2.1.4 Traffic & Transportation/Pedestrian and Bicycle Facilities

2.1.4.1 Regulatory Setting

FHWA directs that full consideration should be given to the safe accommodation of pedestrians and bicyclists during the development of federal-aid highway projects (23 CFR 652). It further directs that the special needs of the elderly and 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.

The Department and FHWA are committed to carrying out the 1990 Americans with Disabilities Act by building transportation facilities that provide equal access for all persons. The same degree of convenience, accessibility, and safety available to the general public will be provided to persons with disabilities.

"DESTINATION 2030" is the 2004 Regional Transportation Plan (RTP) for the six-county southern California region, including Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial counties. The Southern California Association of Governments (SCAG), as the designated Metropolitan Planning Organization for the region, is required to develop, maintain, and update the RTP on a 3-year cycle. The 2007 RTP is scheduled for adoption by the Regional Council in December 2007.

The 2004 RTP provides the basic policy and program framework for long-term investment of the region's regional transportation system in a coordinated, cooperative, and continuous manner. SCAG approved and adopted the 2004 RTP in April 2004. Since that time, two amendments to the 2004 RTP have been adopted.

Transportation investments in the SCAG region that receive state or federal transportation funds must be consistent with the RTP, and they must be included in the Regional Transportation Improvement Program (RTIP) when ready for funding. The adopted goals of the 2004 RTP are to:

1. Maximize mobility and accessibility for all people and goods in the region
2. Ensure travel safety and reliability for all people and goods in the region
3. Preserve and ensure a sustainable regional transportation system
4. Maximize the productivity of our transportation system
5. Protect the environment, improve air quality, and promote energy efficiency
6. Encourage land-use and growth patterns that complement our transportation investments

Every even-numbered year, SCAG prepares an RTIP. This document is the short-term implementation tool for the transportation goals described in the adopted RTP. The RTIP provides a listing of projects proposed for implementation in the region during the 6-year period covered by the document. The RTIP projects are described in detail, with funding amounts allocated by source and fiscal year. RTIP projects are categorized according to the transportation system to which they apply: State Highways, Local Highways, or Transit.

2.1.4.2 Affected Environment

The existing roadway configuration and traffic characteristics of the I-5/Ortega Highway interchange are described in Chapter 1 of this EIR/EA. A complete discussion of the traffic analysis and forecasting methodology is available in the Traffic Impact Study for the I-5/Ortega Highway Interchange Improvement Project (Austin-Foust, 2007a), the I-5/Ortega Highway Interchange Supplemental Traffic Analysis (Austin-Foust, 2007b) and the Project Study Report (Parsons, 2005).

A Traffic Operations

Traffic Study Methodology. The traffic analysis carried out for the project used current year (2006) and projected future year (2030) peak-hour traffic data for intersections and interchange ramps to determine traffic operational performance for the various project alternatives. The traffic study analysis area includes the two I-5/Ortega Highway ramp intersections and the intersection of Del Obispo Street/Ortega Highway immediately to the west of the interchange. Several analysis tools were used to provide a realistic understanding of how current and future projected traffic operates along the arterial streets in the project study area. Table 2.1.4-1 lists the performance criteria used to evaluate existing and future traffic conditions for this analysis.

Figure 2.1.4-1 provides a typical traffic level of service (LOS) rating chart for signalized intersections. LOS A represents ideal operating conditions with free-flowing traffic and no delays, while LOS F represents a condition where the volume of vehicles exceeds the capacity of the roadway, resulting in substantial delays.

As summarized in Table 2.1.4-1, traffic LOS performance standards were defined for each set of criteria used for the project's traffic study. For intersections in the project area, LOS D was used as the minimum performance standard. For the I-5 freeway ramps, LOS E was used as the minimum performance standard. For intersection performance, intersection capacity utilization (ICU) values were calculated, consistent with procedures used by the City. Also, for consistency with Department procedures, intersection performance was analyzed using the Highway Capacity Manual (HCM) stopped delay methodology. In this case, SYNCHRO 6.0 was used to derive the delay values at the intersections.

The I-5 freeway ramp performance criteria shown in Table 2.1.4-1 are representative volume-to-capacity (V/C) ratios used for long-range planning purposes in south Orange County. They do not account for intersection deficiencies, which may limit the amount of traffic exiting or entering the ramp. When such deficiencies occur, the ramp V/C measure is not applicable and ramp performance is more realistically represented by the intersection performance. Accordingly, ramp V/C measures are only presented in this analysis when intersection performance is adequate, and ramp performance is thereby determined by the exiting or entering lane configurations of the ramp.

For an overall measure of how the arterial system in the project area performs, the SIM TRAFFIC feature of SYNCHRO was used. Network performance measures of effectiveness (MOEs) from SIM TRAFFIC include peak-hour travel time, travel time in

minutes per vehicles, and average travel speed. The MOEs provide an estimate of the actual travel times that would be experienced while driving through the interchange area at individual intersections. The SIM TRAFFIC Queuing and Blocking report calculates queue build up, which enables queue length to be compared to actual storage length.

Table 2.1.4-1
Traffic Performance Criteria for the I-5/Ortega Highway Interchange Improvement Project

ARTERIAL INTERSECTIONS

Volume to Capacity Ratio (V/C) Calculation Methodology

Based on peak-hour intersection capacity utilization (ICU) values calculated using the following assumptions:

- Saturation Flow Rate: 1,700 vehicles per hour per lane
- Clearance Interval: .05

Stopped Delay Calculation Methodology

Highway Capacity Manual (HCM) methodology using SYNCHRO 6.0.

Performance Standard

Level of Service (LOS) D (peak-hour ICU less than or equal to 0.90 and stopped delay less than or equal to 55 seconds).

FREEWAY RAMPS

V/C Calculation Methodology

Based on peak-hour V/C calculated using the following ramp capacities:

- A maximum capacity of 1,500 vehicles per hour (vph) for a one-lane on-ramp.
- A maximum capacity of 2,250 (50 percent greater than 1,500) vph for a two-lane on-ramp that tapers to one merge lane at or beyond the freeway mainline gore.
- A maximum capacity of 1,660 vph for a one-lane off-ramp.
- A maximum capacity of 2,900 (75 percent greater than 1,660) vph for a two-lane off-ramp with only one auxiliary lane.

Performance Standard

LOS E (peak-hour V/C less than or equal to 1.00)

MEASURES OF EFFECTIVENESS

The following measures are derived for all vehicles using any portion of the three intersections in the interchange area:

- Total Peak-Hour Travel Time in Hours
- Average Travel Time per Vehicle in Minutes
- Average Speed

Source: Austin-Foust Associates, Inc., 2007a

Existing Traffic Performance. Currently (year 2006 data), 99,000 vehicles per day (vpd) travel through the I-5/Ortega Highway interchange (Austin Foust, 2007a). Table 2.1.4-2 shows the existing (year 2006) peak-hour performance of the I-5/Ortega Highway interchange. As noted in the footnote to the table, current operational deficiencies within the interchange area prevent the theoretical calculated LOS values noted in the table from actually being achieved. Although the calculated theoretical LOS values listed in the table range from LOS A through LOS E, the actual delays currently experienced in the project study area are equivalent to LOS F conditions due to traffic operational problems resulting from closely spaced intersections (i.e., traffic queue blockage between intersections). Such operational deficiencies are apparent from the existing traffic queue

lengths, which exceed the available vehicle storage space for various turning movements within the interchange area. With these operational deficiencies, V/C ratios for the I-5 freeway ramps were not calculated, since they would not give an accurate representation of actual ramp performance conditions currently experienced within the interchange area.

