

PROJECT LOCATION MAP

On Interstate 5 (I-5) from PM 12.4 to PM 18.9
From SR-73 to El Toro Interchange in Orange County



This Project Study Report/Project Development Support has been prepared under the direction of the following registered civil engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

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DATE

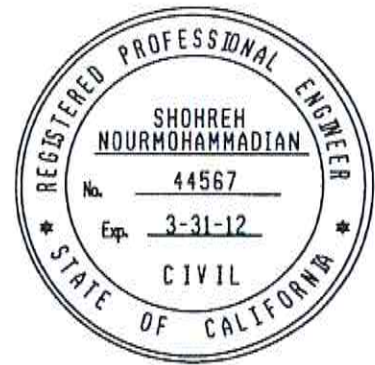


TABLE OF CONTENTS

1. Introduction.....1

2. Background2

 2.1 General.....2

 2.2 State/Regional Plans2

 2.3 Previous and On-going Project Studies within the Project Limit.....3

3. Purpose and Need5

 3.1 Need.....5

 3.2 Purpose.....8

4. Deficiencies8

 4.1 Primary Deficiencies.....8

 4.2 Analysis Methodology8

 4.3 Freeway Segments8

 4.4 Merge/Diverge and Weaving.....8

 4.5 Local Intersection Arterials.....9

 4.6 Existing Traffic Volumes.....9

 4.6.1 Existing (2008) Freeway Volumes.....9

 4.6.2 Existing (2008) Ramp Volumes9

 4.7 Traffic Forecasts12

 4.7.1 2040 Freeway Volumes.....12

 4.7.2 2040 Ramp Volumes13

 4.7.3 Freeway Operations Analysis—Existing and 2040 No-Build.....13

 4.7.4 Existing (2008) Freeway Operation14

 4.7.5 2040 Freeway Operation—No-Build Alternative16

 4.8 Ramp Junction Analysis—Existing and 2040 No-Build17

 4.8.1 Existing (2008) Ramp Junction Analysis.....17

 4.8.2 2040 Ramp Junction Analysis—No-Build Alternative19

 4.9 Weaving Analysis for 2008 and No-Build For 204020

 4.9.1 Existing (2008) Weaving Analysis.....20

 4.9.2 2040 Weaving Analysis—No-Build Alternative.....20

 4.10 Intersection Analysis—Existing and 2040 No-Build21

 4.10.1 Existing (2008) Intersection Levels of Service21

 4.10.2 2040 Intersection Levels of Service—No-Build Alternative22

 4.11 HOV Analysis—2040 No-Build Alternative.....23

 4.12 Collision Data—Safety Review Analysis23

 4.12.1 I-5 Northbound Collision Data.....23

 4.12.2 I-5 Southbound Collision Data.....25

5. Corridor and System Coordination28

6. Alternatives.....29

 6.1 Alternative 1—No-Build Baseline Alternative.....29

 6.2 Alternative 2 -Addition of One General Purpose Lane in Each Direction30

 6.2.1 Segment 1: From Avery Parkway UC to Crown Valley Parkway OC.....31

 6.2.2 Segment 2: From Crown Valley Parkway OC to Oso Parkway OC31

 6.2.3 Segment 3: From Oso Parkway OC to La Paz Road UC32

 6.2.4 Segment 4: From La Paz Rd. UC to Alicia Parkway OC.....33

 6.2.5 Segment 5: From Alicia Parkway OC to El Toro Road UC.....33

6.3 Alternative 3—Addition of Two General Purpose Lanes in Each Direction	34
6.4 Transportation System Management (TSM/TDM) Improvements	35
6.5 Traffic Improvements for Build Alternatives	36
6.5.1 Design Year (2040) Alternative 2 Freeway Operations	36
6.5.2 Design Year (2040) Alternative 3 Freeway Operations	36
6.5.3 Ramp Junction Analysis	39
6.5.4 Weaving Analysis.....	42
6.5.5 HOV Analysis	42
6.5.6 Intersection Analysis Results—2040 Build Alternatives 2 and 3	43
6.5.7 Queuing Analysis	43
6.5.8 No-Build and Build Alternative Comparisons	47
6.6 Non-Standard Design Features	52
6.7 Right-of-Way.....	54
6.8 Transportation Management Plan (TMP)	55
6.9 Stage Construction and Temporary Detours	55
6.10 Structures.....	56
6.10.1 Structures for Alternative 2	56
6.10.2 Structures for Alternative 3	56
6.11 Drainage.....	57
6.12 Utilities.....	58
6.13 Retaining Walls.....	60
6.14 Noise Impacts.....	61
6.15 Fills.....	61
6.16 Ramp Termini , Maintenance Vehicle Pullout (MVP), ADA	64
6.16.1 Portland Cement Concrete (PCC) ramp termini.....	64
6.16.2 Maintenance Vehicle Pullout (MVP)	64
6.16.3 Nonmotorized and Pedestrian Facilities	65
6.17 Ramp Metering	65
6.18 Overhead Sign and Signs	65
6.19 Geotechnical Assessment Site and Subsurface Conditions	65
6.19.1 Site Conditions	65
6.19.2 Geology	66
6.19.3 Subsurface Data from as-Built Log of Test Borings at Bridges.....	66
6.19.4 Liquefaction Potential	66
6.19.5 Pavements.....	66
6.20 Electrical.....	68
6.21 Replacement Planting	68
6.22 Irrigation Modification.....	68
6.24 Contiguous HOV Access	69
6.25 Operation Safety Analysis	69
6.26 Final Operational Pavement Surface	69
7. Community Involvement.....	69
8. Environmental Determination and Environmental Issues	69
8.1 Hazardous Waste Materials	69
8.2 NPDES Permit Compliance/Water Quality	71
8.2.1 Receiving Water Bodies: San Diego Region 9	71
8.2.2 Project design considerations:	72

8.2.3 Measures for avoiding or reducing potential storm water impacts:76
8.3 Environmental Status77
8.4 Special Considerations77
8.5 Permits.....78
8.5.1 Water Quality permits78
8.5.2 U.S. Army Corps of Engineers Section 404 Permit78
8.5.3 California Department of Fish and Game Streambed Alteration 1602 Agreement.....78
8.5.4 Regional Water Quality Control Board Section 401 Certification.....78
8.5.5 U.S. Fish and Wildlife Service (USFWS), Section 7 - Federal Endangered Species Act79
8.5.6 CDFG, Section 2080.1 or 2081(b) of the California Fish and Game Code per compliance ...79
9. Funding79
10. Schedule80
11. FHWA Coordination81
12. Programming Recommendation.....81
12.1 Conclusion. ... 81
12.2 Future Improvements at Existing Interchanges81
13. District Contact82
14. Project Reviews84

LIST OF TABLES

Table 1	Summary of Previous and On-going Projects within Project Limit.....	4
Table 2	Mainline LOS Summary—Existing (2008) Conditions	5
Table 3	Mainline LOS Summary—2040 Conditions, No-Build Alternative.....	7
Table 4	Existing (2008) Mainline Peak Hour Volumes	10
Table 5	Existing (2008) Mainline ADT Volumes.....	11
Table 5	Existing (2008) Mainline ADT Volumes.....	11
Table 6	Existing (2008) Peak Hour Ramp Volumes	11
Table 7	Existing (2008) and Future (2040) ADT Volumes	12
Table 8	2040 Mainline Peak Hour Volumes	13
Table 9	2040 Ramp Peak Hour Volumes	14
Table 10	Mainline LOS Summary—Existing (2008) Conditions	15
Table 11	Mainline LOS Summary—2040 Conditions, No-Build Alternative	16
Table 12	Interchange Merge/Diverge Analysis—Existing (2008) Conditions	18
Table 13	Interchange Merge/Diverge Analysis—2040 Conditions, No-Build Alternative	19
Table 14	Weaving Section LOS Summary—Existing (2008) Conditions	20
Table 15	Weaving Section LOS Summary—2040 Conditions, No-Build Alternative	20
Table 16	Intersection LOS Summary—Existing (2008) Conditions.....	21
Table 17	Intersection LOS Summary—2040 Conditions, No-Build Alternative	22
Table 18	I-5 Northbound Accident Rates.....	23
Table 19	I-5 Southbound Accident Rates.....	26
Table 20	Projects in the Vicinity of Study Area.....	28
Table 21	Mainline LOS Summary—2040 Conditions, Project Alternative 2.....	37
Table 22	Mainline LOS Summary—2040 Conditions, Project Alternative 3.....	38
Table 23	2040 Ramp Lanes Comparison	39
Table 26	Weaving Section LOS Summary—2040 Conditions, Project Alternative 2.....	42
Table 27	Weaving Section LOS Summary—2040 Conditions, Project Alternative 3.....	42
Table 28	Intersection Lane Geometry—Existing and 2040 Conditions.....	44
Table 29	Intersection LOS Summary—2040 Conditions, Project Alternatives 2 and 3	46
Table 30	Off Ramp Queuing Analysis—2040 Conditions, Project Alternatives 2 and 3	47
Table 31	On-Ramp Metering Queue Analysis—2040 Conditions, Project Alternatives 2 and 3	48
Table 32	2040 Mainline LOS Comparison	49
Table 33	2040 Interchange Merge/Diverge Comparison	50
Table 34	2040 Weaving Analysis Comparison	51
Table 35	2040 Intersection LOS Comparison	51
Table 36	TCE of Retaining Wall Footing Easement.....	54
Table 37	Alternate 2 and 3 Utility Impacts with Right of Way Acquisition.....	59
Table 39	Major Existing Drainage Facility	63
Table 40	Groundwater Data Summary.....	74
Table 41	Capital Outlay Estimate	79
Table 42	Capital Outlay Support Estimate for PA/ED.....	80
Table 43	Tentative Project Schedule.....	80

LIST OF EXHIBITS

- EXHIBIT A:** Project Location Map
- EXHIBIT B:** Alternative Schematics
- EXHIBIT C:** Strip Map
- EXHIBIT D:** Typical Cross Sections—Alternative 2 (One Lane Widening)
- EXHIBIT E:** Alternative 2: Key Map and Layouts
- EXHIBIT F:** Alternative 3: Key Map and Layouts
- EXHIBIT G:** General Utilities Conflict Plan
- EXHIBIT H:** Project Cost Estimate Summary (Alt 2 and 3)
- EXHIBIT I:** Right of Way Data Sheet
- EXHIBIT J:** Non-Standard Design Features List
- EXHIBIT K:** Preliminary Environmental Analysis Report (PEAR)
- EXHIBIT L:** Initial Site Assessment (ISA) Checklist
- EXHIBIT M:** Storm Water Data Report Cover

LIST OF ATTACHMENTS (SEPARATELY BOUND REPORT)

- Traffic Operations Analysis Report (Includes CD)
- Initial Site Assessment (ISA)
- Storm Water Data Report (SWDR)

I-5 PROJECT STUDY REPORT/ PROJECT DEVELOPMENT SUPPORT (PSR/PDS)

1. INTRODUCTION

The Orange County Transportation Authority (OCTA), in cooperation with the California Department of Transportation (Caltrans) District 12, is evaluating alternatives to increase freeway capacity and improve traffic operations on Interstate 5 (I-5) from Post Mile 12.4 (North of SR-73) to Post Mile 18.9 (South of the El Toro Interchange through the cities of Laguna Niguel, Mission Viejo, Laguna Hills, and Lake Forest in the County of Orange). The study area is shown in EXHIBIT A.

