530	171,990 106,890	4,400	38.3 km/h 23.8 mph	101.0 km/h 62.8 mph	32.7 km/h 20.3 mph
2 – Between Beach Blvd. and Magnolia St.	No Build	75,550	69,650 43.290	1,120	67.2 km/h 41.8 mph	N/A	49.2 km/h 30.5 mph
	TSM/Expanded Bus Service	79,990	70,970 44,110	1,140	67.9 km/h 42.2 mph	N/A	49.6 km/h 30.8 mph
	Full Build	93,110	93,480 58,100	1,330	74.4 km/h 46.2 mph	98.5 km/h 61.2 mph	50.6 km/h 31.5 mph
	Reduced Build	89,190	86,320 53,650	1,190	79.3 km/h 49.3 mph	109.4 km/h 68.0 mph	50.4 km/h 31.3 mph
3 – Between Harbor Blvd. and Haster St.	No Build	118,370	98,820 61,420	2,390	55.3 km/h 34.4 mph	N/A	33.4 km/h 20.7 mph
	TSM/Expanded Bus Service	122,490	101,270 62,940	2,410	54.6 km/h 33.9 mph	N/A	34.8 km/h 21.6 mph
	Full Build	141,740	147,480 91,660	2,670	73.3 km/h 45.5 mph	96.1 km/h 59.7 mph	45.3 km/h 28.1 mph
	Reduced Build	132,200	116,170 72,200	2,310	69.4 km/h 43.1 mph	96.5 km/h 60.0 mph	37.0 km/h 23.0 mph
4 – Between Glassell St. and Tustin Ave.	No Build	202,520	129,690 80,600	3,020	42.3 km/h 26.3 mph	73.3 km/h 45.6 mph	34.1 km/h 21.2 mph
	TSM/Expanded Bus Service	204,480	130,680 81,220	3,050	41.8 km/h 26.0 mph	73.8 km/h 45.9 mph	35.6 km/h 22.1 mph
	Full Build	210,000	136,590 84,890	3,170	40.9 km/h 25.4 mph	76.7 km/h 47.7 mph	36.4 km/h 22.6 mph
	Reduced Build	205,830	132,340 82,250	3,140	40.8 km/h 25.4 mph	77.1 km/h 47.9 mph	35.9 km/h 22.3 mph

D. CORRIDOR TRAVEL TIME COMPARISON

Table 4.7-5 provides a comparison of forecast year 2020 PM peak-period HOV and SOV average travel times (on the highway system) between selected pairs of trip origins (O) and destinations (D) within the corridor.

No Build Alternative. Under the No Build Alternative, the travel time difference between SOV and HOV would be zero for all O-D pairs, with the exception of the O-D pairs that have access to other freeways HOV lanes

TSM/Expanded Bus Service Alternative. The TSM/Expanded Bus Service Alternative travel time difference between the SOV and HOV would also be zero for all O-D pairs, except for the O-D pairs that have access to other freeways HOV lanes. The TSM/Expanded Bus Service Alternative would provide a small travel benefit, with approximately two minutes of travel time –savings on most trips over the No Build Alternative.

Table 4.7-5
PROJECTED SOV AND HOV TRAVEL TIMES IN MINUTES[1]
YEAR 2020 – PM PEAK PERIOD

Origin	Destination	Mode[2]	Alternative			
			No Build	TSM/ Expanded Bus Service	Full Build	Reduced Build
Orange Mall		SOV	34	33	32	32
Orange	Seal Beach	HOV	34	33	27	28
Orange Mall	Belmont Shore Dr.	SOV	45	43	42	43
Orange	Long Beach	HOV	45	43	37	37
17th St. at Bristol St.	Belmont Shore Dr.	SOV	45	43	42	43
Santa Ana	Long Beach	HOV	45	43	36	37
Transit Center	Newport Avenue.	SOV	55	51	50	50
Long Beach	Tustin	HOV	41	38	34	35
Transit Center	Civic Center	SOV	45	43	42	42
Long Beach	Santa Ana	HOV	37	34	25	29
Jamboree Road	Seal Beach	SOV	39	38	35	36
Tustin		HOV	31	31	28	28
Chapman Ave.	Compton	SOV	63	63	60	62
Orange		HOV	54	54	51	51

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
[1] Rounded to the nearest minute
[2] HOV assumed to be 3+ occupants per vehicle in 2020

Full Build Alternative. The Full Build Alternative, because of its exclusive HOV lane access on SR-22, would provide a substantial travel time benefit over the No Build Alternative. The SOV travel time savings compared to the No Build Alternative would range between 2 and 5 minutes per vehicle and, similarly, the HOV travel time savings would range between 3 and 8 minutes per vehicle. Comparing HOV and SOV travel times within the Full Build Alternative demonstrates the distinct travel time advantage (ranging between 5 and 17 minutes) offered by HOV lanes over general-purpose lanes during PM peak periods.

Reduced Build Alternative. The Reduced Build Alternative, because of its exclusive HOV lane access on SR-22, would provide a substantial travel time benefit over the No Build Alternative. The SOV travel time savings compared to the No Build Alternative would range between 1and 5 minutes per vehicle and, similarly, the HOV travel time savings would range between 3 and 7 minutes per vehicle. Comparing HOV and SOV travel times within the Reduced Build Alternative demonstrates the distinct travel time advantage (ranging between 4 and 15 minutes) HOV lanes offer over general-purpose lanes during PM peak periods.

4.7.2 Freeway Mainline Impacts

Table 4.7-6 summarizes the No Build, TSM/Expanded Bus Service, Full Build, and Reduced Build Alternatives V/C ratios and levels of service (LOS) for various SR-22, I-405, I-605, and SR-55 freeway segments. Figure 1.2-3 in Section 1.2 provides a pictorial explanation of LOS. The LOS was determined by freeway operational analysis which estimated the p.m. peak-hour V/C rations by freeway segment. This was done in order to assess the relative traffic service levels of each of the alternatives.