Table 2.1.4-2
Peak-Hour Traffic Performance – Existing Conditions (Year 2006)

I. INTERSECTION PERFORMANCE

Intersection	ICU				HCM Delay (secs)			
	AM	LOS	PM	LOS	AM	LOS	PM	LOS
Del Obispo & Ortega	0.54	A	0.57	A*	13.8	B*	11.2	B*
I-5 SB Ramps & Ortega	0.79	C*	0.87	D*	44.2	D*	71.3	E*
I-5 NB Ramps & Ortega	0.86	D*	0.74	C*	69.5	E*	16.2	B*

II. CRITICAL QUEUING DISTANCES

Intersection	Movement	AM/PM	Traffic Queue Length (feet)	Available Storage Length (feet)
Del Obispo & Ortega	EBT/R**	PM	519**	425
I-5 SB Ramp & Ortega	EBT**	AM	384**	310
	EBT**	PM	418**	310
	WBT**	PM	545**	325
I-5 NB Ramp & Ortega	WBT**	AM	1,282**	900

Notes:

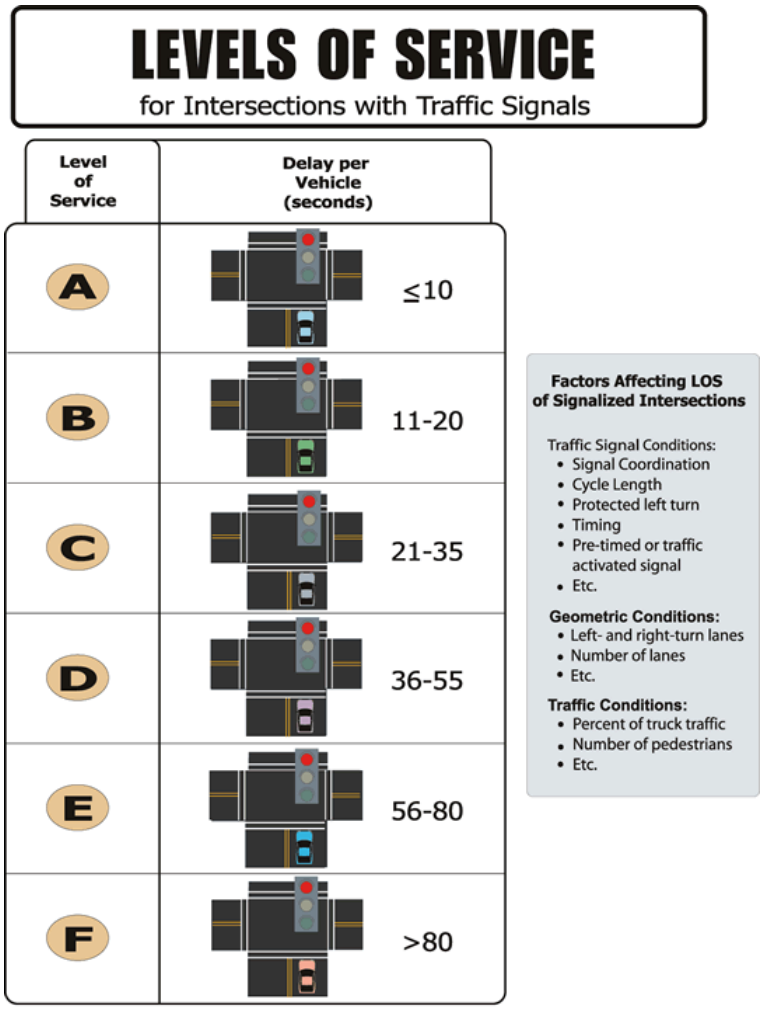
* Operational problems due to closely spaced intersections prevent these theoretical LOS conditions from being achieved. **The actual delays currently experienced are equivalent to LOS F due to traffic queue blockage between intersections.**

** For the movements listed here, traffic queue length exceeds available storage length, causing blockage to upstream intersections.

EBT – eastbound through
EBT/R – eastbound through/right
HCM – Highway Capacity Manual
ICU – Intersection Capacity Utilization
LOS – level of service
NB – northbound
SB – southbound
WBT – westbound through

Source: Austin-Foust Associates, Inc., 2007a

Ortega Highway at the I-5 interchange has been identified by the Department and the Orange County Transportation Authority (OCTA) as part of Orange County's Choke Point Program, which is a cooperative effort between OCTA and Caltrans to eliminate more then forty freeway traffic congestion chokepoints in Orange County. Under the Choke Point Program, a chokepoint is defined as a "bottleneck" or location where lack of



Source: 2000 HCM, Exhibit 16-2, Level of Service Criteria for Signalized Intersections

Figure 2.1.4-1
LOS for Intersections with Traffic Signals

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adequate traffic volume capacity and operational deficiencies result in increased traffic congestion. The existing I-5/Ortega Highway interchange experiences congestion during the morning and afternoon peak periods and has traffic operational deficiencies including inadequate traffic queue lengths which exceed available vehicle storage space at traffic signal approaches, causing blockage to upstream intersections. The existing traffic congestion levels and operational deficiencies result in unacceptable LOS conditions.

B Accident Rates

The Department's Traffic Accident Surveillance and Analysis System (TASAS) Tables B and C accident data were analyzed for the following project segments for a 36-month period commencing April 1, 2000:

- I-5 between kilometer post (KP) 14.484 (post mile [PM] 9.000) and KP 16.413 (PM 10.199)
- Ortega Highway (SR-74) between KP 0.000 (PM 0.000) and KP 0.204 (PM 0.127)
- I-5 Southbound on-ramp from Ortega Highway (Line OH-1), KP 15.172 (PM 9.428)
- I-5 Southbound off-ramp to Ortega Highway (Line OH-2), KP 15.646 (PM 9.722)
- I-5 Northbound on-ramp from Ortega Highway (Line OH-3), KP 15.681 (PM 9.744)
- I-5 Northbound off-ramp to Ortega Highway (Line OH-4), KP 15.206 (PM 9.449)

I-5 Freeway Mainline. As shown in Table 2.1.4-3, on the I-5 mainline, there were 54 accidents in the northbound direction and 112 accidents in the southbound direction recorded, with 40 injury accidents and three fatality accidents. Most of the accidents were sideswipes, rear-ends, and hit objects corresponding to approximately 23 percent, 40 percent, and 27 percent of the total accidents, respectively. The total accident rate was 0.36 accidents per million vehicle miles (a/mvm) in the I-5 northbound direction and 0.75 a/mvm in the I-5 southbound direction, compared to the statewide average accident rate of 0.99 a/mvm for similar facilities. With the exception of fatalities, actual accident rates in both directions on I-5 near the project are lower than the statewide average accident rate for similar facilities.