The corridor improvement consists of widening I-5 to accommodate additional general purpose lanes, reestablishing existing auxiliary (Aux) lanes, and extending the second high occupancy vehicle (HOV) lane from the Alicia Parkway Interchange to the El Toro Interchange in each direction. This project also includes modifications to the ramps at the interchanges within the project limit. Thus, the project will improve both traffic circulation of the mainline and access to the freeway from surrounding cities. The schematic of three alternatives including the "Baseline Alternative" is shown in EXHIBIT B.

This project primarily funded by OCTA with the Renewed Measure M2 local sales tax and identified as "Project C" and La Paz Road and Avery Parkway Interchanges from "Project D" is aimed at relieving the existing and forecasted mobility problems. Construction is estimated to begin in 2016 and be completed in 2018.

The proposed project could qualify for Mobility Improvement Project funding. Therefore, per the Federal Highway Administration (FHWA)/Caltrans stewardship agreement of December 2002, this project is a State Authorized project with review and oversight responsibilities delegated to Caltrans. The project is classified as Category 4A as described in Chapter 8 of the Project Development Procedure Manual.

There are three proposed alternatives under consideration:

- **Alternative 1:** The No-Build or Baseline alternative includes the existing condition and incorporates the previously funded and/or environmentally approved projects approved by Caltrans PSR as listed in section 2.1 below. There is no capital cost for this alternative.
- **Alternative 2 - Addition of One General Purpose Lane in Each Direction and Extension of Second HOV Lane**

To alleviate the heavy traffic congestion, this alternative proposes to add a new general purpose (GP) lane, second HOV lane from El Toro Interchange to Alicia Parkway, and reestablishment of the existing auxiliary lanes replaced by the new GP lanes in both directions while providing full standard features per Caltrans Highway Design Manual (HDM).

The estimated capital construction cost is \$279.8 Million and the right-of-way cost is \$73.0 Million. See EXHIBITS D and E for typical cross sections and layouts for this alternative.

▪ **Alternative 3 - Addition of Two General Purpose Lanes in Each Direction and Extension of Second HOV Lane**

This alternative is the same as Alternative 1 except it adds two GP lanes from Crown Valley Parkway to Alicia Parkway with existing auxiliary lanes being reconstructed in both directions. This alternative also provides full standard features.

The estimated capital construction cost is \$342.8 Million, and the right-of-way cost is \$113.7 Million. See EXHIBITS D and F for typical cross sections and layouts for this alternative.

Both Alternatives 2 and 3 will include the extension of the second (new) HOV from Alicia Parkway to the El Toro Interchange due to lack of capacity on the existing HOV lanes (see Section 4, Deficiencies).

The ultimate widening improvements at La Paz Road and Avery Parkway interchanges are also included in this project to further improve local traffic operations.

Transportation Systems Management/Transportation Demand Management (TSM/TDM) Improvements will improve the corridor's capacity by making changes as to how the system is managed. Examples of such improvements include signal timing upgrades, freeway service patrols, variable message boards, ride match services for carpooling, road condition reports, pavement restriping, and other techniques.

The capital cost for TSM/TDM improvements are included in project estimate for Alternatives 2 and alternative 3.

The above proposed improvements will be performed generally within the existing right-of-way (ROW) limits. However, partial and full take Right of Way acquisition will be required as shown in Exhibit I, Right-of-Way Data Sheet and ROW Plans, for both Alternatives 2 and 3.

2. BACKGROUND

2.1 General

I-5 is a corridor of regional and statewide importance since it is the only major freeway corridor for commerce and daily commuters connecting San Diego County to Los Angeles County with freeway-to-freeway interchanges to SR-73, I-405, SR-55, and SR-22 freeways. It is also one of the main routes to beaches and tourist attractions in the County's coastal communities.

I-5 is one of the most heavily congested freeways in Southern California. Normal morning delays begin at 5:00 A.M. and continue through 9:00 A.M. while afternoon delays generally extend from 3:00 P.M. to 7:00 P.M. Currently, I-5 within this project limit has four GP lanes, auxiliary lanes, and one HOV lane in each direction carrying approximately 300,000 annual average daily traffic (AADT) with level of service (LOS) F during peak hours. This is based on AADT published by Caltrans.

2.2 State/Regional Plans

The proposed improvement project is included in the 2008 Regional Transportation Plan (RTP), a long range vision of the regional system for the six counties in the Southern California Region.

The I-5 project is also programmed and planned under the RTP to include a new GP in each direction from SR-73 to El Toro Interchange in the County of Orange.

The Southern Orange County Transportation Infrastructure Improvement Project (SOCTIIP) is currently evaluating alternatives to complete the southern leg of SR-241. One alternative is to widen I-5, which assumes full build out of the Master Plan of Arterial Highway (MPAH) and the RTP. This alternative includes "one to two GP lanes in each direction at various segments of the I-5 between Lake Forest Drive Interchange and Orange/San Diego County line as recommended per SOCTIIP in 2008.

The project is within the SR-73 Non-Compete Zone as referenced in the Cooperative Agreement No. 12-079 dated February 16, 1993, between the Department of Transportation and the San Joaquin Hills Transportation Corridor Agency. As such, the project is subject to the terms identified in the above-noted document and further evaluation may be necessary.

2.3 Previous and On-going Project Studies within the Project Limit

This PSR/PDS includes MIS projects , approved Project Study Reports, and projects currently under construction, as listed below:

- **South Orange County MIS (SOCMIS):** A Major Investment Study (MIS) for South County completed in 2008, identified a full standard ten-lane with HOV lanes as the Locally Preferred Alternative (LPA). This study concluded to add one to two general purpose lanes in each direction between Lake forest Drive interchange to Orange /San Diego County line.
- **MPAH:** Proposes improvements to the arterial within Caltrans right of way to address east-west capacity needs due to the growing traveling demand in southeast Orange County. Proposed east-west arterial improvements concepts have been included in the base plans in I-5 Corridor Study after discussions and reviews by the affected local agencies within the project limit.
- **Approved PSR (EA 0A220K)- Improve existing mainline I-5 cross fall:** This project improved the existing mainline cross fall of the southbound I-5 from the current variable cross slopes (1% to 1.7%) by placement of overlays to a minimum standard 2% cross slopes. This project also included construction of retaining walls and modifications to existing MSE walls.
- **Approved PSR (EA 0F820K)- Crown Valley Parkway:** This project widens the SB Crown Valley Parkway off-ramp at I-5 from four lanes to five lanes while extending the standard auxiliary lane from Oso Parkway to Crown Valley Parkway in the city of Mission Viejo.
- **Approved PSR (EA 09520K)- Oso Creek slope Improvements along I-5 :** This project proposes to stabilize the existing failing slope and embankment at Oso Creek along the southbound I-5 by construction of "Articulated Concrete Block Mat".
- **Approved PS&E (EA0E0701) – I-5 Aux Lane improvement:** This project is currently under construction to improve I-5 from Oso Pkwy to La Paz road in the cities of Laguna Hills and Mission Viejo. It includes construction of SB Aux lane and sight distance improvement to the NB on ramp at Oso Pkwy interchange.
- **Approved PSR (EA 0A070K) - La Paz Road UC Replacement :** This project is proposed to improve La Paz Road interchange in the cities of Laguna Hills and Mission Viejo by replacement of existing undercrossing structure at La Paz to accommodate a wider road to accommodate the future traffic demand for La Paz Road. The improvements would also

include widening of the existing southbound off-ramp, modifying southbound loop on-ramp, re-aligning La Paz Road , and extending the eastbound La Paz Road to northbound I-5 on-ramp.

- **Approved PSR (EA 0E620K) -Alicia Parkway OC:** This project will extend the auxiliary lane from the southbound I-5 off-ramp at Alicia Parkway to southbound I-5 on-ramp from westbound Alicia Parkway in the City of Laguna Hills.
- **Approved PSR/PR (EA 0H8600) - Crown Valley Parkway:** This project widens EB Crown Valley Parkway to the NB I-5 ramp intersection from Cabot Road to NB I-5 ramp intersection to improve arterial and traffic operation in the cities of Laguna Niguel and Mission Viejo.
- **Approved PSR (EA 0E030K) – Roadway Rehabilitation:** This project proposed the rehabilitation of the existing Portland cement concrete pavement in both directions of the I-5 between SR-1 Interchange Bridge to Oso Creek Bridge.
- **Approved PSR (EA 0E020K) - Roadway Rehabilitation:** This project proposed the rehabilitation of the existing Portland cement concrete pavement on I-5 corridor between Oso Creek and the I-5/I-405 separation structure in the cities of Mission Viejo, Lake Forest, and Laguna Hills. In addition, it includes NB and SB Alicia Pkwy off ramps, ramp terminus of El Toro Road off ramp, and bridge approach slab rehabilitation at La Paz UC.

Table 1
Summary of Previous and On-going Projects within Project Limit

Caltrans EA	Post Mile	Limit	Location	Description
1 EA-OA220K	12.8	11.98-12.45	Within Avery Parkway interchange	SB Cross fall Improvements
2 EA-OF820K	13.6	13.78-15.03	Crown Valley Parkway	SB off-ramp widening
3 EA-09520K	14.8		Oso Creek Improvement	SB at Oso Creek -slope work repair
4 EA-OE0701	14.9	14.54-21.36	I-5 Aux Lane from Oso Parkway to La Paz road	Currently under Construction
5 EA-0A070K	16.4		La Paz Road UC Replacement	Approved- Interchange Improvement
6 EA-0E620K	17.3	16.77-18.33	Aux Lane from SB at Alicia Parkway off-ramp	Approved Aux Lane Improvement-
7 OH8600	13.6		Crown Valley Parkway	Widening of Crown Valley Parkway
8 0E030K & 0E020K	Misc. Areas		Roadway Rehabilitation on I-5 Mainline	Misc Rehab. Improvement

3. PURPOSE AND NEED

3.1 Need

The I-5 corridor is the only major freeway connecting Los Angeles and Orange counties with San Diego County. The 2005 traffic volume for this corridor was approximately 342,000 vehicles per day and is expected to increase by nearly 35 percent by 2035 bringing it up to 480,000 vehicles per day. Currently, this stretch of the I-5 corridor has insufficient capacity on the freeway mainline and major adjacent surface streets to handle existing and projected 2040 travel demand from SR-73 to El Toro interchange. This condition also affects the traffic operation at the local interchanges with this segment of I-5 corridor.