The CMP, according to its traffic impact analysis guidelines, recommends a minimum LOS E standard for all key intersections and freeway segments within Orange County. If the baseline condition (2020 No Build) conforms to that recommendation, i.e., operates at LOS E or better, any proposed alternative that would deteriorate the level of service to worse than LOS E conditions would require mitigation. If the baseline condition is operating at worse than LOS E, then the proposed alternative would require mitigation only if implementing the proposed alternative would cause a 0.10 or more increase in volume-to-

capacity (V/C) ratio over that of baseline condition (2020 No Build). If the V/C ratio increases less than 0.10, no mitigation would be planned.

A. NO BUILD ALTERNATIVE

Under the No Build Alternative, 15 of the 30 SR-22 segments would operate at LOS F conditions. Traffic operation on I-405 would operate at LOS F in the two southbound segments. Northbound I-405, as well as the I-605 and SR-55 segments in both directions, would be satisfactory (LOS E or better).

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

Implementing the TSM/Expanded Bus Service Alternative would result in minor V/C ratio improvements, though the LOS would be similar to those for the No Build Alternative. Fourteen of the 30 SR-22 segments would still operate at LOS F conditions, because this alternative would not add freeway capacity. Traffic operations on I-405, I-605, and SR-55 study segments would be similar to those under the No Build Alternative. The transit improvements proposed would induce some mode shift from auto to transit. However, the mode shift would not be substantial enough to reduce the demand and achieve the desired LOS. Implementing this alternative would not cause any threshold violations.

C. FULL BUILD ALTERNATIVE

The Full Build Alternative would better serve the year 2020 peak-hour forecast traffic volumes than the No Build or TSM/Expanded Bus Service Alternative. Only two of the thirty SR-22 general-purpose lane segments would operate at LOS F conditions. In both cases, these are segments that are forecast to operate at LOS E in the No Build condition, thus resulting in a threshold violation. However, in both cases there are auxiliary lanes in these segments that are not included in the capacity calculation. These auxiliary lanes would improve the weaving section to optimize the capacity of the mainline lanes, thus having a mitigating effect and reducing the level of service to less than LOS F. Two SR-55 HOV lane segments would also result in threshold violations (V/C increases from 1.12 to 1.87 northbound and from 1.13 to 1.64 southbound).

The SR-22 HOV lanes in both directions would generally operate in the LOS C to E range, except the eastbound segments between I-405 and Knott Street and between Haster Street and the I-5/SR-57 interchange. In these sections, the HOV traffic volumes (in the 1,500- to 1,700-vehicle range) would exceed the HOV 1,500 vehicles per hour lane capacity. The two-plus sensitivity analysis in shows that the two-plus HOV demand exceeds the capacity and supports the need for a three-plus occupancy policy in 2020.

The Full Build Alternative would not result in a substantial traffic operations impact on I-405, I-605, and SR-55 general-purpose lane study segments. Implementing the SR-22 HOV lane and particularly the freeway-to-freeway connectors would induce higher volumes on the existing I-405 and SR-55 HOV lanes, resulting in higher V/C ratios and worse LOS, particularly on the SR-55 HOV lanes. The increased volumes in the HOV lanes on I-405 and SR-55 are in large part a result of the diversion of existing HOV trips in the general-purpose lanes or on the parallel arterials into the HOV lanes.

D. REDUCED BUILD ALTERNATIVE

Implementing the Reduced Build Alternative would better serve the year 2020 peak-hour forecast traffic volumes than the No Build Alternative. Only two of the 30 SR-22 general-purpose lane segments operate at LOS F conditions. Two SR-55 HOV lane segments would also result in threshold violations (V/C increases from 1.12 to 1.38 northbound and from 1.13 to 1.23 southbound).

The SR-22 HOV lanes would generally operate in the LOS C to E range, with a few locations operating better (eastbound from Beach Boulevard to Magnolia Street and westbound between I-5/SR-57 Interchange and Haster Street), and one location operating at a worse level of service (westbound between Euclid Street and Brookhurst Street). In this section, the HOV traffic volumes (in the 1,600-vehicle range) would exceed the 1,500 vehicles per hour HOV lane capacity.

The Reduced Build Alternative would not result in a substantial traffic operations impact on I-405, I-605, and SR-55 general-purpose lane study segments. Implementing the SR-22 HOV lane and particularly the freeway-to-freeway connectors would induce higher volumes on the existing I-405 and SR-55 HOV lanes, resulting in higher V/C ratios and worse LOS. This is true for I-405 and SR-55 because the availability of a SR-22 HOV lane (even without the SR-55 direct connection) would encourage HOVs to use the I-405 and SR-55 HOV lanes to access the SR-22 HOV lanes. The increased volumes in the HOV lanes on I-405 and SR-55 are in large part a result of the diversion of existing HOV trips in the general-purpose lanes or on the parallel arterials into the HOV lanes.