Table 2.1.4-3
Accident Rates for I-5 Freeway Mainline

	Number of Accidents			Person		Accident Rate (mvm)					
						Actual Rate			Average Rate		
Segment	FAT	F+I	Total	Kill	Injured	FAT	F+I	Total	FAT	F+I	Total
Northbound	1	12	54	3	20	0.007	0.08	0.36	0.005	0.30	0.99
Southbound	2	31	112	2	39	0.013	0.21	0.75	0.005	0.30	0.99

FAT – Fatalities
F+I – Fatalities plus injuries

Source: Austin-Foust Associates, Inc., 2007a

I-5 Freeway Ramps. Table 2.1.4-4 lists the total accident rate for vehicles crossing the I-5 ramps in the project area, compared to the statewide average accident rate for similar facilities (i.e., diamond ramps). There were 52 accidents recorded on the I-5 northbound and southbound ramps, with 16 injury accidents and no fatality accidents. Most of the accidents were sideswipes, rear-ends, broadsides, and hit objects. As shown in Table 2.1.4-4, actual accident rates for the four I-5 ramps are lower than the statewide average accident rate, with the exception of the southbound off-ramp (Ramp OH-2). The actual total accident rate for the I-5 southbound off-ramp is 1.97 accidents per million vehicles (a/mv) compared to the statewide average accident rate of 1.50 a/mv for similar facilities. It should be noted that most of the total accidents (41 out of 52, or 79 percent) were recorded along the I-5 southbound off-ramp.

Table 2.1.4-4
Accident Rates for I-5 Interchange Ramps

	Number of Accidents			Person		Accident Rate (mv)					
						Actual Rate			Average Rate		
Ramp	**FAT**	**F+I**	**Total**	**Kill**	**Injured**	**FAT**	**F+I**	**Total**	**FAT**	**F+I**	**Total**
SB On-ramp (OH-1)	0	2	4	0	2	0.0	0.21	0.42	0.002	0.32	0.80
NB Off-ramp (OH-4)	0	2	6	0	3	0.0	0.17	0.50	0.006	0.35	0.90
SB Off-ramp (OH-2)	0	11	41	0	24	0.0	0.53	1.97	0.005	0.61	1.50
NB On-ramp (OH-3)	0	1	1	0	1	0.0	0.05	0.05	0.003	0.17	0.45

Source: Austin-Foust Associates, Inc., 2007a

Table 2.1.4-5 shows a comparison of the total number of accidents recorded along the four I-5 ramps versus the ramp accident location. As noted in Table 2.1.4-5, most of the accidents recorded along the freeway ramps occurred at the ramp terminus and the local intersecting street. This condition is most evident along the I-5 southbound off-ramp, where most of the accidents were recorded. Approximately 88 percent of the 41 accidents recorded along the I-5 southbound off-ramp occurred at the ramp terminus (51.2 percent) and the local intersecting street (36.5 percent). This may be attributed to a backup of traffic along the ramp because of operational problems at the ramp intersection in addition to traffic backup along Ortega Highway because of the three closely spaced signalized intersections.

Table 2.1.4-5
I-5 Ramp Accident Locations

Ramp	Total Number of Accidents	Ramp Accident Location							
		Entry		Ramp		Exit		Intersecting Street	
		Number	%	Number	%	Number	%	Number	%
SB On-ramp (OH-1)	4	0	0.0	1	25.0	0	0.0	3	75.0
NB Off-ramp (OH-4)	6	0	0.0	1	16.6	4	66.6	1	16.6
SB Off-ramp (OH-2)	41	0	0.0	5	12.1	21	51.2	15	36.5
NB On-ramp (OH-3)	1	1	100.0	0	0.0	0	0.0	0	0.0

Source: Austin-Foust Associates, Inc., 2007a

Based on the above analysis, it is anticipated that the improvements proposed under Alternatives 3 and 5 would alleviate the backup of traffic along the I-5 southbound off-ramp, which would potentially decrease accident rates. It is concluded that the high accident rate would not increase with the proposed improvements.

Ortega Highway. As shown in Table 2.1.4-6, there were 43 accidents recorded on Ortega Highway, with five injury accidents and no fatalities. Most of the accidents were broadsides (23.2 percent), rear ends (27.9 percent), and sideswipes (34.8 percent) associated with the signalized intersections along Ortega Highway. The total actual accident rate was 11.11 a/mvm compared to the statewide average accident rate of 3.14 a/mvm for similar facilities. This high rate may be attributed to a backup of traffic along Ortega Highway because of operational problems at the three closely spaced intersections, which include the I-5 southbound ramps, the I-5 northbound ramps, and Del Obispo Street.

Table 2.1.4-6
Accident Rates for Ortega Highway Intersections

Segment	Number of Accidents			Person		Accident Rate (mvm)					
						Actual Rate			Average Rate		
	FAT	F+I	Total	Kill	Injured	FAT	F+I	Total	FAT	F+I	Total
Ortega Highway	0	5	43	0	5	0.000	1.32	11.11	0.019	1.36	3.14

FAT – Fatalities
F+I – Fatalities plus injuries

Source: Austin-Foust Associates, Inc., 2007a

TASAS Table C data were also reviewed to determine high accident frequency spot locations, if any, within the proposed project limits. Two locations within the project limits were identified in Table C, which include the northbound ramps intersection and the Los Cerritos Avenue intersection along Ortega Highway. Based on this review, the actual total accident rate for the 36-month period studied was 0.51 a/mv entering the I-5 northbound ramps intersection compared to the statewide average accident rate of 0.43

a/mv for similar facilities. Similarly, the actual total accident rate was 0.51 a/mv entering the Los Cerritos Avenue intersection compared to the statewide average accident rate of 0.14 a/mv for similar facilities.

Based on the above analysis, it is anticipated that the improvements proposed under Alternatives 3 and 5 would alleviate traffic congestion at the interchange, which would potentially decrease accident rates. It is anticipated that the high accident rate would not increase with the proposed improvements.

C Pedestrian and Bicycle Facilities

Sidewalks, 1.5 meters in width, are provided in both directions on the bridge. A continuous sidewalk is provided along the south side of Ortega Highway, which provides connectivity for pedestrians across the interchange. Sidewalks on the north side of Ortega Highway are provided only between Los Cerritos Avenue and the southbound I-5 off-ramp intersection across the bridge; this requires pedestrians to cross Ortega Highway at both ramp intersections. Furthermore, no bicycle facilities or shoulders are provided along Ortega Highway across the bridge or along the approaches to the overcrossing.

2.1.4.3 Environmental Consequences

A Temporary Impacts

Alternatives 3 and 5. The proposed project's interchange reconstruction would involve, at various times, lane closures, detours, and other traffic related inconveniences. These impacts are related to construction, are temporary, and would be rectified with the completion of construction.

Alternatives 3 and 5 involve replacing the I-5/Ortega Highway overcrossing. Temporary traffic detour routes would be necessary while the new bridge is being constructed. It is anticipated that half of the current overcrossing shall be replaced at a time, so that a minimum of two lanes of through traffic in each direction could be maintained throughout the construction duration.