As a result, this corridor is operating with a condition of traffic demand exceeding capacity due to the following conditions:

- A high level of traffic during the weekdays as well as the weekends/holidays through this segment of I-5 due to lack of capacity.
- Congestion at the on/off-ramps due to high traffic demands at the ramps.
- Congestion due to weaving and merging between the successive ramps at several interchanges.
- Inadequate intelligent transportation system (ITS) technologies along the freeway and at interchanges and nearby local arterials.

Table 2 summarizes the density and LOS results for the freeway segments along I-5 under the existing (2008) conditions. The results are separated in mainline segments (including auxiliary lanes) and HOV lanes. Assumptions used in deriving these results and the actual calculations can be found in Appendix D of the traffic report. Three mainline general purpose segments show LOS “E” or “F” in the AM peak hour and four segments show LOS “E” or “F” in the PM peak hour. For the HOV lanes, four segments in the AM and eight segments in the PM show LOS “E” or “F.”

Table 2 Mainline LOS Summary—Existing (2008) Conditions															
Location	Lanes			AM Peak Hour				PM Peak Hour							
				Mainline				HOV		Mainline				HOV	
	HOV	GP	Aux	Vol	Speed	Density	LOS	Vol	V/C	Vol	Speed	Density	LOS	Vol	V/C
NORTHBOUND															
NB s/o Avery Pkwy	1	4	0	6,490	67.4	27.3	D	960	.436	6,080	68.6	25.2	C	1,100	.500
NB s/o Crown Valley	1	4	1	6,570	69.8	21.4	C	1,080	.491	6,110	70.0	19.8	C	1,150	.523
NB s/o Oso Pkwy	1	4	1	7,810	68.1	26.0	D	1,240	.564	7,490	68.8	24.7	C	1,360	.618

**Table 2
 Mainline LOS Summary—Existing (2008) Conditions**

Location	Lanes			AM Peak Hour					PM Peak Hour						
				Mainline				HOV		Mainline				HOV	
	HOV	GP	Aux	Vol	Speed	Density	LOS	Vol	V/C	Vol	Speed	Density	LOS	Vol	V/C
NB s/o La Paz Rd	1	4	0	8,630	n/a	n/a	F	1,490	.677 E	7,190	64.0	31.9	D	1,620	.736 F
NB s/o Alicia Pkwy	1	5	0	10,060	57.5	39.7	E	1,580	.718 E	7,430	68.9	24.5	C	1,580	.718 E
NB s/o El Toro Rd	1	5	1	12,190	56.8	40.6	E	1,680	.764 F	8,670	69.2	23.7	C	1,530	.695 E
SOUTHBOUND															
SB s/o Avery Pkwy	1	4	0	5,600	69.5	22.9	C	1,230	.559	6,720	66.4	28.7	D	1,320	.600
SB s/o Crown Valley	1	4	1	5,730	70.0	18.6	C	1,460	.664 E	7,040	69.4	23.0	C	1,470	.668 E
SB s/o Oso Pkwy	1	4	0	7,270	63.5	32.5	D	1,420	.645	8,870	n/a	n/a	F	1,790	.814 F
SB s/o La Paz Rd	1	4	0	6,930	65.5	30.0	D	1,440	.655	9,140	n/a	n/a	F	2,090	.950 F
SB s/o Alicia Pkwy	1	4	1	7,450	68.9	24.6	C	1,240	.564	9,830	59.1	37.8	E	2,210	1.005 F
SB s/o El Toro Rd	1	4	2	8,360	66.6	28.5	D	1,280	.582	11,080	n/a	n/a	F	2,310	1.050 F

Bold = Level of service (LOS) "E" or "F"

Table 3 summarizes the density and LOS results of the freeway segment analysis performed for the design year (2040) No-Build conditions. Five mainline general purpose segments in the AM and six segments in the PM show LOS "E" or "F." For the HOV lanes, 10 segments in the AM and 11 segments in the PM show LOS "E" or "F."

**Table 3
 Mainline LOS Summary—2040 Conditions, No-Build Alternative**

Location	Lanes			AM Peak Hour						PM Peak Hour					
	HOV	GP	Aux	Mainline				HOV		Mainline				HOV	
				Vol	Speed	Density	LOS	Vol	V/C	Vol	Speed	Density	LOS	Vol	V/C
NORTHBOUND															
NB s/o Avery Pkwy	1	4	0	7,920	58.7	38.3	E	1,240	.564	7,420	62.6	33.7	D	1,420	.645
NB s/o Crown Valley	1	4	1	7,870	68.0	26.3	D	1,370	.623	7,320	69.1	24.1	C	1,480	.673 E
NB s/o Oso Pkwy	1	4	1	9,010	63.9	32.0	D	1,550	.705 E	8,890	64.5	31.3	D	1,750	.795 F
NB s/o La Paz Rd	1	4	0	10,340	n/a	n/a	F	1,850	.841 F	8,710	n/a	n/a	F	2,090	.950 F
NB s/o Alicia Pkwy	1	5	0	11,960	n/a	n/a	F	1,950	.886 F	8,850	64.7	31.1	D	2,040	.927 F
NB s/o El Toro Rd	1	5	1	15,000	n/a	n/a	F	2,060	.936 F	10,340	65.6	29.8	D	1,970	.895 F
SOUTHBOUND															
SB s/o Avery Pkwy	1	4	0	6,830	65.9	29.4	D	1,590	.723 E	8,200	56.0	41.6	E	1,700	.773 F
SB s/o Crown Valley	1	4	1	7,040	69.4	23.0	C	1,800	.818 F	8,350	66.6	28.5	D	1,860	.845 F
SB s/o Oso Pkwy	1	4	1	8,680	65.4	30.1	D	1,700	.773 F	10,540	53.6	44.7	E	2,150	.977 F
SB s/o La Paz Rd	1	4	1	8,640	65.5	29.9	D	1,750	.795 F	11,390	n/a	n/a	F	2,300	1.045 F
SB s/o Alicia Pkwy	1	4	1	9,010	63.9	32.0	D	1,530	.695 E	12,200	n/a	n/a	F	2,400	1.091 F
SB s/o El Toro Rd	1	4	2	10,010	57.9	39.3	E	1,600	.727 E	13,700	n/a	n/a	F	2,500	1.136 F

Bold = Level of service (LOS) "E" or "F"

For an expanded discussion of existing and future traffic, see Section 4, Deficiencies.

3.2 Purpose

The purpose of the proposed project is to improve both existing and future mobility while minimizing environmental and economic impacts. The proposed project will generally be constructed within the existing rights-of-way. The following key issues represent general deficiencies on the I-5 freeway and local interchanges, and the potential solutions/opportunities for improvement:

- Weekend congestion: Improve mobility and reduce congestion.
- Interchange and arterial roadway congestion: Improve the capacity of the on/off-ramps within the project limits.
- Mainline congestion: Increase the capacity of this corridor and relieve congestion between successive ramps.
- Improve and incorporate up-to-date technological traffic control measures.

4. DEFICIENCIES

4.1 Primary Deficiencies

The I-5 project corridor between SR-73 and El Toro Interchange has insufficient capacity on the freeway mainline (GP and HOV lanes), resulting in unacceptable LOS E or F conditions during the AM and PM peak hours. The design year (2040) forecast volumes indicate that peak hour congestion and delays are expected to worsen in the future. Several factors contributing to the poor LOS and traffic congestion have been identified along the I-5 corridor, including limited mainline capacity and short merging distances at the on and off-ramps. This project will analyze the design year (2040) traffic impacts associated with the No-Build Alternative and two Build Alternatives that will address the existing and future deficiencies along the I-5 corridor.

4.2 Analysis Methodology

The operational analysis addresses existing conditions, future No-Build conditions, and future conditions under the two Build Alternatives (see Section 6.7 for the operational analysis of the Build Alternatives). In each case, the analysis includes freeway mainline segments, freeway sections between ramp termini (merging, diverging, and weaving), and local roadway ramp termini (intersections). The measures of effectiveness derived from these analyses (speed, delay, etc.) are in most cases converted to levels of service (LOS) as a means of comparing the operational performance of the No-Build and Build Alternatives. The following discusses the procedures used to determine LOS for the various components of the analysis.

4.3 Freeway Segments

For freeway segments, peak hour volumes by direction are used to determine LOS using procedures outlined in the Highway Capacity Manual (HCM). For general purpose mainline segments, the volumes and lane configurations are used to calculate density, which is then converted to LOS.

4.4 Merge/Diverge and Weaving

Ramps merge and diverge areas and the weave movements are analyzed using procedures in the HCM. The ramp volumes and the adjacent freeway volumes are used to calculate density within the adjacent freeway section, and LOS is determined according to defined density ranges. A weaving

analysis is only carried out only when the distance between an on-ramp and the successive off-ramp is less than 2,500 feet.

4.5 Local Intersection Arterials

Ramp terminals with the arterial street system and the adjacent arterial intersections on each side of the interchange are analyzed according to the HCM signalized intersection methodology.

While it is recognized that ramp intersections with local streets are under Caltrans jurisdiction, the LOS "D" performance standard is a desirable goal of the adjacent cities in this corridor and hence is used here to identify potential intersection deficiencies.

Intersection delay and the corresponding LOS are calculated using the HCM analysis methodology as represented in the Synchro 6.0 software. This accounts for the effects of signal coordination and adjacent intersection platoon formation on intersection operations. Traffic signal timing is optimized along with network offsets and phase splits where signal coordination is applied.

4.6 Existing Traffic Volumes

Existing traffic data was collected in the study area and used to describe current conditions for the various components of the highway system. The following sections present the existing volumes for the freeway mainline and ramps.

4.6.1 Existing (2008) Freeway Volumes

Existing peak hour traffic volumes for freeway segments in the project area were collected from the Caltrans Freeway Performance Measurement System (PeMS). Table 4 below presents the AM and PM peak hour volumes for each freeway mainline segment in the study area (note that the "study area" for the operational analysis extends slightly north and south of the "project area"). Average daily traffic (ADT) volumes are presented in Table 5.

The Traffic Report (tables in Appendix B) contains detailed information on the derivation of these volumes.

4.6.2 Existing (2008) Ramp Volumes

Existing ramp volumes were compiled from PeMS data and from existing turning movement counts collected from the cities of Irvine, Lake Forest, Laguna Hills, and Mission Viejo. Table 6 presents the peak hour ramp volumes for the interchanges within the study area, and Appendices B and C of the traffic report discuss the derivation of these volumes.