Table 4.7-6
FREEWAY V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PM PEAK HOUR

Study Fwy	Study Segment Between	Year 2020 No Build Alternative				TSM/Expanded Bus Service Alternative				Full Build Alternative				Reduced Build Alternative			
		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV	
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
EASTBOUND DIRECTION																	
SR-22	SR-22/I-405 – Valley View Bl.	0.94	E			0.94	E			0.97	E	1.05	F	0.94	E	0.77	D
	Valley View Blvd. – Knott St.	0.97	E			0.97	E			0.98	E	1.15	F	0.96	E	0.86	E
	Knott St. – Beach Blvd.	0.98	E			0.98	E			1.06	F	0.87	E	1.04	F	0.58	C
	Beach Blvd. – Magnolia St.	1.05	F			1.05	F			0.93	E	0.49	C	0.89	E	0.21	A
	Magnolia St. – Brookhurst St.	1.09	F			1.08	F			0.88	E	0.91	E	0.86	E	0.63	C
	Brookhurst. – Euclid St.	1.12	F			1.10	F			0.93	E	0.71	D	0.86	E	0.71	D
	Euclid St. – Harbor Blvd.	1.15	F			1.14	F			0.78	D	0.60	C	0.91	E	0.60	C
	Harbor Blvd. – Haster St.	1.14	F			1.13	F			0.78	D	0.77	D	0.88	E	0.73	D
	Haster St. – The City Dr.	1.20	F			1.18	F			0.62	C	1.01	F	0.72	D	0.79	D
	The City Dr. – Bristol St.	1.26	F			1.26	F			0.86	E	1.01	F	0.83	D	0.79	D
	Bristol St. – I-5/SR-57 IC	1.03	F			1.02	F			0.80	D	1.17	F	0.77	D	0.96	E
	I-5/SR-57 IC – Main St.	1.02	F			1.00	F			0.86	E	0.83	D	0.44	B	0.96	E
	Main St. – Glassell St.	1.01	F			0.99	E			0.84	D	0.84	D	0.85	D		
	Glassell St. – Tustin St.	0.92	E			0.91	E			1.06	F	0.75	D	1.04	F		
	Tustin St. – SR-55	0.67	C			0.66	C			0.81	D	0.75	D	0.79	D		
WESTBOUND DIRECTION																	
SR-22	SR-55 – Tustin St.	0.55	C			0.53	C			0.61	C	0.51	C	0.60	C		
	Tustin St. – Glassell St.	0.73	D			0.71	D			0.80	D	0.51	C	0.79	D		
	Glassell St. – Main St.	0.77	D			0.74	D			0.61	C	0.61	C	0.63	C		
	Main St. – I-5/SR-57 IC	0.84	D			0.82	D			0.67	C	0.53	C	0.60	C	0.50	C
	I-5/SR-57 IC – Bristol St.	0.82	D			0.80	D			0.62	C	0.62	C	0.82	D	0.45	B
	Bristol St. – The City Dr.	1.23	F			1.21	F			0.74	D	0.62	C	0.98	E	0.45	B
	The City Dr. – Haster St..	0.88	E			0.88	E			0.52	C	0.53	C	0.74	D	0.44	B
	Haster St. – Harbor Blvd.	1.18	F			1.19	F			0.75	D	0.96	E	0.89	E	0.87	E
	Harbor Blvd. – Euclid St.	1.16	F			1.18	F			0.81	D	0.49	C	0.91	E	0.68	D
	Euclid St. – Brookhurst St.	1.10	F			1.10	F			0.86	E	0.89	E	0.79	D	1.08	F
	Brookhurst St. – Magnolia St.	1.03	F			1.03	F			0.85	D	0.59	C	0.83	D	0.51	C
	Magnolia St. – Beach Blvd.	0.94	E			0.94	E			0.78	D	0.57	C	0.76	D	0.49	C
	Beach Blvd. – Knott St.	0.83	D			0.83	D			0.88	E	0.66	C	0.87	E	0.58	C

Table 4.7-6 (continued)
FREEWAY V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PM PEAK HOUR

Study Fwy	Study Segment Between	Year 2020 No Build Alternative				TSM/Expanded Bus Service Alternative				Full Build Alternative				Reduced Build Alternative			
		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV		General-Purpose		3+ HOV	
		V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
WESTBOUND DIRECTION																	
SR-22	Knott St. – Valley View St.	0.73	D			0.73	D			0.81	D	0.57	C	0.79	D	0.49	C
	Valley View St. – SR-22/I-405	0.75	D			0.75	D			0.81	D	0.65	C	0.79	D	0.57	C
NORTHBOUND DIRECTION																	
I-405	SR-22/I-405 – Seal Beach Blvd.	0.86	E	0.47	C	0.87	E	0.47	C	0.88	E	0.78	D	0.90	E	0.67	C
	Seal Beach Blvd. – I-605	0.84	D	0.63	C	0.84	D	0.63	C	0.85	E	0.78	D	0.87	E	0.75	D
SR-55	SR-22 – Chapman Ave.	0.79	D	1.12	F	0.79	D	1.12	F	0.81	D	1.87	F	0.79	D	1.38	F
I-605	I-405 – Katella Ave	0.63	C			0.64	C			0.67	C	0.73	D	0.70	D	0.75	D
SOUTHBOUND DIRECTION																	
I-405	I-605 – Seal Beach Blvd.	1.08	F	0.95	E	1.09	F	0.95	E	1.09	F	0.93	E	1.09	F	0.84	D
	Seal Beach Blvd. – SR-22/I-405	1.06	F	0.71	D	1.07	F	0.71	D	1.06	F	0.96	E	1.07	F	0.82	D
SR-55	Chapman Ave – SR-22	0.68	D	1.13	F	0.68	D	1.13	F	0.73	D	1.64	F	0.70	D	1.23	F
I-605	Katella Ave – I-405	0.70	D			0.72	D			0.65	C	0.61	C	0.65	C	0.57	C

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis* V/C calculations do not include auxiliary lane capacity in both directions between I-5 and Beach Boulevard, which would reduce LOS.

4.7.3 HOV Connector Impacts

Table 4.7-7 lists the traffic volumes on the proposed HOV direct connectors and the associated general-purpose connectors.

A. NO BUILD ALTERNATIVE

The No Build Alternative does not include any HOV connectors and is the baseline to which the other alternatives are compared.

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

The TSM/Expanded Bus Service Alternative does not include HOV connectors. The general-purpose connector volumes vary only slightly compared to the No Build Alternative.