Left-turn traffic access to I-5 would require traffic detours during project construction. A detour route south on Del Obispo Street, then south on Camino Capistrano could be utilized for traffic seeking to travel south on I-5 via the Camino Capistrano/I-5 interchange. An alternate route for southbound freeway access could include La Novia Avenue to San Juan Creek Road and ultimately to the Camino Capistrano/I-5 interchange. A route north on Rancho Viejo Road could also be utilized for northbound freeway access at Junipero Serra Road from eastern San Juan Capistrano. Similarly, northbound Camino Capistrano could be utilized to access the freeway interchange at Junipero Serra Road. The required Traffic Management Plan (TMP) prepared prior to project construction would address traffic detours during construction.

Pedestrian access along the Ortega Highway overcrossing during project construction would be maintained and separated by temporary railing (i.e., Type K) as each half of the bridge is constructed. Currently there are no bicycle facilities or shoulders provided along Ortega Highway across the bridge or along the approaches to the overcrossing. Due to

construction staging requirements, bicycle facilities would not be provided during construction but would be implemented as part of the project and open after construction is complete.

Due to the temporary nature of the project construction activities affecting traffic and circulation and the fact that standard project requirements would be followed to minimize impacts, the project would not result in temporary adverse effects. Measures MM TC-1 and MM TC-2 are proposed to avoid and minimize construction-related traffic and circulation impacts of the project.

B Permanent Impacts (Year 2030 Traffic Impact Analysis)

This section presents traffic analysis results projected for year 2030. The traffic forecasts are based on Orange County growth projections prepared by the California State University, Fullerton Center for Demographic Research under sponsorship by a number of agencies, including the Orange County Transportation Authority (OCTA). Two Regional Statistical Area's (RSAs), C-43 and D-40, surround the I-5/Ortega Highway interchange. Within these RSAs, selected Community Analysis Areas (CAAs) are the primary contributors to the projected growth in traffic. Demographic projections for the CAAs in the interchange area are shown in Table 2.1.4-7.

Table 2.1.4-7
Traffic Study Area Demographic Projections

CAAs within RSA C-43 and RSA D-40	Year 2005	Year 2030	Growth
CAAs 59 and 70 (EAST Side of I-5)			
Population	100,322	150,660	50.2%
Employment	17,477	30,820	76.4%
CAA 64 (WEST Side of I-5)			
Population	64,784	69,129	10.1%
Employment	15,049	16,953	12.7%

Notes:
CAA – Community Analysis Area
RSA – Regional Statistical Area
Sources:
Austin-Foust Associates, Inc., 2007b
California State University, Fullerton Center for Demographic Research

As demonstrated in Table 2.1.4-7, much of the projected population and employment increase is related to anticipated future growth to the east of the I-5/Ortega Highway interchange, which is considerably less than the growth projected to the west of the interchange. This projected demographic growth pattern is reflected in the year 2030 traffic forecasts prepared for this analysis.

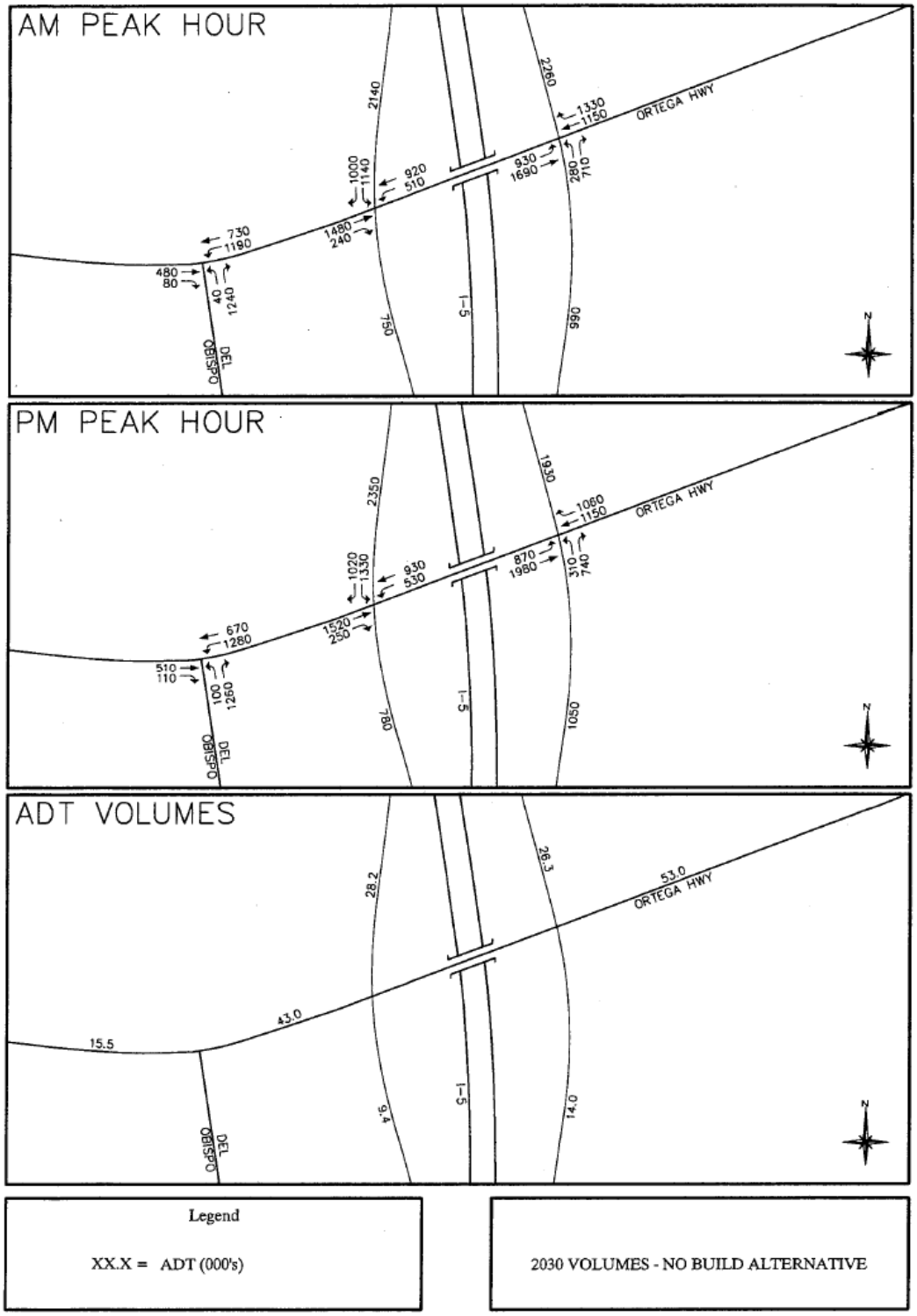
The discussions below address the No Build Alternative followed by year 2030 results for Build Alternatives 3 and 5.