Table 4
Existing (2008) Mainline Peak Hour Volumes

Northbound Peak Hour			Southbound Peak Hour		
Location	AM	PM	Location	AM	PM
GENERAL PURPOSE & AUXILIARY LANES					
NB s/o Junipero Serra	9,200	7,610	SB s/o Junipero Serra	6,510	9,390
NB s/o SR 73 Connector	9,540	7,750	SB s/o SR 73 Connector	6,870	9,780
NB s/o Avery Pkwy	6,490	6,080	SB s/o Avery Pkwy	5,600	6,720
NB s/o Crown Valley	6,570	6,110	SB s/o Crown Valley	5,730	7,040
NB s/o Oso Pkwy	7,810	7,490	SB s/o Oso Pkwy	7,270	8,870
NB s/o La Paz Rd	8,630	7,190	SB s/o La Paz Rd	6,930	9,140
NB s/o Alicia Pkwy	10,060	7,430	SB s/o Alicia Pkwy	7,450	9,830
NB s/o El Toro Rd	12,190	8,670	SB s/o El Toro Rd	8,360	11,080
NB s/o Lake Forest Dr	13,090	9,070	SB s/o Lake Forest Dr	9,070	11,530
NB s/o Bake Pkwy	9,900	7,120	SB s/o Bake Pkwy	8,490	10,380
NB at I-405 Junction	6,300	4,570	SB at I-405 Junction	4,300	4,720
HOV LANES					
NB s/o Junipero Serra	1,060	950	SB s/o Junipero Serra	1,460	1,170
NB s/o SR 73 Connector	960	1,100	SB s/o SR 73 Connector	1,230	1,320
NB s/o Avery Pkwy	960	1,100	SB s/o Avery Pkwy	1,230	1,320
NB s/o Crown Valley	1,080	1,150	SB s/o Crown Valley	1,460	1,470
NB s/o Oso Pkwy	1,240	1,360	SB s/o Oso Pkwy	1,420	1,790
NB s/o La Paz Rd	1,490	1,620	SB s/o La Paz Rd	1,440	2,090
NB s/o Alicia Pkwy	1,580	1,580	SB s/o Alicia Pkwy	1,240	2,210
NB s/o El Toro Rd	1,680	1,530	SB s/o El Toro Rd	1,280	2,310
NB s/o Lake Forest Dr	1,830	1,540	SB s/o Lake Forest Dr	1,240	2,110
NB s/o Bake Pkwy	1,930	1,510	SB s/o Bake Pkwy	1,220	2,170
NB at I-405 Junction	860	1,010	SB at I-405 Junction	710	1,090
Source: Volumes were derived using weekday peak hour data from the Freeway Performance Measurement System (PeMS) for 2008 non-summer months.					

Location	Volumes
s/o Junipero Serra	259,000
s/o SR 73 Junction	267,000
s/o Avery Pkwy	240,000
s/o Crown Valley Pkwy	273,000
s/o Oso Pkwy	305,000

Location	Volumes
s/o La Paz Rd	311,000
s/o Alicia Pkwy	319,000
s/o El Toro Rd	367,000
s/o Lake Forest Dr	394,000
s/o Bake Pkwy	377,000
at I-405 Junction	436,000

Northbound Peak Hour			Southbound Peak Hour		
Location	AM	PM	Location	AM	PM
Junipero Serra NB Off	320	370	Junipero Serra SB On	390	510
Junipero Serra NB On	560	660	Junipero Serra SB Off	520	1,050
Avery NB Off	580	820	Avery SB On	410	520
Avery NB On	780	900	Avery SB Off	770	990
Crown Valley NB Off	780	690	Crown Valley SB On	610	1,140
Crown Valley NB Loop On	830	830	Crown Valley SB off	2,110	2,650
Crown Valley NB Direct On	1,350	1,450			
Oso NB Off	770	1,120	Oso SB Direct On	380	440
Oso NB Loop On	550	390	Oso SB Loop On	750	500
Oso NB Direct On	1,290	690	Oso SB Off	810	1,510
La Paz NB Off	300	700	La Paz SB Direct On	140	90
La Paz NB Loop On	780	450	La Paz SB Loop On	280	410
La Paz NB Direct On	1,040	450	La Paz SB Off	740	1,310
Alicia NB Off	420	850	Alicia SB Direct On	270	280
Alicia NB Loop On	1,400	1,120	Alicia SB Loop On	730	1,070
Alicia NB Direct On	1,250	920	Alicia SB Off	1,950	2,700
El Toro NB Off	960	1,260	El Toro SB Direct On	260	480
El Toro NB Loop On	720	900	Avd. Carlota SB Loop On	600	830
El Toro NB Direct On	1,290	770	Avd. Carlota SB Off	1,530	1,560
Lake Forest NB Off	980	570	Lake Forest SB Direct On	220	600
Lake Forest NB On	910	780	Lake Forest SB Loop On	360	550
			Lake Forest SB Off	1,760	2,830
Bake NB Off	880	290	Bake SB Direct On	20	120
Bake NB Loop On	340	1,010	Bake SB Loop On	250	620
Bake NB Direct On	2,190	2,110	Bake SB Off	2,980	2,490

4.7 Traffic Forecasts

Several sources of data were used in preparing the 2040 traffic forecasts used in the analysis. For the freeway, the Orange County Transportation Analysis Model Version 3.3 (OCTAM) provided year 2035 ADT, as well as AM and PM peak period directional volumes. These were used to derive design year (2040) volumes for both general purpose and HOV lanes.

For freeway ramps and ramp termini intersections, OCTAM data was also used together with information from local subarea traffic models. Peak hour turning movement volumes (AM and PM) were derived by reconciling the various sets of data (e.g., ramp volumes and modeled turn movement data) and establishing flow continuity among adjacent intersections. A detailed discussion on this can be found in the traffic report, including actual turn movement volumes for each intersection in the study area.

The 2035 OCTAM forecasts are based on the “committed regional network” as defined by the Orange County Transportation Commission (OCTC). This generally includes roadway improvements and new roadways that are reasonably assured of being funded and built over the next 30 years. Additions to the existing highway system in the vicinity of the study area include the Alton Parkway gap closure and the SR -241 extension, as well as local improvements such as programmed for La Paz Road and its interchange with I-5 and for Crown Valley Parkway west of I-5. The committed network does not include the Ridge Route Drive overcrossing.

The same demand volumes are used for the No-Build and Build Alternatives. This allows a direct comparison of the operational results whereby only capacity differences affect the derived performance measures.

4.7.1 2040 Freeway Volumes

Table 7 summarizes the existing and future average daily traffic (ADT) volumes for the section of I-5 in the study area. As can be seen, growth varies from around 20 to 30 percent.

Table 7			
Existing (2008) and Future (2040) ADT Volumes			
Location	2008	2040	Growth (%)
s/o Junipero Serra	259,000	325,000	25%
s/o SR 73 Junction	267,000	339,000	27%
s/o Avery Pkwy	240,000	294,000	23%
s/o Crown Valley Pkwy	273,000	345,000	26%
s/o Oso Pkwy	305,000	393,000	29%
s/o La Paz Rd	311,000	394,000	27%
s/o Alicia Pkwy	319,000	409,000	28%
s/o El Toro Rd	367,000	455,000	24%
s/o Lake Forest Dr	394,000	479,000	22%
s/o Bake Pkwy	377,000	450,000	19%
at I-405 Junction	436,000	534,000	22%

Table 8 summarizes the 2040 peak hour freeway volumes for the project area with AM and PM peak hour volumes respectively together with the ramp volumes. As it can be seen, the corridor experiences high northbound volumes in the AM and high southbound volumes in the PM reflecting commute patterns in this part of Orange County.

Table 8					
2040 Mainline Peak Hour Volumes					
Northbound Peak Hour			Southbound Peak Hour		
Location	AM	PM	Location	AM	PM
GENERAL PURPOSE & AUXILIARY LANES					
NB s/o Junipero Serra	11,550	9,620	SB s/o Junipero Serra	8,180	11,870
NB s/o SR 73 Connector	12,310	10,000	SB s/o SR 73 Connector	8,860	12,620
NB s/o Avery Pkwy	7,920	7,420	SB s/o Avery Pkwy	6,830	8,200
NB s/o Crown Valley	7,870	7,320	SB s/o Crown Valley	7,040	8,350
NB s/o Oso Pkwy	9,010	8,890	SB s/o Oso Pkwy	8,680	10,540
NB s/o La Paz Rd	10,340	8,710	SB s/o La Paz Rd	8,640	11,390
NB s/o Alicia Pkwy	11,960	8,850	SB s/o Alicia Pkwy	9,010	12,200
NB s/o El Toro Rd	15,000	10,340	SB s/o El Toro Rd	10,010	13,700
NB s/o Lake Forest Dr	15,980	11,100	SB s/o Lake Forest Dr	11,030	14,050
NB s/o Bake Pkwy	11,980	8,600	SB s/o Bake Pkwy	10,400	12,760
NB at I-405 Junction	7,700	5,570	SB at I-405 Junction	5,230	5,760
HOV LANES					
NB s/o Junipero Serra	1,280	1,200	SB s/o Junipero Serra	1,840	1,500
NB s/o SR 73 Connector	1,240	1,420	SB s/o SR 73 Connector	1,590	1,700
NB s/o Avery Pkwy	1,240	1,420	SB s/o Avery Pkwy	1,590	1,700
NB s/o Crown Valley	1,370	1,480	SB s/o Crown Valley	1,800	1,860
NB s/o Oso Pkwy	1,550	1,750	SB s/o Oso Pkwy	1,700	2,150
NB s/o La Paz Rd	1,850	2,090	SB s/o La Paz Rd	1,750	2,300
NB s/o Alicia Pkwy	1,950	2,040	SB s/o Alicia Pkwy	1,530	2,400
NB s/o El Toro Rd	2,060	1,970	SB s/o El Toro Rd	1,600	2,500
NB s/o Lake Forest Dr	2,230	1,930	SB s/o Lake Forest Dr	1,550	2,640
NB s/o Bake Pkwy	2,330	1,840	SB s/o Bake Pkwy	1,480	2,700
NB at I-405 Junction	1,050	1,230	SB at I-405 Junction	870	1,330

4.7.2 2040 Ramp Volumes

The 2040 ramp volumes for the study area are summarized in Table 9. They reflect local growth along the corridor plus arterial roadway changes such as noted above.

4.7.3 Freeway Operations Analysis—Existing and 2040 No-Build

As noted in Section 4.1, freeway mainline operation was analyzed using the methodology in the Highway Capacity Manual (HCM), with level of service (LOS) based on density as derived in the

HCM procedures. The following sections present the results for existing conditions and for 2040 No-Build conditions.