C. FULL BUILD ALTERNATIVE

The three general-purpose connector pairs (I-405/I-605, SR-22/I-405 and SR-22/SR-55) would experience increased volumes with the construction of the HOV connectors. This would occur because the freeway mainline would be moving more smoothly and at a higher speed and it could thus deliver more vehicles to the freeway connectors.

The fourth general-purpose connector pair (I-5/SR-22) would experience a substantial decrease in forecasted demand. This would primarily be a result of including the Pacific Electric Arterial in the Full Build Alternative.. The Pacific Electric Arterial would provide drivers an alternative to using the eastbound SR-22 to southbound I-5 general-purpose connector. So a fairly high percentage of the trips would be diverted to the Pacific Electric Arterial. However, the analysis indicates that the reverse movement (northbound I-5 to westbound SR-22) would not experience the same level of trip diversion due to PE Arterial.

Of the four HOV connectors, the one connecting SR-22 and I-5 would carry the fewest vehicles in the peak hour. It would carry less than 800 vehicles in the peak hour and would suffer from “empty lane syndrome.” For that reason, this connector would be considered a less effective component of the Full Build Alternative than the other connectors would.

Table 4.7-7
FREEWAY CONNECTOR VOLUMES
AM AND PM PEAK HOUR

General-Purpose Connector	No Build		TSM/Expanded Bus Service		Full Build		Reduced Build	
	AM	PM	AM	PM	AM	PM	AM	PM
Southbound I-605 to Southbound I-405	2,320	2,600	2,520	2,790	2,410	2,800	2,410	2,830
Northbound I-405 to Northbound I-605	3,470	3,010	3,550	3,040	3,910	2,980	3,970	3,280
Southbound I-405 to Eastbound SR-22	4,190	6,510	4,170	6,470	4,460	6,660	4,250	6,520
Westbound SR-22 to Northbound I-405	6,540	5,160	6,500	5,180	7,020	5,580	6,700	5,470
Eastbound SR-22 to Southbound I-5	2,060	2,140	2,120	2,190	520	690	2,060	2,090
Northbound I-5 to Westbound SR-22	2,390	2,020	2,270	2,090	1,480	1,430	2,370	2,190
Eastbound SR-22 to Northbound SR-55	2,070	2,770	2,010	2,740	2,100	3,420	2,120	3,220
Southbound SR-55 to Westbound SR-22	2,120	1,880	1,890	1,840	2,070	2,000	2,200	2,110
HOV Connector					**AM**	**PM**	**AM**	**PM**
Southbound I-605 to Southbound I-405					760	910	720	850
Northbound I-405 to Northbound I-605					540	1,090	550	1,120
Southbound I-405 to Eastbound SR-22					660	1,580	530	1,150
Westbound SR-22 to Northbound I-405					920	970	710	850
Eastbound SR-22 to Southbound I-5					270	510		
Northbound I-5 to Westbound SR-22					200	210		
Eastbound SR-22 to Northbound SR-55					440	1,120		
Southbound SR-55 to Westbound SR-22					1,630	770		

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
Capacity of the I-405/I-605 connectors and the SR-22/I-405 connectors is assumed to be the same as the freeway mainline (2,300 vehicles per hour per lane) because of their higher-speed design. Capacity of the I-5/SR-22 and SR-22/SR-55 connectors is assumed to be less (2,000 vehicles per hour per lane) because of their geometry.

The HOV connector between SR-22 and SR-55 is forecasted to carry 1,630 vehicles southbound in the AM peak hour and 1,120 vehicles northbound in the PM peak hour. These volumes, combined with the forecasted volumes on the SR-55 mainline, HOV lane (2,000 southbound in the AM peak hour and 1,680 northbound in the PM peak hour), would exceed the single HOV lanes capacity on northbound and southbound SR-55 in 2020. Based solely on the traffic volumes, this HOV connector appears to be an effective Full Build Alternative component, but when coupled with the effect it would have on the SR-55 HOV operations, this connector's effectiveness decreases.

The other two HOV connectors (I-605/I-405, SR-22/I-405) would meet the 800 vehicles minimum criteria (in at least one peak hour) to avoid the empty lane syndrome perception, and would not exceed the 1,500 vehicles preferred maximum, when the connectors traffic flow could begin to break down. (The volume on the southbound I-405 to eastbound SR-22 HOV connector would actually exceed 1,500 in the PM peak hour, but by a margin small enough to be discounted.)

D. REDUCED BUILD ALTERNATIVE

The volumes on all four of the general-purpose connector pairs (I-605/I-405, SR-22/I-405, SR-22/I-5, SR-22/SR-55) would remain essentially the same as or increase slightly over the No Build Alternative if the Reduced Build Alternative is constructed. This would occur because the freeway mainline would be moving more smoothly and at a higher speed and it could thus deliver more vehicles to the freeway connectors.

Both HOV connectors included in the Reduced Build Alternative (I-605/I-405, SR-22/I-405) would meet the 800 vehicles minimum criteria (in at least one peak hour) to avoid the empty lane syndrome perception, and would not exceed the 1,500 vehicles preferred maximum, at which point the connectors traffic flow could begin to break down.

4.7.4 Arterial Impacts

The study area arterials would also be affected by the proposed alternatives, as can be seen in Table 4.7-8. Table 4.7-8 presents the study area arterials and connectors' average daily traffic and levels of service, by alternative.

A. NO BUILD ALTERNATIVE

As can be seen in Table 4.7-8, the arterials' LOS range from LOS B on Westminster Boulevard/17th Street to LOS F on Fairview Street. The ADTs range from 12,000 (Fifth Street) to 60,000 (Harbor Boulevard).