No Build Alternative. Under the No Build Alternative, no improvements would be made to the interchange. The 2030 traffic forecasts represent demand volumes, since the current configuration of the interchange does not have the capacity to carry the projected year 2030 traffic volumes. Currently (year 2006 data), 99,000 vpd travel through the I-5/Ortega Highway interchange. With the current and projected development to the east of the project area, year 2030 traffic at the interchange is projected to reach approximately 121,000 vpd (Austin Foust, 2007a). Without any improvements, the interchange will experience more congestion, which will further degrade traffic operations at the interchange.

Figure 2.1.4-2 shows the projected year 2030 average daily traffic (ADT) and peak-hour volumes for the No Build Alternative. The corresponding LOS values for the intersections and traffic performance data can be found in Table 2.1.4-8. As noted in the footnote to the table, the operational deficiencies present within the interchange area prevent the theoretical calculated LOS values noted in the table from actually being achieved. Although the calculated theoretical LOS values listed in the table range from LOS B through LOS F, the actual delays in year 2030 that would be experienced in the project study area would all be equivalent to LOS F conditions due to traffic operational problems resulting from the closely spaced intersections (i.e., traffic queue blockage between intersections).

The SIM TRAFFIC simulation for the 2030 No Build Alternative summarized in Table 2.1.4-8 indicates significant traffic delays and queuing problems for the network such that the number of vehicles that can be accommodated through the network is less than the demand. The traffic queue lengths exceed the available vehicle storage space for various turning movements within the interchange area. Many movements would fail because of insufficient storage, leading to prolonged periods throughout the day when severe delays would occur. With these operational deficiencies, V/C ratios for the I-5 freeway ramps were not calculated, since they would not give an accurate representation of actual ramp performance conditions that would be experienced within the interchange area.

Network system performance MOEs indicate that peak-hour travel time for a vehicle traveling the network, under the No Build Alternative, is 9.4 minutes in the AM peak hour and 14.1 minutes in the PM peak hour, with an average speed of 7 miles per hour (mph) in the AM peak hour and 5 mph in the PM peak hour.



Source: Austin-Foust Associates, Inc., 2007a

Figure 2.1.4-2
Year 2030 ADT and Peak-Hour Volumes – No Build Alternative

Table 2.1.4-8
Year 2030 Peak-Hour Traffic Performance – No Build Alternative

I. INTERSECTION PERFORMANCE

Intersection	ICU				HCM Delay (secs)			
	AM	LOS	PM	LOS	AM	LOS	PM	LOS
Del Obispo & Ortega	0.61	B*	0.63	B*	13.6	B*	20.7	C*
I-5 SB Ramps & Ortega	0.98	E*	1.05	F	73.7	E*	117.7	F
I-5 NB Ramps & Ortega	0.90	E*	0.88	D*	82.6	F	81.4	F

II. CRITICAL QUEUING DISTANCES

Intersection	Movement	AM/PM	Traffic Queue Length (feet)	Available Storage Length (feet)
Del Obispo & Ortega	EBT**	AM	518**	310
	EBT/R**	AM	441**	310
	EBT**	PM	494**	310
	WBL**	PM	319**	310
I-5 SB Ramp & Ortega	EBT**	AM	388**	310
	WBT**	AM	461**	325
	EBT**	PM	415**	310
	WBT**	PM	524**	325
	SBR**	AM	782**	450
	SBR**	AM	727**	450
I-5 NB Ramp & Ortega	WBT**	AM	1,191**	900
	WBT**	PM	1,101**	900
	NBL/R**	PM	667**	650

III. MEASURES OF EFFECTIVENESS (MOEs)

	AM	PM
Peak-Hour Travel Time (hours)	419	524
Travel Time/Veh (minutes)	9.4	14.1
Average Travel Speed (mph)	7	5

Notes:

* Operational problems due to closely spaced intersections prevent these theoretical LOS conditions from being achieved. **The actual delays experienced would be equivalent to LOS F conditions due to traffic queue blockage between intersections.**

** For the movements listed here, traffic queue length exceeds available storage length, causing blockage to upstream intersections.

NB – northbound
EBT – eastbound through
HCM – Highway Capacity Manual
LOS – level of service
SBR – southbound right turn
WBT – westbound through
SB – southbound
EBT/R – eastbound through/right
ICU – Intersection Capacity Utilization
NBL/R – northbound left turn/right
V/C – volume to capacity ratio
WBL – westbound left turn

Source: Austin-Foust Associates, Inc., 2007a

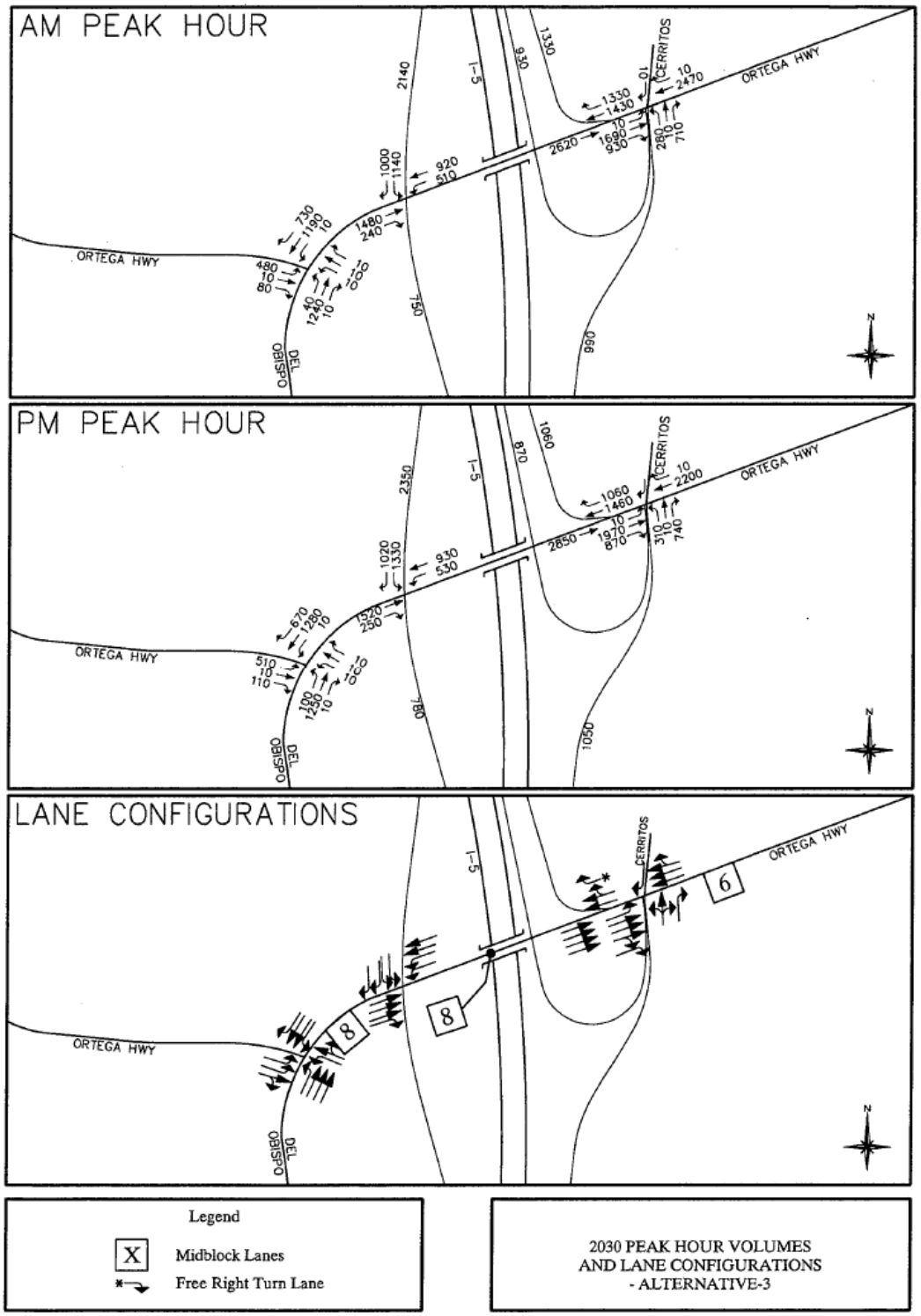
Alternative 3. This alternative realigns Ortega Highway west of the southbound off-ramp. The west side of the interchange features a "parclove" ramp configuration (i.e., a loop ramp for the eastbound-to-northbound movement and a direct ramp for the westbound-to-northbound movement). Projected year 2030 traffic volumes and lane configurations for Alternative 3 are shown in Figure 2.1.4-3, and year 2030 traffic performance information is summarized in Table 2.1.4-9. Critical queuing distances for the interchange where the calculated 95th percentile queue exceeds the available storage are also shown in this table. The intersection and ramp performance for Alternative 3 show adequate levels of service and demonstrate that this alternative meets all of the specified minimum performance criteria in year 2030.