Northbound Peak Hour			Southbound Peak Hour		
Location	AM	PM	Location	AM	PM
Junipero Serra NB Off	460	390	Junipero Serra SB On	420	510
Junipero Serra NB On	1,180	990	Junipero Serra SB Off	850	1,460
Avery NB Off	730	980	Avery SB On	540	710
Avery NB On	810	940	Avery SB Off	960	1,020
Crown Valley NB Off	1,090	790	Crown Valley SB On	810	1,190
Crown Valley NB Loop On	970	1,070	Crown Valley SB Off	2,350	3,090
Crown Valley NB Direct On	1,440	1,560			
Oso NB Off	860	1,310	Oso SB Direct On	380	480
Oso NB Loop On	760	400	Oso SB Loop On	760	510
Oso NB Direct On	1,730	1,070	Oso SB Off	1,150	1,990
La Paz NB Off	370	890	La Paz SB Direct On	150	100
La Paz NB Loop On	810	460	La Paz SB Loop On	450	420
La Paz NB Direct On	1,280	520	La Paz SB Off	750	1,430
Alicia NB Off	470	920	Alicia SB Direct On	280	300
Alicia NB Loop On	2,070	1,300	Alicia SB Loop On	980	1,160
Alicia NB Direct On	1,550	1,040	Alicia SB Off	2,330	3,060
El Toro NB Off	1,380	1,360	El Toro SB Direct On	270	490
El Toro NB Loop On	1,210	1,190	Avd. Carlota SB Loop On	810	1,180
El Toro NB Direct On	1,320	890	Avd. Carlota SB Off	2,050	2,160
Lake Forest NB Off	1,000	590	Lake Forest SB Direct On	230	610
Lake Forest NB On	1,560	1,300	Lake Forest SB Loop On	400	680
			Lake Forest SB Off	1,800	2,830
Bake NB Off	1,020	550	Bake SB Direct On	160	200
Bake NB Loop On	340	1,020	Bake SB Loop On	330	630
Bake NB Direct On	2,200	2,120	Bake SB Off	3,300	2,520

4.7.4 Existing (2008) Freeway Operation

Table 10 summarizes the density and LOS results for the freeway segments along I-5 under the existing (2008) conditions. The results are separated in mainline segments (including auxiliary lanes)

and HOV lanes. Assumptions used in deriving these results and the actual calculations can be found in Appendix D of the traffic report.

As can be seen here, three mainline general purpose segments show LOS “E” or “F” in the AM peak hour and four segments show LOS “E” or “F” in the PM peak hour. For the HOV lanes, four segments in the AM and eight segments in the PM show v/c greater than 0.66 (LOS E) and v/c greater than 0.74 (LOS F)..

**Table 10
 Mainline LOS Summary—Existing (2008) Conditions**

Location	Lanes			AM Peak Hour						PM Peak Hour					
	H O V	G P	Aux	Mainline				HOV		Mainline				HOV	
				Vol	Speed	Density	LOS	Vol	V/C	Vol	Speed	Density	LOS	Vol	V/C
NORTHBOUND															
NB s/o Avery Pkwy	1	4	0	6,490	67.4	27.3	D	960	.436	6,080	68.6	25.2	C	1,100	.500
NB s/o Crown Valley	1	4	1	6,570	69.8	21.4	C	1,080	.491	6,110	70.0	19.8	C	1,150	.523
NB s/o Oso Pkwy	1	4	1	7,810	68.1	26.0	D	1,240	.564	7,490	68.8	24.7	C	1,360	.618
NB s/o La Paz Rd	1	4	0	8,630	n/a	n/a	F	1,490	.677 E	7,190	64.0	31.9	D	1,620	.736 F
NB s/o Alicia Pkwy	1	5	0	10,060	57.5	39.7	E	1,580	.718 E	7,430	68.9	24.5	C	1,580	.718 E
NB s/o El Toro Rd	1	5	1	12,190	56.8	40.6	E	1,680	.764 F	8,670	69.2	23.7	C	1,530	.695 E
SOUTHBOUND															
SB s/o Avery Pkwy	1	4	0	5,600	69.5	22.9	C	1,230	.559	6,720	66.4	28.7	D	1,320	.600
SB s/o Crown Valley	1	4	1	5,730	70.0	18.6	C	1,460	.664 E	7,040	69.4	23.0	C	1,470	.668 E
SB s/o Oso Pkwy	1	4	0	7,270	63.5	32.5	D	1,420	.645	8,870	n/a	n/a	F	1,790	.814 F
SB s/o La Paz Rd	1	4	0	6,930	65.5	30.0	D	1,440	.655	9,140	n/a	n/a	F	2,090	.950 F
SB s/o Alicia Pkwy	1	4	1	7,450	68.9	24.6	C	1,240	.564	9,830	59.1	37.8	E	2,210	1.005 F
SB s/o El Toro Rd	1	4	2	8,360	66.6	28.5	D	1,280	.582	11,080	n/a	n/a	F	2,310	1.050)
Bold = Level of service (LOS) “E” or “F”															

4.7.5 2040 Freeway Operation—No-Build Alternative

Table 11 summarizes the density and LOS results of the freeway segment analysis performed for the design year (2040) No-Build conditions. Five mainline general purpose segments in the AM and six segments in the PM show LOS “E” or “F.” For the HOV lanes, 10 segments in the AM and 11 segments in the PM show v/c greater than 0.66 (LOS E) and v/c greater than 0.74 (LOS F).

Table 11 Mainline LOS Summary—2040 Conditions, No-Build Alternative															
Location	Lanes			AM Peak Hour					PM Peak Hour						
	H O V	GP	Aux	Mainline				HOV		Mainline				HOV	
				Vol	Speed	Density	LOS	Vol	V/C	Vol	Speed	Density	LOS	Vol	V/C
NORTHBOUND															
NB s/o Avery Pkwy	1	4	0	7,920	58.7	38.3	E	1,240	.564	7,420	62.6	33.7	D	1,420	.645
NB s/o Crown Valley	1	4	1	7,870	68.0	26.3	D	1,370	.623	7,320	69.1	24.1	C	1,480	.673 E
NB s/o Oso Pkwy	1	4	1	9,010	63.9	32.0	D	1,550	.705 E	8,890	64.5	31.3	D	1,750	.795 F
NB s/o La Paz Rd	1	4	0	10,340	n/a	n/a	F	1,850	.841 F	8,710	n/a	n/a	F	2,090	.950 F
NB s/o Alicia Pkwy	1	5	0	11,960	n/a	n/a	F	1,950	.886 F	8,850	64.7	31.1	D	2,040	.927 F
NB s/o El Toro Rd	1	5	1	15,000	n/a	n/a	F	2,060	.936 F	10,340	65.6	29.8	D	1,970	.895 F
SOUTHBOUND															
SB s/o Avery Pkwy	1	4	0	6,830	65.9	29.4	D	1,590	.723 E	8,200	56.0	41.6	E	1,700	.773 F
SB s/o Crown Valley	1	4	1	7,040	69.4	23.0	C	1,800	.818 F	8,350	66.6	28.5	D	1,860	.845 F
SB s/o Oso Pkwy	1	4	1	8,680	65.4	30.1	D	1,700	.773 F	10,540	53.6	44.7	E	2,150	.977 F
SB s/o La Paz Rd	1	4	1	8,640	65.5	29.9	D	1,750	.795 F	11,390	n/a	n/a	F	2,300	1.045 F
SB s/o Alicia Pkwy	1	4	1	9,010	63.9	32.0	D	1,530	.695 (E)	12,200	n/a	n/a	F	2,400	1.091 (F)

**Table 11
 Mainline LOS Summary—2040 Conditions, No-Build Alternative**

Location	Lanes			AM Peak Hour					PM Peak Hour						
	H O V	GP	Aux	Mainline				HOV		Mainline				HOV	
				Vol	Speed	Density	LOS	Vol	V/C	Vol	Speed	Density	LOS	Vol	V/C
SB s/o El Toro Rd	1	4	2	10,010	57.9	39.3	E	1,600	.727 (E)	13,700	n/a	n/a	F	2,500	1.136 (F)

Bold = Level of service (LOS) "E" or "F"

4.8 Ramp Junction Analysis—Existing and 2040 No-Build

The following sections give the merge/diverge results for existing conditions followed by 2040 No-Build conditions. A weaving analysis for sections where the distance between an on- and off-ramp is less than 2,500 feet as follows.

4.8.1 Existing (2008) Ramp Junction Analysis

Table 12 presents the existing conditions density and LOS results for the ramp junctions along I-5 within the project corridor.

Table 12
Interchange Merge/Diverge Analysis—Existing (2008) Conditions

Location	AM Peak Hour				PM Peak Hour			
	Volumes		Density	LOS	Volumes		Density	LOS
	Fwy	Ramp			Fwy	Ramp		
I-5 at El Toro								
NB Diverge	12,190	960	n/a	F	8,670	1,260	27.2	C
NB Merge	11,800	1,290	n/a	F	8,300	770	24.1	C
SB Diverge	9,070	1,530	30.1	D	11,530	1,560	38.6	D
SB Merge	8,100	260	26.7	C	10,600	480	n/a	F
I-5 at Alicia								
NB Merge	9,200	1,250	39.4	E	6,460	920	28.6	D
SB Diverge	8,360	1,950	0.0	A	11,080	2,700	n/a	F
I-5 at La Paz								
NB Diverge	8,630	300	41.8	D	7,190	700	37.8	D
SB Merge	6,790	140	29.8	D	9,050	90	n/a	F
I-5 at Oso								
NB Diverge	7,810	770	21.6	C	7,490	1,120	22.4	C
NB Merge	7,070	1,290	39.7	E	6,500	690	32.7	D
SB Diverge	6,930	810	31.0	D	9,140	1,510	42.4	E
SB Merge	6,890	380	32.1	D	8,430	440	n/a	F
I-5 at Crown Valley								
NB Merge	6,460	1,350	30.2	D	6,040	1,450	29.6	D
SB Diverge	7,270	2,110	n/a	F	8,870	2,650	45.4	F
I-5 at Avery								
NB Diverge	6,490	580	34.2	D	6,080	820	33.8	D
SB Merge	5,190	410	26.7	C	6,200	520	31.1	D
I-5 at SR 73								
NB Diverge	9,540	3,050	n/a	F	7,750	1,670	0.0	A
SB Merge	6,020	850	15.0	B	7,740	2,040	28.9	D

Per weaving analysis above, most sections have a merge and/or diverge at LOS "E" or "F." It should also be noted that some entries show LOS "F" even though the density does not exceed 35. This is because the HCM procedure calculates the volume/capacity (V/C) for the section, and beyond a maximum V/C, the LOS is set to be "F" regardless of density.

4.8.2 2040 Ramp Junction Analysis—No-Build Alternative

Table 13 presents the 2040 No-Build density and LOS results for the ramp junctions within the project corridor. The LOS results for the No-Build Alternative indicate that all sections have ramp junctions that are projected to operate at LOS “E” or “F” in at least one of the peak hours.