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

The TSM/Expanded Bus Service Alternative shows a mixed result in ADT volume changes on east/west and north/south arterials. These volume changes are attributable to the components that would address these main cross-county streets. These components include signal synchronization, changeable message signs, and closed-circuit surveillance. The TSM/Expanded Bus Service Alternative would have only a negligible impact on the SR-22/I-5 general-purpose connectors forecasted demand.

C. FULL BUILD ALTERNATIVE

The Full Build Alternative includes all the TSM/Expanded Bus Service Alternative elements and serves additional traffic to and from the proposed Pacific Electric Arterial. The Pacific Electric Arterial would provide direct free-flow access into downtown Santa Ana. It would serve forecasted traffic demand of nearly 40,000 vehicles, with peak-hour traffic volumes ranging from 1,400 to 1,800 vehicles in each direction. The Full Build Alternative would accommodate this additional traffic demand, without SR-22 operations deteriorating, primarily resulting from the additional mixed-flow capacity that would become available from the mode shift to HOV lanes.

Table 4.7-8
ARTERIAL AND FREEWAY CONNECTOR LEVEL OF SERVICE (LOS)
YEAR 2020

		No Build		TSM/ Expanded Bus Service		Full Build		Reduced Build	
Arterial		**ADT***	**LOS****	**ADT**	**LOS****	**ADT***	**LOS****	**ADT***	**LOS****
Newhope Street at Westminster Boulevard		29,100	C	30,000	C	28,500	C	31,600	D
Harbor Boulevard at Westminster Boulevard		60,000	C	57,100	C	56,600	C	62,200	D
Fairview Street at Westminster Boulevard		45,800	F	49,200	F	44,700	F	47,900	F
Westminster Boulevard/17th Street at Fairview Avenue		38,700	B	45,000	C	41,700	C	44,600	C
Fifth Street at Fairview Avenue		12,000	E	11,300	D	10,700	D	11,500	E
First Street at Fairview Avenue		44,100	C	43,000	C	34,800	B	41,800	C
Connector		**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Eastbound SR-22 to southbound I-5	PHV***	2,060	2,140	2,120	2,190	520	690	2,060	2,090
	LOS	D	D	D	D	A	A	D	D
Northbound I-5 to westbound SR-22	PHV***	2,390	2,020	2,270	2,090	1,480	1,430	2,370	2,190
	LOS	F	F	F	F	E	E	F	F

* ADT forecasts were derived from adjusted estimates of daily traffic demand provided by OCTA, December 1999
** LOS presented above are for the PM peak hour.
*** PHV = Peak Hour Volume. LOS was estimated using a capacity of 1500 vphpl for the connectors.

The study area arterials would show some change from implementing the Pacific Electric Arterial. ADT volumes on five of the six arterials evaluated would drop by 600 to 9,300 vehicles; only Westminster Boulevard/17th Street is forecast to have an ADT increase. LOS on five of the six arterials would improve or remain unchanged from the No Build condition.

The vehicles using the Pacific Electric Arterial (39,900 per day) would include new trips, but a greater majority would be trips that were formerly on the freeway. This is evident from the forecasted demand change on the eastbound SR-22 to southbound I-5 general-purpose connector. The AM and PM peak-hour volumes would decrease by approximately 1,500 vehicles, suggesting that those vehicles would be using a different route, namely the Pacific Electric Arterial. (See Section 4.7.3 C, HOV Connector Impacts, Full Build Alternative, for additional discussion of the forecasted changes in demand on this connector.) However, the eastbound SR-22 to southbound I-5 connector is forecasted to operate below capacity in the No Build scenario without constructing the Pacific Electric Arterial, so reducing the demand on it would not improve mobility on the connector.

D. REDUCED BUILD ALTERNATIVE

The Reduced Build Alternative shows an ADT volume increase on north/south arterials and a volume reduction on two of three east/west arterials. The ADT volume increase in north-south arterials can mainly be attributed to the increased number of commuters using these streets to access the freeway in order to use the additional capacity created by the HOV lanes. In the Full Build Al-

ternative, PE Arterial is anticipated to carry this additional demand; therefore, other arterial streets may not experience increased traffic flows.

The Reduced Build Alternative would have only a negligible impact on the SR-22/I-5 general-purpose connectors forecasted demand because the Pacific Electric Arterial and associated connectors (which result in a noticeable difference on those connectors between the Full Build Alternative and the No Build Alternative) are not part of the Reduced Build Alternative.

4.7.5 Intersection Impacts

Table 4.7-9 summarizes the intersection volume to capacity (V/C) ratio and LOS values for the study alternatives.

A. NO BUILD ALTERNATIVE

Of the 37 intersections studied, 16, or approximately 43 percent, are projected to operate below LOS E thresholds in the PM peak period (i.e., LOS F conditions). The most congested intersections (V/C over 1.2) would be as follows:

- I-605/Katella Avenue northbound on-/off-ramps
- SR-22/Haster Street westbound on-ramp
- SR-22/Fairview Street eastbound on-ramp
- SR-22/Bristol Street eastbound on-/off-ramps
- SR-22/Main Street/Town and Country Road eastbound on-/off-ramps
- SR-22/Glassel Street westbound on-/off-ramps
- SR-22/Tustin Street eastbound off-ramp

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

Under the TSM/Expanded Bus Service Alternative, the same 16 intersections would operate at LOS F conditions. However, almost two-thirds of the V/C ratio values are the same as or slightly lower than the No Build Alternative, ranging between 0.51 and 1.36. Although the 16 intersections would operate at LOS F, they still would not exceed the CMP threshold criteria, as identified in Section 4.7.2 of this report.