The SIM TRAFFIC simulation indicates that the eastbound through traffic on Ortega Highway traveling through the I-5 southbound ramp intersection will exceed the available vehicle storage space during the AM peak hour. This eastbound queue backup between Del Obispo and the I-5 southbound ramps could reduce the operational efficiency of the Del Obispo Street/Ortega Highway intersection. Left turning vehicles from the west leg and thru vehicles from the south leg of the Del Obispo Street/Ortega Highway intersection would not be able to proceed to the queued up eastbound link between the two intersections. This interaction could result in reduced capacity and increased delay so that the calculated LOS C condition may not be achieved in the AM peak hour at the I-5 southbound ramps/Ortega Highway intersection. However, the actual delays experienced at the I-5 southbound ramps/Ortega Highway intersection due to traffic queue blockage between these intersections are not anticipated to be worse than an LOS D condition, so the minimum traffic performance criteria would be achieved.

The section of Ortega Highway between the two I-5 ramp intersections performs adequately. Under this alternative, eastbound vehicles can use two lanes to make a right turn at the I-5 northbound on-ramp parclove. The availability of this right-turn movement at the I-5 northbound on-ramp results in minimum queuing and delay associated with drivers accessing this eastbound right turn at the northbound on-ramp, and it results in an acceptable level of operation.

Overall, the traffic analysis indicates that Alternative 3 generally performs adequately and meets the minimum performance criteria under year 2030 traffic conditions.

Network system performance MOEs indicate that peak-hour travel time for a vehicle traveling the network, under Alternative 3, is just over five minutes (5.2 minutes in the AM and PM peak hours) with an average speed of 11 miles per hour (mph) in the AM peak hour and 10 mph in the PM peak hour.



Source: Austin-Foust Associates, Inc., 2007a

Figure 2.1.4-3
Year 2030 Peak-Hour Volumes and Lane Configurations – Alternative 3

Table 2.1.4-9
Year 2030 Peak-Hour Traffic Performance – Alternative 3

I. INTERSECTIONS

Intersection	ICU				HCM Delay (secs)			
	AM	LOS	PM	LOS	AM	LOS	PM	LOS
Del Obispo & Ortega	0.57	A	0.65	B	13.6	B	17.3	B
I-5 SB Ramps & Ortega	0.76	C*	0.82	D	26.1	C*	33.4	C
I-5 NB Ramps & Ortega	0.84	D	0.89	D	18.6	B	19.0	B

II. INTERCHANGE RAMPS

Location	Capacity	AM Peak Hour			PM Peak Hour		
		Volume	V/C	LOS	Volume	V/C	LOS
I-5 SB Off-Ramp	2,900	2,140	0.74	C	2,350	0.81	D
I-5 SB On-Ramp	1,500	750	0.50	A	780	0.52	A
I-5 NB Off-Ramp	1,660	990	0.60	A	1,050	0.63	B
I-5 NB On-Ramp - Direct	1,500	1,070	0.71	C	1,060	0.71	C
I-5 NB On-Ramp - Loop	1,500	930	0.62	B	870	0.58	A

III. CRITICAL QUEUING DISTANCES

Intersection	Movement	AM/PM	Traffic Queue Length (feet)	Available Storage Length (feet)
I-5 SB Ramp & Ortega	EBT**	AM	436**	380

IV. MEASURES OF EFFECTIVENESS (MOEs)

	AM	PM
Peak-Hour Travel Time (hours)	329	328
Travel Time/Veh (minutes)	5.2	5.2
Average Travel Speed (mph)	11	10

Notes:

* Operational problems due to closely spaced intersections may prevent this calculated LOS condition from being achieved. The actual delays experienced due to traffic queue blockage between intersections are not anticipated to be worse than LOS D conditions, which would still meet the minimum performance criteria required for this intersection location.