Table 13								
Interchange Merge/Diverge Analysis—2040 Conditions, No-Build Alternative								
Location	AM Peak Hour				PM Peak Hour			
	Volumes		Density	LOS	Volumes		Density	LOS
	Fwy.	Ramp			Fwy.	Ramp		
I-5 at Lake Forest								
NB Diverge	15,980	1,000	50.6	F	11,100	590	27.8	C
SB Merge	10,800	230	29.9	D	13,440	610	40.9	F
I-5 at El Toro								
NB Diverge	15,000	1,380	61.5	F	10,340	1,360	33.5	D
NB Merge	14,660	1,320	51.2	F	10,210	890	n/a	F
SB Diverge	11,030	2,050	n/a	F	14,050	2,160	54.1	F
SB Merge	9,740	270	32.6	D	13,210	490	63.1	F
I-5 at Alicia								
NB Merge	11,210	1,550	49.1	F	7,750	1,040	32.5	D
SB Diverge	10,010	2,330	n/a	F	13,700	3,060	51.1	F
I-5 at La Paz								
NB Diverge	10,340	370	57.9	F	8,710	890	45.3	F
SB Merge	8,490	150	n/a	F	11,290	100	54.8	F
I-5 at Oso								
NB Diverge	9,010	890	26.3	C	8,890	1,310	28.2	D
NB Merge	8,610	1,730	48.8	F	7,640	1,070	n/a	F
SB Diverge	8,640	1,150	26.5	C	11,390	1,990	n/a	F
SB Merge	8,300	380	n/a	F	10,060	480	n/a	F
I-5 at Crown Valley								
NB Merge	7,570	1,440	n/a	F	7,330	1,560	n/a	F
SB Diverge	8,680	2,350	n/a	F	10,540	3,090	54.9	F
I-5 at Avery								
NB Diverge	7,920	730	41.1	E	7,420	980	40.3	E
SB Merge	6,790	540	33.4	D	7,460	710	37.2	E
I-5 at SR 73								
NB Diverge	12,310	4,390	n/a	F	10,000	2,580	n/a	F
SB Merge	7,510	1,350	22.4	C	9,670	2,950	43.4	F

Bold = Level of service (LOS) “E” or “F”

4.9 Weaving Analysis for 2008 and No-Build For 2040

This section describes the results of the weaving analysis carried out for those sections where the distance between ramp termini is less than 2,500 feet. Existing conditions are first described followed by 2040 No-Build conditions.

4.9.1 Existing (2008) Weaving Analysis

The existing weaving section results are summarized in Table 14 below along with the AM and PM speeds, density and LOS results.

Three of the weave segments are projected to operate at LOS “E” or “F,” one during the AM peak hour and two during the PM peak hour.

Table 14						
Weaving Section LOS Summary—Existing (2008) Conditions						
Location	AM Peak Hour			PM Peak Hour		
	Speed	Density	LOS	Speed	Density	LOS
NORTHBOUND						
NB Avery to Crown Valley	53.9	27.6	C	53.4	25.9	C
NB La Paz to Alicia	63.3	36.0	E	64.4	26.1	C
SOUTHBOUND						
SB Crown Valley to Avery	51.4	25.2	C	44.4	35.9	E
SB Alicia to La Paz	63.3	26.6	C	59.1	37.7	E

4.9.2 2040 Weaving Analysis—No-Build Alternative

The weaving sections are identified in Table 15 below along with the AM and PM speed, density, and LOS results for the 2040 No-Build Alternative.

Three of the weave segments are projected to operate at LOS “E” or “F,” one during the AM peak hour and two during the PM peak hour.

Table 15						
Weaving Section LOS Summary—2040 Conditions, No-Build Alternative						
Location	AM Peak Hour			PM Peak Hour		
	Speed	Density	LOS	Speed	Density	LOS
NORTHBOUND						
NB Avery to Crown Valley	51.0	34.9	D	52.4	31.6	D
NB La Paz to Alicia	61.7	43.9	F	63.6	31.5	D
SOUTHBOUND						
SB Crown Valley to Avery	47.7	33.4	D	44.2	42.7	E
SB Alicia to La Paz	62.8	32.5	D	58.0	47.7	F
Bold = Level of service (LOS) “E” or “F”						

4.10 Intersection Analysis—Existing and 2040 No-Build

This section describes the existing and future No-Build intersection analysis results. The study area for the intersection analysis includes all ramp intersections plus the nearest signalized intersection on each side of the interchange. The intersection delay and corresponding LOS were derived using the HCM procedures embodied in Synchro 6.0 with the intersections at and adjacent to each interchange coded as a network. Actual turn movement volumes are illustrated in Appendix C of the traffic report and the following sections present the results for existing and 2040 No-Build conditions.

4.10.1 Existing (2008) Intersection Levels of Service

The levels of service at the study intersections under existing conditions are summarized in Table 16 and the LOS calculation worksheets are contained in Appendix F of the traffic report.

Table 16				
Intersection LOS Summary—Existing (2008) Conditions				
Location	AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS
Avenida de la Carlota & Paseo Valencia/SB Ramps	29.5	C	28.8	C
Avenida de la Carlota & El Toro Rd	18.6	B	63.6	E
Bridger/NB Ramps & El Toro Rd	23.9	C	42.9	D
Rockfield & El Toro Rd	10.8	B	25.5	C
Alicia Pkwy & Paseo Alicia/Hon	17.1	B	21.1	C
Alicia Pkwy & SB Ramps	18.6	B	43.2	D
Alicia Pkwy & NB Ramps	6.0	A	9.4	A
Alicia Pkwy & Charlinda	9.0	A	13.0	B
McIntyre & La Paz Rd	21.8	C	20.0	B
Cabot/SB Ramps & La Paz Rd	43.2	D	91.6	F
NB Off ramp/Muirlands & La Paz Rd	10.5	B	17.2	B
Chrisanta & La Paz Rd	58.0	E	47.0	D
Cabot & Oso Pkwy	25.3	C	33.8	C
SB Ramps & Oso Pkwy	6.3	A	11.1	B
NB Ramps & Oso Pkwy	53.8	D	31.7	C
Montanoso & Oso Pkwy	43.3	D	16.5	B
Forbes Rd & Crown Valley	18.6	B	17.6	B
SB Ramps & Crown Valley	29.2	C	76.3	E
NB Ramps & Crown Valley	17.7	B	12.2	B
Kaleidoscope & Crown Valley	10.4	B	12.0	B
Camino Capistrano & Avery Pkwy	44.5	D	43.9	D
SB Ramps & Avery Pkwy	13.3	B	28.5	C
NB Ramps & Avery Pkwy	13.4	B	42.9	D
Marguerite Pkwy & Avery Pkwy	37.4	D	112.6	F
Delay = Average vehicle delay in seconds				
Bold = exceeds performance standard (LOS "D")				

The performance standard of LOS “D” is used for the intersection analysis. One intersection in the AM and four intersections in the PM do not meet the performance standard.

4.10.2 2040 Intersection Levels of Service—No-Build Alternative

The 2040 intersection levels of service for the No-Build Alternative are listed in Table 17.

Table 17				
Intersection LOS Summary—2040 Conditions, No-Build Alternative				
Location	AM Peak Hour		PM Peak Hour	
	Delay	LOS	Delay	LOS
Avenida de la Carlota & Paseo Valencia/SB Ramps	37.5	D	47.8	D
Avenida de la Carlota & El Toro Rd	40.2	D	122.4	F
Bridger/NB Ramps & El Toro Rd	55.5	E	74.4	E
Rockfield & El Toro Rd	14.3	B	44.9	D
Alicia Pkwy & Paseo Alicia/Hon	25.8	C	48.3	D
Alicia Pkwy & SB Ramps	57.3	E	87.5	F
Alicia Pkwy & NB Ramps	8.4	A	9.4	A
Alicia Pkwy & Charlinda	13.0	B	22.3	C
McIntyre & La Paz Rd	25.4	C	25.3	C
Cabot/SB Ramps & La Paz Rd	67.8	E	197.9	F
NB Off ramp/Muirlands & La Paz Rd	46.1	D	50.4	D
Chrisanta & La Paz Rd	94.9	F	55.7	E
Cabot & Oso Pkwy	51.6	D	45.5	D
SB Ramps & Oso Pkwy	9.4	A	31.4	C
NB Ramps & Oso Pkwy	9.1	A	47.6	D
Montanoso & Oso Pkwy	156.2	F	44.7	D
Forbes Rd & Crown Valley	43.6	D	52.4	D
SB Ramps & Crown Valley	37.5	D	125.5	F
NB Ramps & Crown Valley	13.5	B	18.6	B
Kaleidoscope & Crown Valley	15.6	B	18.4	B
Camino Capistrano & Avery Pkwy	42.9	D	43.7	D
SB Ramps & Avery Pkwy	28.2	C	27.1	C
NB Ramps & Avery Pkwy	40.0	D	75.8	E
Marguerite & Avery Pkwy	63.7	E	91.8	F
Delay = Average vehicle delay in seconds Bold = exceeds performance standard (LOS “D”)				

This shows that nine of the project area intersections are projected to operate at an unacceptable LOS during the AM and/or PM peak hour. Only currently committed intersection lane improvements are included in the No-Build Alternative. A summary of intersection lane configurations for existing, 2040 No-Build and 2040 Build can be found in Section 6.2 of this report.

4.11 HOV Analysis—2040 No-Build Alternative

The freeway operations analysis in the HCM focuses only on mainline and ramp volumes using density as the operational measure to determine LOS. Hence, the HOV lanes are analyzed using a standard volume-to-capacity (V/C) ratio. The capacity and LOS relationships were summarized in this report, and results were presented in Table 10 and 11. As noted, the 2040 No-Build Alternative, 10 HOV segments in the AM and 11 segments in the PM are projected to operate at LOS “E” or “F.”

The project corridor has one HOV merge where the two southbound HOV lanes merge to one lane at the El Toro interchange. A modified analysis was required for this since the HCM does not have a direct method of analyzing a situation where an HOV to HOV merge occurs (The minimum number of lanes on the facility where the merge occurs is three - two continuing lanes and one merging lane.). Therefore, an estimated volume in a hypothetical lane adjacent to the continuous HOV lane was combined with the HOV volume so that a two-lane HCM analysis could be conducted with a single lane HOV merging volume. The LOS results for the HOV merge location are as follows:

AM Peak Hour LOS “C”
 PM Peak Hour LOS “E”

4.12 Collision Data—Safety Review Analysis

The following sections discuss the findings from a review of the accident data in the corridor.

4.12.1 I-5 Northbound Collision Data

Collision data for I-5 within the project limits was reviewed for the most recent 36-month period. Data between July 2005 and July 2008 from the Traffic Accident Surveillance and Analysis System (TASAS) was obtained. Accident data from TASAS Table B (Selective Accident Rate Calculation and Accident Records), TASAS Selective Accident Retrieval (TSAR), Individual Accident Summary Tables and TASAS Table C (dry and wet) were reviewed during the PSR/PDS process. Actual accident rates are compared with average accident rates for similar highway facilities throughout the State. Table 18 presents a summary of the mainline and ramp TASAS data for the northbound direction. This data indicates that the northbound freeway mainline within the study area has a lower accident rate than the statewide average for fatal accidents, fatal plus injury accidents, and for total accidents.