C. FULL BUILD ALTERNATIVE

Under the Full Build Alternative, of the 37 intersections, only ten would operate at LOS F conditions (27 percent). The V/C ratios would range between 0.48 and 1.34. Of the ten LOS F intersections, three would exceed CMP impact thresholds because: 1) they would deteriorate to LOS F compared to LOS E under the No Build Alternative, or 2) the intersection was already operating at LOS F and the V/C ratio would increase by more than 0.10. These intersections include:

- Goldenwest Street/Garden Grove Boulevard westbound off-ramp
- Beach Boulevard westbound off-ramp
- Haster Street westbound off-ramp

These intersections would require mitigation (see Section 4.7.6). The deterioration of LOS at the Beach Boulevard westbound off-ramp would result from geometric changes proposed for the ramps as part of the Full Build Alternative to replace the outdated four-quadrant cloverleaf interchange. Additionally, 27 of the intersections would experience some operational improvements under the Full Build Alternative. This is most likely a result of the improved freeway LOS and speed, encouraging drivers to stay on the freeway rather than exiting early and using the surface street network for part of their trip.

Operations at the two intersections at which new Pacific Electric Arterial connections would be constructed would not experience a negative impact. The Fairview Street and Civic Center Drive

intersection would improve from LOS F to LOS E in the PM as a result of adding the ramps to the Pacific Electric Arterial.

D. REDUCED BUILD ALTERNATIVE

Under the Reduced Build Alternative, of the 37 intersections, only eight would operate at LOS F conditions (22 percent). The V/C ratios would range between 0.49 and 1.33. The Reduced Build Alternative would result in improvement of LOS at 16 intersections while deterioration would occur at 7 intersections. The deterioration of LOS at the Beach Boulevard westbound off-ramp would result from geometric changes proposed for the ramps as part of the Reduced Build Alternative to replace the outdated four-quadrant cloverleaf interchange. Of the eight LOS F intersections, one would exceed CMP impact thresholds because it would deteriorate to LOS F in the AM peak period compared to LOS E under the No Build Alternative. This would occur at the Goldenwest Street/Garden Grove Boulevard westbound off-ramp intersection. This intersection would require mitigation (see Section 4.7.6). Additionally, 24 of the intersections would experience some operational improvements. This is most likely a result of the improved freeway LOS and speed, encouraging drivers to stay on the freeway rather than exiting early and using the surface street network for part of their trip.

Table 4.7-9
INTERSECTION V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PEAK HOURS

Study Intersection	No Build Alternative				TSM/Expanded Bus Service Alternative				Full Build Alternative				Reduced Build Alternative			
	V/C		LOS		V/C		LOS		V/C		LOS		V/C		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-605/Katella Ave. northbound ramps	1.25	1.34	**F**	**F**	1.25	1.34	**F**	**F**	1.19	1.34	**F**	**F**	1.17	1.29	**F**	**F**
I-605/Katella Ave. southbound ramps	0.86	1.11	D	**F**	0.86	1.11	D	**F**	0.81	0.99	D	E	0.81	0.93	D	E
I-405/Seal Beach northbound ramp	0.60	0.68	A	B	0.58	0.68	A	B	0.57	0.65	A	B	0.55	0.64	A	B
I-405/Seal Beach southbound ramps	0.75	0.75	C	C	0.75	0.73	C	C	0.78	0.72	C	C	0.77	0.74	C	C
SR-22/Valley View St. westbound ramps	0.96	1.10	E	**F**	0.95	1.09	E	**F**	0.88	1.12	D	**F**	0.96	1.11	D	**F**
SR-22/Valley View St. eastbound ramps	0.75	0.83	C	D	0.77	0.86	C	D	0.74	0.76	C	C	0.74	0.75	C	C
SR-22/Knott St. westbound ramps	0.73	0.95	C	E	0.73	0.96	C	E	0.83	0.97	D	E	0.75	0.95	C	E
SR-22/Goldenwest St. eastbound ramps	0.64	0.82	B	D	0.68	0.83	B	D	0.68	0.84	B	D	0.68	0.83	B	D
SR-22/Goldenwest St. westbound ramps	0.96	0.89	E	D	0.95	0.95	E	E	1.06	0.99	**F**	E	1.09	0.98	**F**	E
SR-22/Beach Blvd. westbound ramps	0.53	0.65	A	B	0.52	0.61	A	B	1.02	0.97	**F**	E	0.99	0.93	E	E
SR-22/Beach Blvd. eastbound ramps	0.57	0.61	A	B	0.56	0.57	A	A	0.76	0.73	C	C	0.75	0.77	C	C
SR-22/Magnolia St. eastbound ramps	0.97	1.03	E	**F**	0.85	0.95	D	E	0.84	0.90	D	D	0.84	0.90	D	D
SR-22/Magnolia St. westbound ramps	0.59	0.81	A	D	0.68	0.95	B	E	0.68	0.95	B	E	0.67	0.99	B	E
SR-22/Brookhurst St. westbound ramps	0.82	0.91	D	E	0.95	0.96	E	E	0.91	0.97	E	E	0.84	0.93	D	E
SR-22/Brookhurst St. eastbound ramps	0.77	0.93	C	E	0.79	1.00	C	E	0.56	0.96	A	E	0.60	0.98	B	E
SR-22/Euclid St. eastbound ramps	0.68	0.98	B	E	0.67	0.97	B	E	0.60	0.97	B	E	0.67	0.95	B	E
SR-22/Euclid St. westbound ramps	1.11	1.17	**F**	**F**	1.19	1.16	**F**	**F**	1.01	1.12	**F**	**F**	1.09	1.14	**F**	**F**
SR-22/Harbor Blvd. westbound ramps	0.75	0.89	C	D	0.74	0.89	C	D	0.80	0.99	C	E	0.79	0.96	C	E
SR-22/Harbor Blvd. eastbound ramps	0.52	0.65	A	B	0.56	0.71	A	C	0.54	0.64	A	B	0.54	0.70	A	B
SR-22/Haster St. westbound off-ramp	0.82	0.94	D	E	0.80	0.91	C	E	0.79	1.06	C	**F**	0.77	0.84	C	D