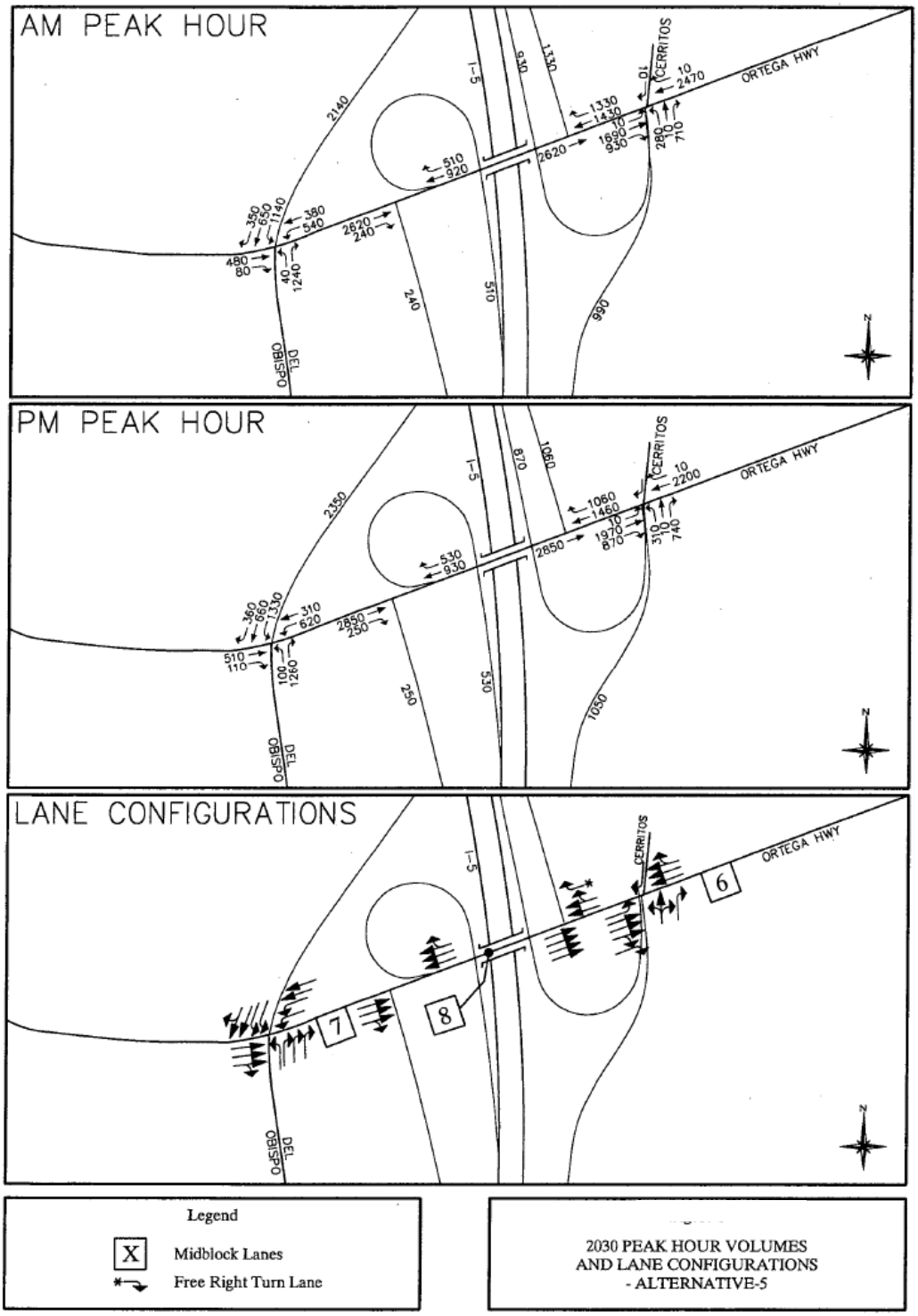
** For the movements listed here, traffic queue length exceeds available storage length, causing blockage to upstream intersection.

NB – northbound
SB – southbound
EBL – Eastbound Left
EBT – Eastbound Through
HCM – Highway Capacity Manual
ICU – Intersection Capacity Utilization
LOS – level of service
V/C – volume to capacity ratio

Source: Austin-Foust Associates, Inc., 2007a

Alternative 5. This alternative provides a partial cloverleaf layout on both sides of the freeway. The southbound off-ramp connects directly into Del Obispo Street thereby creating a four-way intersection at this location. Projected year 2030 traffic volumes and lane configurations for Alternative 5 are shown in Figure 2.1.4-4, and year 2030 traffic performance information is summarized in Table 2.1.4-10. The intersection and ramp performance for Alternative 5 show adequate levels of service and demonstrate that this alternative meets all of the specified minimum performance criteria under year 2030 traffic conditions.

No traffic queue length problems were found with Alternative 5. Network system performance MOEs indicate that peak-hour travel time for a vehicle traversing the network, under Alternative 5, is 3.3 minutes in the AM and 4.7 minutes in the PM peak hour, with an average speed of 13 mph in the AM peak hour and 11 mph in the PM peak hour.



Source: Austin-Foust Associates, Inc., 2007a

Figure 2.1.4-4
Year 2030 Peak-Hour Volumes and Lane Configurations – Alternative 5

Table 2.1.4-10
Year 2030 Peak-Hour Traffic Performance – Alternative 5

I. INTERSECTIONS								
Intersection	ICU				HCM Delay (secs)			
	AM	LOS	PM	LOS	AM	LOS	PM	LOS
I-5 SB Off/Del Obispo & Ortega	0.74	C	0.81	D	24.4	C	29.9	C
I-5 NB On/Los Cerritos & Ortega	0.84	D	0.89	D	14.5	B	17.9	B

II. INTERCHANGE RAMPS							
Location	Capacity	AM Peak Hour			PM Peak Hour		
		Volume	V/C	LOS	Volume	V/C	LOS
I-5 SB Off-Ramp	2,900	2,140	0.74	C	2,350	0.81	D
I-5 SB On-Ramp - Direct	1,500	240	0.16	A	250	0.17	A
I-5 SB On-Ramp - Loop	1,500	510	0.34	A	530	0.35	A
I-5 NB Off-Ramp	1,660	990	0.60	A	1,050	0.63	B
I-5 NB On-Ramp - Direct	1,500	1,330	0.89	D	1,060	0.71	C
I-5 NB On-Ramp - Loop	1,500	930	0.62	B	870	0.58	A

III. CRITICAL QUEUING DISTANCES				
Intersection	Movement	AM/PM	Queue Length (feet)	Available Length (feet)
None	N/A	N/A	N/A	N/A

IV. MEASURES OF EFFECTIVENESS (MOEs)		
	AM	PM
Peak-Hour Travel Time (hours)	187	256
Travel Time/Veh (minutes)	3.3	4.7
Average Travel Speed (mph)	13	11

Notes:
HCM – Highway Capacity Manual
ICU – Intersection Capacity Utilization
LOS – level of service
N/A – Not Applicable
NB – northbound
SB – southbound
V/C – volume to capacity ratio

Source: Austin-Foust Associates, Inc., 2007a

C Permanent Impacts (Year 2035 Supplemental Traffic Sensitivity Analysis)

This discussion presents a summary of the supplemental year 2035 traffic sensitivity analysis for the proposed build Alternatives 3 and 5 derived from the I-5/Ortega Highway Interchange Supplemental Traffic Analysis (Austin-Foust, 2007b). Its purpose is to provide a sensitivity analysis to evaluate the implications of extending the traffic study planning horizon year from 2030 to 2035 and determine whether the longer time frame would change the future year traffic performance of Alternatives 3 or 5 in any significant manner. This information is intended to supplement the traffic impact analysis presented

above, which was derived from the Traffic Impact Study for the I-5/Ortega Highway Interchange Improvement Project (Austin-Foust, 2007a).

Methodology. The project's Traffic Impact Study (Austin-Foust, 2007a) used a 2030 planning horizon year, which is consistent with the planning horizon year used by the current Orange County Transportation Analysis Model (OCTAM)[1]. Due to the fact that future year traffic projections beyond year 2030 are not currently available from OCTAM, a different methodology was used to project traffic volumes for year 2035.