Table 18								
I-5 Northbound Accident Rates								
Post Mile	Name	MVM or MV ^a	Segment Accident Rates			Statewide Average Rates		
			Fatal Accidents	Fatal + Injury	Total Accidents	Fatal Accidents	Fatal + Injury	Total Accidents
Northbound Mainline								
010.910-021.299	Junipero Serra Road to I-405	1620.79	.002	.18	.62	.011	.33	1.13
Northbound Ramps								
011.069	NB On at Junipero Serra	11.51	.000	.09	.70	.002	.26	.75

Table 18
I-5 Northbound Accident Rates

Post Mile	Name	MVM or MV ^a	Segment Accident Rates			Statewide Average Rates		
			Fatal Accident s	Fatal + Injury	Total Accident s	Fatal Accident s	Fatal + Injury	Total Accident s
012.820	NB Off at Avery Parkway	8.66	.000	.23	.92	.004	.42	1.20
013.109	NB On at Avery Parkway	11.95	.000	.17	.67	.002	.26	.75
013.572	NB Off at Crown Valley	11.62	.000	.26	.86	.004	.42	1.20
013.718	NB On at EB Crown Valley	11.73	.000	.26	.94	.002	.26	.80
013.934	NB On at WB Crown Valley	21.37	.000	.14	.70	.002	.26	.75
014.945	NB Off at Oso Parkway	14.47	.000	.21	.90	.004	.42	1.20
015.156	NB On at EB Oso Parkway	6.58	.000	.00	.61	.004	.20	.70
015.450	NB On at WB Oso Parkway	13.48	.000	.15	.22	.003	.20	.65
016.373	NB Off at La Paz Road	8.11	.000	.62	1.36	.004	.42	1.20
016.555	NB On at EB La Paz Road	8.22	.000	.24	.37	.004	.20	.70
016.738	NB On at WB La Paz Road	10.30	.000	.00	.49	.003	.20	.65
017.297	NB Off at Alicia Parkway	11.18	.000	.45	1.07	.004	.42	1.20
017.464	NB On at EB Alicia Parkway	15.78	.000	.38	1.01	.004	.20	.70
017.704	NB On at WB Alicia Parkway	17.54	.057	.17	.80	.003	.20	.65
018.490	NB Off at El Toro	17.21	.000	.23	1.28	.004	.42	1.20
018.631	NB On at EB El Toro	11.62	.000	.52	1.21	.004	.20	.70
018.813	NB On at WB El Toro	11.84	.000	.34	.76	.003	.20	.65
019.499	NB Off at Lake Forest	11.95	.000	1.34	2.68	.004	.42	1.20
019.734	NB Off at Bake Parkway	30.69	.000	.07	.13	.005	.20	.60
019.952	NB On at Lake Forest	15.34	.000	.07	.59	.003	.20	.65
019.953	NB 5/405 On/Off	35.62	.000	.03	.11	.001	.07	.25

Table 18
I-5 Northbound Accident Rates

Post Mile	Name	MVM or MV ^a	Segment Accident Rates			Statewide Average Rates		
			Fatal Accidents	Fatal + Injury	Total Accidents	Fatal Accidents	Fatal + Injury	Total Accidents
020.565	NB Off at Bake Parkway	35.07	.000	.09	.26	.004	.42	1.20
020.566	NB 5/405 On	25.10	.000	.08	.16	.001	.07	.25
020.706	NB 5/405 at Bake	6.36	.000	.47	.63	.004	.20	.70
020.707	NB 5/405 On	31.78	.000	.06	.19	.001	.07	.25
020.801	NB HOV at I-405	17.54	.000	.00	.06	.005	.20	.60
020.867	NB 5/405 at Bake	26.30	.000	.11	.68	.003	.20	.65
020.868	NB 5/405 On	58.09	.000	.17	.43	.001	.07	.25
020.930	NB at I-405 NB	56.99	.000	.11	.47	.005	.20	.60

Bold = exceeds statewide average for similar facilities
 MVM = Million Vehicle Miles
 MV = Million Vehicles
 Accident rates are expressed as # of accidents/MVM^a or # of accidents/MV^a
^aFor mainline segments, MVM is used for accident rates. For ramps, MV is used for accident rates.

There are 30 northbound on- and off-ramps within the study area. Of these ramps, 14 have an accident rate greater than the statewide average in at least one of the three categories. For instance, the northbound on -ramp at westbound Alicia Parkway, has a fatal accident rate (0.057 accidents/million vehicles) greater than the statewide average (0.003 accidents/million vehicles). At this location, one fatality was reported within the 36 month period between July 2005 and July 2008.

4.12.2 I-5 Southbound Collision Data

TASAS data was also obtained for the same time period for the southbound mainline and ramps within the project limits. Table 19 presents a summary of the mainline and ramp TASAS data for the southbound direction. This data indicates that the southbound freeway mainline within the study area has a lower accident rate than the statewide average for fatal accidents, fatal plus injury accidents, and for total accidents.

**Table 19
 I-5 Southbound Accident Rates**

Post Mile	Name	MVM or MV ^a	Segment Accident Rates			Statewide Average Rates		
			Fatal Accidents	Fatal + Injury	Total Accidents	Fatal Accidents	Fatal + Injury	Total Accidents
Southbound Mainline								
010.910-021.299	Junipero Serra Road to I-405	1620.79	.004	.22	.72	.011	.33	1.13
Southbound Ramps								
011.138	SB Off at Junipero Serra	8.88	.000	.23	.45	.004	.42	1.20
012.831	SB On at Avery Parkway	8.55	.000	.00	.35	.002	.26	.75
013.104	SB Off at Avery Parkway	13.15	.000	.15	1.83	.004	.42	1.20
013.609	SB On at Crown Valley	13.59	.000	.29	.88	.002	.26	.75
013.900	SB Off at Crown Valley	42.74	.000	.14	.73	.004	.42	1.20
015.028	SB On at EB Oso Parkway	8.22	.000	.85	1.70	.003	.20	.65
015.315	SB On at WB Oso Parkway	6.03	.000	.33	.66	.004	.20	.70
015.474	SB Off at Oso Parkway	19.53	.000	.10	.61	.004	.42	1.20
016.386	SB On at EB La Paz Road	5.97	.000	.00	.17	.003	.20	.65
016.571	SB On at WB La Paz Road	4.82	.000	.00	.00	.004	.20	.70
016.717	SB Off at La Paz Road	16.55	.000	.30	.85	.004	.42	1.20
017.255	SB On at EB Alicia Parkway	5.59	.000	.36	1.25	.003	.20	.65
017.487	SB On at WB Alicia Parkway	11.73	.000	.00	.77	.004	.20	.70
017.634	SB Off at Alicia Parkway	33.98	.000	.56	1.68	.004	.42	1.20
018.537	SB On at El Toro	6.36	.000	.94	1.89	.003	.20	.65
018.722	SB On at Avenida Carlota	9.65	.000	.00	.21	.002	.16	.55

Table 19
I-5 Southbound Accident Rates

Post Mile	Name	MVM or MV ^a	Segment Accident Rates			Statewide Average Rates		
			Fatal Accidents	Fatal + Injury	Total Accidents	Fatal Accidents	Fatal + Injury	Total Accidents
	/Valencia							
018.913	SB Off at Avenida Carlota /Valencia	25.43	.000	.31	1.34	.004	.28	.95
019.798	SB On at Lake Forest	6.58	.000	.00	.30	.003	.20	.65
020.009	SB On at Lake Forest/Avenida Carlota	5.43	.000	.00	.92	.004	.20	.70
020.178	SB Off at Lake Forest	26.30	.000	.34	.84	.004	.42	1.20
020.193	SB On at Bake Parkway	16.99	.000	.00	.00	.004	.15	.45
020.745	SB On at EB Bake Parkway	1.03	.000	.00	.00	.003	.20	.65
020.746	SB 5/405 On	43.29	.000	.00	.02	.001	.07	.25
020.949	SB 5/405 at Bake	4.49	.000	.22	1.11	.004	.20	.70
020.950	SB 5/405 On	42.20	.000	.00	.00	.001	.07	.25
021.118	SB 5/405 On	24.22	.000	.08	.17	.001	.07	.25
021.166	SB 5/405 at Bake Parkway	24.00	.000	.17	.75	.004	.42	1.20
021.182	SB at I-405 SB	64.13	.000	.02	.05	.003	.11	.35
021.194	SB Off at Lake Forest	19.73	.000	.00	.05	.005	.20	.60
021.195	SB Off at Bake Parkway	14.25	.000	.14	.35	.002	.09	.25

Bold = exceeds statewide average for similar facilities
 MVM = Million Vehicle Miles MV = Million Vehicles
 Accident rates are expressed as # of accidents/MVM^a or # of accidents/MV^a
^aFor mainline segments, MVM is used for accident rates. For ramps, MV is used for accident rates.

There are 30 southbound on- and off-ramps within the study area. Of these ramps, 13 have an accident rate greater than the statewide average in at least one the three categories.

5. CORRIDOR AND SYSTEM COORDINATION

This project is to study alternatives to improve north-south mobility between north and south Orange County by providing additional capacity and operational traffic improvements. The alternatives presented in this PSR/PDS are compatible with any recommendations from the first phase of the SOCMIS. The project was identified by the voter approved local sales tax measure and has identified project components for funding as part of Renewed Measure M.

This project is consistent with I-5 Route Concept Report prepared in October 2000. The Route Concept Report indicates that Segment 6 (post mile 12) from I-405 to SR-73 calls for five lanes plus one HOV lane in both directions. The Route Concept Report projected this segment to be at LOS F.

The following projects in Table 20 are on I-5 and are within or adjacent to the proposed project. These projects have been incorporated into this study for each alternative.

Table 20				
Projects in the Vicinity of Study Area				
Caltrans EA	Post Mile	Limit	LOCATION	DESCRIPTION
1 EA-0A220K	12.8	11.98-12.45	Within Avery Parkway interchange	SB Cross fall Improvements
2 EA-0F820K	13.6	13.78-15.03	Crown Valley Parkway	SB off-ramp widening
3 EA-09520K	14.8		Oso Creek Improvement	SB at Oso Creek -slope work repair
4 EA-0E0701	14.9	14.54-21.36	I-5 Aux Lane from Oso Parkway to La Paz road	Currently under Construction
5 EA-0A070K	16.4		La Paz Road UC Replacement	Approved- Interchange Improvement
6 EA-0E620K	17.3	16.77-18.33	Extend Aux Lane from SB Alicia Parkway off-ramp to SB Loop On-Ramps	Aux Lane Improvement-Approved
7 0H8600	13.6		Crown Valley Parkway	Widening of Crown Valley Parkway
8 0E030K & 0E020K	Misc Areas		Roadway Rehabilitation on I-5 Mainline	Misc Rehab. Improvement

6. ALTERNATIVES

I-5 corridor has insufficient capacity on the freeway mainline and major adjacent surface streets to handle existing and projected 2040 travel demand between the SR 73 and I-405 freeways. This segment of I-5 currently operates at unstable conditions (LOS E or F) during peak periods. With projected population and employment growth trends indicating increased transportation volumes, the congestion and delays are expected to worsen in the future.