Table 4.7-9 (continued)
INTERSECTION V/C RATIO AND LEVEL OF SERVICE
YEAR 2020 PEAK HOURS

Study Intersection	No Build Alternative				TSM/Expanded Bus Service				Full Build Alternative				Reduced Build Alternative			
	V/C		LOS		V/C		LOS		V/C		LOS		V/C		LOS	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
SR-22/Haster St. westbound on-ramp	0.84	1.28	D	**F**	0.93	1.18	E	**F**	0.86	1.10	D	**F**	0.87	0.95	D	E
SR-22/Fairview St. eastbound on-ramp	1.32	1.21	**F**	**F**	1.32	1.27	**F**	**F**	1.34	1.19	**F**	**F**	1.33	1.23	**F**	**F**
SR-22/Fairview St. eastbound off-ramp	0.81	0.71	D	C	0.76	0.71	C	C	0.78	0.71	C	C	0.79	0.74	C	C
SR-22/The City Dr. westbound ramps	1.04	1.16	**F**	**F**	1.06	0.99	**F**	E	0.64	0.72	B	C	0.62	0.86	B	D
SR-22/The City Dr. eastbound on-/off-ramps	1.05	0.92	**F**	E	1.11	0.79	**F**	C	1.03	0.99	**F**	E	1.03	0.90	**F**	D
SR-22/Bristol St. eastbound ramps	1.29	1.39	**F**	**F**	1.27	1.34	**F**	**F**	1.04	0.90	**F**	D	0.99	0.93	E	E
SR-22/La Veta Ave. westbound ramps	0.75	0.88	C	D	0.71	0.94	C	E	0.63	1.00	B	E	0.76	0.95	C	E
SR-22/Main St. westbound ramps	0.78	1.14	C	**F**	0.81	1.08	D	**F**	0.74	0.87	C	D	0.73	0.78	C	C
SR-22/Main St. eastbound ramps	1.37	0.93	**F**	E	1.32	0.92	**F**	E	0.77	0.92	C	E	0.77	0.93	C	E
SR-22/Glassel St. westbound ramps	1.07	1.29	**F**	**F**	1.08	1.34	**F**	**F**	0.78	0.98	C	E	0.74	1.00	C	E
SR-22/Glassel St. eastbound ramps	0.80	1.07	C	**F**	0.82	1.07	D	**F**	0.76	0.97	C	E	0.78	0.99	C	E
SR-22/Tustin St. westbound ramps	0.89	0.78	D	C	0.82	0.76	D	C	0.88	0.79	D	C	0.86	0.80	D	C
SR-22/Tustin St. eastbound ramps	0.84	1.39	D	**F**	0.81	1.36	D	**F**	0.81	1.00	D	E	0.80	1.22	C	**F**
SR-55/Chapman Ave. southbound ramps	0.68	0.65	B	B	0.74	0.68	C	B	0.69	0.65	B	B	0.67	0.66	B	B
SR-55/Chapman Ave. northbound ramps	0.50	0.65	A	B	0.51	0.65	A	B	0.48	0.65	A	B	0.49	0.72	A	C
Fairview St./Civic Center Dr.*	0.90	1.04	D	**F**	0.90	1.04	D	**F**	0.83	0.97	D	E	0.89	1.01	D	**F**
Raitt St./Santa Ana Blvd.*	0.59	0.65	A	B	0.59	0.65	A	B	0.68	0.76	B	C	0.64	0.69	B	B

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
Shaded intersections require mitigation. See Section 4.7.6 - D.
*Surface-street intersection; includes Pacific Electric Arterial in Full Build Alternative only.

Thresholds of Significance for CEQA:

- Insufficient capacity on SR-55 HOV facility for incoming SR-22 HOV traffic

A. NO BUILD ALTERNATIVE

The No Build Alternative would not have impacts on the SR-55 HOV facility due to a lack of capacity for incoming SR-22 HOV traffic.

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

The TSM/Expanded Bus Service Alternative would not include any major capital improvements to SR-22, therefore, it would have negligible on the SR-55 HOV facility due to a lack of capacity for incoming SR-22 HOV traffic.

C. FULL BUILD ALTERNATIVE

Of the four proposed HOV connectors, only one, the SR-22/SR-55 connector, would result in a negative impact to the highway network. Implementation of this connector is projected to increase the demand on SR-55 north of SR-22 to a level that would far exceed the capacity of a single HOV lane. This impact would remain significant unless mitigated. To mitigate impacts to the SR-22/SR-55 HOV connector, it may be necessary to include an additional SR-55 HOV lane in each direction north of SR-22 for some distance until the forecasted demand drops below the single HOV lane capacity. However, this is beyond the scope of the SR-22/West Orange County Connection project and will have to be investigated if the Full Build Alternative is the preferred one. Alternatively, the SR-22/SR-55 HOV connector could be eliminated, but this is inconsistent with the Full Build Alternative.

D. REDUCED BUILD ALTERNATIVE

The Reduced Build Alternative has elements that are eliminated from the Full Build Alternative to reduce impacts such as environmental. Among the environmental impacts are the SR-22/SR-55 HOV connector. As mentioned above, implementation of this connector is projected to increase the demand on SR-55 north of SR-22 to a level that would far exceed the capacity of a single HOV lane. Since this alternative does not include the SR-22/SR-55 HOV connector, it would not have an impact on the SR-55 HOV facility resulting from incoming SR-22 HOV traffic.
Since this alternative does not include the SR-22/SR-55 HOV connector, it would not have an impact on the SR-55 HOV facility resulting from incoming SR-22 HOV traffic.