Projections for population and employment growth in the project area derived from Orange County Projections 2006 (OCP-2006) indicate a minimum employment and population growth of not more than 0.3% between the years of 2030 and 2035 (Austin-Foust, 2007b). Because this nominal increase would yield insignificant traffic growth, it was determined that the year 2035 supplemental traffic sensitivity analysis should be carried out using a more conservative growth factor approach. The following straight line growth factors were developed to project year 2035 traffic volumes in the project area:

- Corridor growth 2006-2035: 41 percent increase
- Through traffic growth 2030 to 2035: 1 percent increase

The first component addresses the I-5/Ortega Highway corridor and postulates a 41 percent growth in traffic between 2006 and 2035. This factor is generally representative of population and employment growth in the I-5 corridor within the project area for this time period. The second component recognizes that adjacent communities such as San Juan Capistrano are largely built out, and hence, local traffic (i.e., local pass-through traffic not traveling to or from I-5) will have minimal increase from 2030 to 2035. Hence, for this through trip component, the 2030 volumes are given a nominal increase of one percent to give 2035 through trips. The year 2035 forecasts for the interchange are then a combination of these two sets of factored volumes.

Year 2035 Sensitivity Analysis Results. An LOS and queuing analysis was carried out for year 2035 using the same methodology as applied in the project's original traffic study for the 2030 forecasts. The results are presented in Table 2.1.4-11 for Alternative 3 and in Table 2.1.4-12 for Alternatives 5.

[1] OCTAM is the official countywide transportation model maintained by the Orange County Transportation Authority that all traffic studies in Orange County must maintain consistency with.

Table 2.1.4-11
Year 2035 Peak-Hour Traffic Performance – Alternative 3

I. INTERSECTIONS

Intersection	HCM Delay (secs)			
	AM	LOS	PM	LOS
Del Obispo & Ortega	13.3	B	18.4	B
I-5 SB Ramp & Ortega	29.7	C*	43.6	D
I-5 NB Off/Cerritos & Ortega	22.9	C	26.6	C

II. INTERCHANGE RAMPS

Location	Capacity	AM Peak Hour			PM Peak Hour		
		Volume	V/C	LOS	Volume	V/C	LOS
I-5 SB Off Ramp	2,900	2,010	0.69	B	2,580	0.88	D
I-5 SB On Ramp	1,500	860	0.57	A	960	0.64	B
I-5 NB Off Ramp	1,660	1,100	0.66	B	1,230	0.74	C
I-5 NB On Ramp - Direct	1,500	1,400	0.93	E	1,060	0.71	C
I-5 NB On Ramp - Loop	1,500	1,020	0.68	B	850	0.57	A

III. CRITICAL QUEUING DISTANCES

Intersection	Movement	AM/PM	Traffic Queue Length (feet)	Available Storage Length (feet)
I-5 SB Ramp & Ortega	EBT**	AM	483**	380

IV. MEASURES OF EFFECTIVENESS (MOEs)

	AM	PM
Peak Hour Travel Time (hours)	334	400
Travel Time/Veh (mins)	5.2	6.3
Average Travel Speed (MPH)	10	9

Notes:

* Operational problems due to closely spaced intersections may prevent this calculated LOS condition from being achieved. The actual delays experienced due to traffic queue blockage between intersections are not anticipated to be worse than LOS D conditions, which would still meet the minimum performance criteria required for this intersection location.

** For the movements listed here, traffic queue length exceeds available storage length, causing blockage to upstream intersection.

HCM – Highway Capacity Manual
ICU – Intersection Capacity Utilization
LOS – level of service
NB – northbound
SB – southbound
V/C – volume to capacity ratio

Source: Austin-Foust Associates, Inc., 2007b

Table 2.1.4-12
Year 2035 Peak-Hour Traffic Performance – Alternative 5

I. INTERSECTIONS				
Intersection	**HCM Delay (secs)**			
	AM	**LOS**	**PM**	**LOS**
I-5 SB Off/Del Obispo & Ortega	24.2	C	35.4	D
I-5 NB Off/Cerritos & Ortega	17.8	B	24.2	C

II. INTERCHANGE RAMPS							
Location	**Capacity**	**AM Peak Hour**			**PM Peak Hour**		
		Volume	**V/C**	**LOS**	**Volume**	**V/C**	**LOS**
I-5 SB Off Ramp	2,900	2,010	0.69	B	2,580	0.89	D
I-5 SB On Ramp - Direct	1,500	230	0.15	A	280	0.19	A
I-5 SB On Ramp - Loop	1,500	630	0.42	A	680	0.45	A
I-5 NB Off Ramp	1,660	1,100	0.66	B	1,230	0.74	C
I-5 NB On Ramp - Direct	1,500	1,400	0.93	E	1,060	0.71	C
I-5 NB On Ramp - Loop	1,500	1,020	0.68	B	850	0.57	A

III. CRITICAL QUEUING DISTANCES				
Intersection	**Movement**	**AM/PM**	**Traffic Queue Length (feet)**	**Available Storage Length (feet)**
None	N/A	N/A	N/A	N/A

IV. MEASURES OF EFFECTIVENESS (MOEs)		
	AM	**PM**
Peak Hour Travel Time (hours)	303	384
Travel Time/Veh (mins)	4.4	6.0
Average Travel Speed (MPH)	11	10

Notes:
HCM – Highway Capacity Manual
ICU – Intersection Capacity Utilization
LOS – level of service
N/A – Not Applicable
NB – northbound
SB – southbound
V/C – volume to capacity ratio

Source: Austin-Foust Associates, Inc., 2007b

Findings and Conclusions. The year 2035 traffic volumes derived using the growth factor approach methodology described above are somewhat higher than the official year 2030 traffic forecasts provided in the project's Traffic Impact Study. The higher volumes for year 2035 compared to year 2030 result in some differences in the intersection delay values and ramp V/C ratios for Alternatives 3 and 5; however, these differences are relatively minor in magnitude.

For Alternative 3 in year 2035, the same critical queuing distance issue for the AM peak hour eastbound through traffic on Ortega Highway traveling through the I-5 southbound

ramp intersection would occur as described above for the Alternative 3 year 2030 traffic impact scenario. Similar to the Alternative 3 year 2030 conditions, this interaction could result in reduced capacity and increased delay so that the calculated LOS C condition may not be achieved in the AM peak hour at the I-5 southbound ramps/Ortega Highway intersection. However, the actual delays experienced at the I-5 southbound ramps/Ortega Highway intersection due to traffic queue blockage between intersections are not anticipated to be worse than LOS D conditions, which would still meet the minimum performance criteria required for this intersection location in year 2035.

The overall conclusion is that both build Alternatives 3 and 5 achieve the required performance criteria and will operate satisfactorily with the projected year 2035 traffic volumes.

2.1.4.4 Avoidance, Minimization, and/or Mitigation Measures

A Temporary Measures

The following measures apply to both Alternatives 3 and 5:

MM TC-1 **Traffic Management Plan (TMP).** A TMP shall be developed prior to project construction and shall be implemented during construction to ensure traffic safety, reduce accident hazards, minimize construction-related traffic congestion, identify detour routes, and minimize driver and pedestrian inconveniences. The plan must include appropriate signage, identification of alternate/detour routes, and a public awareness campaign.

MM TC-2 **Construction Management Plan.** A construction management plan shall be prepared prior to project construction that describes construction management activities pertaining to on-site and off-site street circulation, planned haul routes, and anticipated temporary traffic lane closures. The project construction contractor shall follow the plan and coordinate with the City and Caltrans in advance if any deviations or changes to the plan are necessary.

B Permanent Measures

No permanent measures are required.