4.7.6 Mitigation

Several intersections and freeway mainline segments under any study alternatives would operate below threshold criteria (below LOS E for freeway mainline segments and intersections). However, for all threshold exceedances that would exist under the baseline conditions (No Build Alternative), others would need to prepare a separate mitigation because these threshold exceedances would not be caused by this project's proposed improvement strategies. The TSM/Expanded Bus Service, Full Build, or Reduced Build Alternative's projected threshold exceedances, beyond those predicted to occur with the No Build scenario, were evaluated. Alternative modifications have been identified to eliminate potential threshold criteria exceedances.

A. NO BUILD ALTERNATIVE

None planned.

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

None planned.

C. FULL BUILD ALTERNATIVE

To mitigate impacts to the SR-22/SR-55 HOV connector it would be necessary to include an additional SR-55 HOV lane in each direction north of SR-22 for some distance until the forecasted demand drops below the single HOV lane capacity. This is beyond the scope of the SR-22/West Orange County Connection. Alternatively, the SR-22/SR-55 HOV connector could be eliminated, but this is inconsistent with the Full Build Alternative.

TRA-FB-1. Three intersections under the Full Build Alternative would exceed CMP threshold criteria. Additional lanes will be required at these intersections, as shown on Figure 4.7-2. These ramp intersection modifications have been incorporated into the Full Build Alternative.

D. REDUCED BUILD ALTERNATIVE

TRA-RB-1. One intersection under the Reduced Build Alternative would exceed CMP threshold criteria. Additional lanes will be required at this intersection, as shown on Figure 4.7-3. This ramp intersection modification has been incorporated into the Reduced Build Alternative.

As indicated in Table 4.7-6, increases in V/C ratios in the northbound and southbound HOV lanes of SR-55 would exceed the CMP threshold criteria. Providing a second HOV lane in either direction is not recommended as an immediate mitigation measure, considering the recent widening of SR-55 and the structure replacement/modification costs. Therefore, it is recommended to provide ingress/egress points for vehicles from SR-22 at suitable distances from the interchange where the HOV volumes are lower and the CMP threshold criteria will not be violated.

4.7.7 Residual Impacts After Mitigation

This section discussed the residual impacts after implementing proposed mitigation. The only mitigation discussed in the intersection mitigation because the other mitigation components included alternative modifications that resulted in reducing the impacts to below threshold levels.

A. NO BUILD ALTERNATIVE

None.

B. TSM/EXPANDED BUS SERVICE ALTERNATIVE

None.

C. FULL BUILD ALTERNATIVE

Because there is no feasible mitigation for the excess HOV traffic on SR-55 north and south of SR-22, there would be a residual and substantial traffic impact under the Full Build Alternative.

Table 4.7-10 presents the Full Build Alternative intersection V/C ratios with and without mitigation. As can be seen, implementing the proposed mitigation would improve the V/C ratios below threshold conditions. Specifically, in the No Build Alternative all three intersections would operate with a V/C ratio less than one. In the unmitigated Full Build Alternative, each intersection would operate with a V/C ratio greater than one. Increasing the V/C ratio from less than one to more than one would exceed one of the two CMP

Figure 4.7-2
Full Build Alternative Mitigation Intersection

Figure 4.7-3
Reduced Build Alternative Mitigation Intersection

threshold criteria and, hence, would require mitigation. In the mitigated Full Build Alternative, each intersection would again operate with a V/C ratio **less** than one, which would meet the mitigation requirement. Residual impacts to intersections would be less than substantial because the proposed additional lanes on the ramps would be constructed within the existing state right-of-way and within the area that would be affected by construction without the proposed mitigation. As such, the proposed traffic mitigation would not impact any known sensitive or protected resources beyond those indirect impacts already described in other sections of this report. Further, the air quality analysis was performed for both the unmitigated and mitigated conditions to assess the impact of the traffic mitigation on air quality. See Section 4.8.3 for more discussion.

Table 4.7-10
MITIGATED V/C RATIO
YEAR 2020 PEAK HOUR

Study Intersection	No Build Alternative V/C Ratio*		Full Build Alternative V/C Ratio		Mitigated Full Build Alternative V/C Ratio		Reduced Build Alternative V/C Ratio		Mitigated Reduced Build Alternative V/C Ratio	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
SR-22/Goldenwest Street westbound ramps	0.96	0.89	1.06	0.99	0.80	0.76	1.09	0.98	0.82	0.76
SR-22/Beach Boulevard westbound ramps	0.53	0.65	1.02	0.97	0.92	0.87	N/A	N/A	N/A	N/A
SR-22/Haster Street westbound off-ramp	0.82	0.94	0.79	1.06	0.69	0.90	N/A	N/A	N/A	N/A

Source: OCTAM 2.8 – SR-22 MIS/EIR/EIS Analysis
* No Build Alternative values included for comparison purposes

D. REDUCED BUILD ALTERNATIVE

Table 4.7-10 presents the Reduced Build Alternative intersection V/C ratios with and without mitigation. As can be seen, implementing the proposed mitigation would improve the V/C ratios below threshold conditions. Specifically, in the No Build Alternative the intersection would operate with a V/C ratio less than one. In the unmitigated Reduced Build Alternative, the intersection would operate with a V/C ratio greater than one. Increasing the V/C ratio from less than one to more than one would exceed one of the two CMP threshold criteria and, hence, would require mitigation. In the mitigated Reduced Build Alternative, the intersection would again operate with a V/C ratio **less** than one, which would meet the mitigation requirement. Residual impacts to intersections would be less than substantial because the proposed additional lanes on the ramps would be constructed within the existing state right-of-way and within the area that would be affected by construction without the proposed mitigation. As such, the proposed traffic mitigation would not impact any known sensitive or protected resources beyond those indirect impacts already described in other sections of this report. Further, the air quality analysis was performed for both the unmitigated and mitigated conditions to assess the impact of the traffic mitigation on Air Quality. See Section 4.8.3 for more discussion.

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