The traffic congestion, delays, and reduced travel speeds currently experienced on this segment of I-5 are the result of several contributing factors. These contributing factors include:

- Limited GP lane capacity on I-5;
- Inadequate merging distances along the freeway due to the close proximity of on/off-ramps along the mainline;
- Lack of north /south arterials along the corridor to handle the local traffic demand; and
- Non- Standard lane and shoulder widths at various locations.

Three previously projects at Oso Parkway , La Paz Avenue, and Alicia Parkway are assumed to be in place under the “No-Build Baseline Alternative.” The existing conditions as well as the improvement proposed as Baseline projects were described in detail in these three previous PIDs.

This project proposes to add one new GP lane in both NB and SB directions on I-5 from the SR-73 to south of the El Toro Interchange. Additionally, this project would analyze the existing HOV lanes in both directions to add an additional HOV lane in each direction from Alicia Parkway Overcrossing to El Toro Interchange.

Three project alternatives, which include the No-Build alternative (Baseline), have been evaluated and are presented in this report as shown in EXHIBIT B. In both build alternatives, the existing HOV transitions/tapers have been lengthened to eliminate the non-standard tapers, providing greater merging distance. The existing buffer varies from four feet to two feet near the I-5 HOV direct connectors to the I-405 HOV lane. The project cost is estimated as listed in the Section 9 “Capital Outlay Estimate” Table 41 for each alternative.

This project is divided into five segments as listed below for both NB and SB conditions, since each area/segment has a different right-of-way width and specific issues that need to be addressed.

Segment 1: From Avery Parkway UC to Crown Valley Parkway OC

Segment 2: From Crown Valley Parkway OC to Oso Parkway OC

Segment 3: From Oso Parkway OC to La Paz Rd. UC

Segment 4: From La Paz Rd. UC to Alicia Parkway OC

Segment 5: From Alicia Parkway OC to El Toro Rd. UC

6.1 Alternative 1—No-Build Baseline Alternative

Congestion along this segment of I-5 would be expected to increase and the corridor segment would continue to operate at LOS E and LOS F during peak traffic hours. The results of this alternative are contrary to the goal of improving existing and future mobility. Alternative 1 would not require

additional right-of-way. This alternative is considered as baseline and includes the construction of previously approved and on-going projects as described in section 2.1 above.

There is no capital cost for this alternative.

6.2 Alternative 2 -Addition of One General Purpose Lane in Each Direction and Extension of Second HOV Lane

The rapid growth in south Orange County has resulted heavy traffic congestion along the I-5 corridor operating at unacceptable level of service (F) based on the traffic impact analysis. In addition to the higher traffic demand, the heavy traffic congestion is also due to the lack of north/south arterials in parallel to I-5 corridor resulting in the local commuter utilizing I-5 for their short local commute.

Therefore, to alleviate this heavy traffic congestion, Alternative 2 proposes to add a new general purpose lane, second HOV lane from El Toro Interchange to Alicia Parkway, and reestablishment of the existing auxiliary lanes in each direction. In addition, new auxiliary lanes have been provided where the minimum weaving length established by the Caltrans Highway Design Manual (HDM 504.5) were less than 2000 feet.

Within the project limit, the areas with existing auxiliary lanes are:

Existing Northbound Auxiliary Lanes:

- From NB Avery Parkway on-ramp to NB Crown Valley Parkway off-ramp
- From NB Crown Valley Parkway on-ramp to NB Oso Parkway off-ramp
- From NB La Paz Road on-ramp to NB Alicia Parkway off-ramp
- From NB Alicia Parkway on-ramp to NB El Toro Road off-ramp
- From NB El Toro Road on-ramp to NB Lake Forest Drive off-ramp

Existing Southbound Auxiliary Lanes:

- From SB El Toro Road on-ramp to SB Alicia Parkway off-ramp (2 auxiliary lanes)
- From SB Alicia Parkway on-ramp to SB La Paz Road off-ramp
- From SB La Paz Road on-ramp to SB Oso Parkway off-ramp
- From SB Oso Parkway on-ramp to SB Crown Valley Parkway off-ramp
- From SB Crown Valley Parkway on-ramp to SB Avery Parkway off-ramp

Currently, there are two areas that have non-standard weaving distances (less than 1,600 feet) in the northbound direction. This alternative proposes to provide additional new auxiliary lanes in the following locations:

- From north of SR-73 connectors to NB Avery off-ramp
- From Oso Parkway on-ramp to La Paz off-ramp

Under Alternatives 2, the existing auxiliary lanes will be reconstructed (reestablished) northbound and southbound, as listed above. The auxiliary lanes would be constructed extending outward from the existing edge of pavement. The additional auxiliary lanes would reduce the space available for freeway ramps; therefore, the ramp curvature would be altered at the I-5 on- and off-ramp interchanges. The minimum required new right-of-way is shown in Exhibit I, Right-of-Way Data Sheet and Plans.

6.2.1 Segment 1: From Avery Parkway UC to Crown Valley Parkway OC

Northbound: The existing NB I-5 has four GP lanes north of the SR-73 connectors. The heavy traffic volume during AM peak hours, close proximity of the SR-73 connectors at the Avery Parkway interchange, and lack of an auxiliary lane at the NB off-ramp at Avery are creating congestion. To improve traffic operations a new auxiliary lane is proposed at the NB off-ramp at Avery Parkway. The existing columns of the SR-73 connector are 900 feet north of the off-ramp nose. To eliminate the impact to SR-73 connector structures, I-5 main line has to be shifted toward the existing median to provide four GP lanes with one new auxiliary lane. The 7-foot non-standard right shoulder width at the existing column is shown on Exhibit E and F (layout L-1).

A new pavement and concrete barrier will be provided for the inside left shoulder for the realigned HOV lane. The inside left shoulder for the entire corridor length (except as indicated) will be 10 feet wide per standard while the existing concrete barrier will remain in place.

In addition, the existing frontage road Marguerite Parkway will be realigned as shown in Layout L-2 due to the widening. A concrete barrier with a fence on top will separate the newly reconstructed frontage road at the freeway. The NB off-ramp at Avery Parkway will be realigned to match to the future improvement at the off-ramp as shown in L-3.

All existing east/west local major arterials within Caltrans right-of-way are assumed to be widened per MPAH plans in this project. As the result, this alternative proposes to replace Avery Parkway Undercrossing to accommodate the additional width for a full standard six lane with dual left turn pockets and raised median. The existing structure will be removed and a new PC/PS I-Girder structure will be reconstructed. I-5 profile grade would remain the same as existing grade; however, Avery parkway profile grade will be lowered approximately four inches to provide the minimum standard vertical clearance. The project cost includes the cost of the new interchange at Avery Parkway.

The NB on-ramp from Avery Parkway will provide three lanes tapered to two lanes and then dropping to one lane where it will merge to the freeway with a single auxiliary lane extended additionally 500 feet in length to provide additional storage.

The new fifth GP lane is provided north of Avery Parkway Interchange, with the existing auxiliary lane to Crown Valley Parkway reconstructed. Proposed retaining walls are provided to reduce any new ROW takes.

Southbound: The addition of one new lane along the SB direction will increase capacity at this heavily congested area with minimal partial R/W take at the SB Avery off-ramp. The new 5th fifth GP lane merges to the existing four GP lanes with more than 1500 feet prior to 23-foot nose of SB SR-73 connector. In addition, the new 5th GP lane provides four GP lanes with a 70:1 taper prior to the SB Avery on-ramp.

6.2.2 Segment 2: From Crown Valley Parkway OC to Oso Parkway OC

Northbound: The widening improvements within this segment in the NB direction will be mostly within existing ROW with proposed retaining walls at the right edge of shoulders due to the existing cut slopes adjacent to the freeway.

The improvements in the NB direction include:

- The existing retaining wall adjacent to the Crown Valley Parkway on-ramp will be reconstructed at the new edge of shoulder per Exhibit E and F, Layout 7 and 8.
- The existing bridge over Oso Creek will be widened as shown in Layouts.
- The NB off-ramp to Oso Parkway will connect to the improvements at this interchange (EA 0E 0701), which is currently under construction.
- Properties along NB I-5 from Crown Valley Parkway to Oso Parkway such as the Mission Viejo Mall properties (NE quadrant), the Mission Ridge property, and the Mission Viejo Country Club will not be impacted by the new widening. However, a new retaining wall with partial grading of existing cut slopes along the parking areas of the Mission Ridge property will be required due to the differential elevation between the freeway and parking area of approximately of 18 feet.

Southbound: I-5 corridor within this segment is mostly elevated, and thus the widening will require re-grading the existing fill slopes within existing ROW with the exception of the area just north of the SB off-ramp to Crown Valley Parkway, where proposed retaining walls are constructed at the edge of shoulder to minimize ROW take.

The existing Metrolink track that parallels the southbound freeway is not impact by this widening.

6.2.3 Segment 3: From Oso Parkway OC to La Paz Road UC

Northbound: The existing residential community “Madrid for Park”, mostly single family homes, and Mission Viejo High School are located along this segment of the freeway. The residential properties are elevated, and therefore, the proposed widening will require partial retaining walls and re-grading the existing cut slopes along the right edge of shoulders.

The existing NB ramp from Oso Parkway also extends 500 feet beyond the standard requirement of on-ramps just to provide additional storage for this heavy traffic volume.

The La Paz Road Undercrossing is proposed to be replaced and reconstructed to allow for the additional width for a full standard six lane typical cross section with left turn pockets and raised median. The existing structure will be removed and a new PC/PS I-Girder structure will be reconstructed. I-5 profile grade would remain the same as existing profile grade, however, La Paz Road profile will be lowered approximately two inches to provide the minimum standard vertical clearance. The project cost includes the cost of the new interchange at La Paz Road Undercrossing.

Southbound: I-5 SB is mostly on earth filled area with commercial and retail properties adjacent to the freeway. The residential properties located westerly are separated by the Metrolink tracks and Cabot Road. The proposed widening within this segment will require re-grading the existing slope within the existing ROW and will not impact any property.

The existing main structures at El Toro Overhead will be widened; however, the ramp overhead will be replaced as discussed in Structures 6.10 below.

The existing on-ramps from La Paz Road will be realigned with 500 feet in addition to the standard 300-foot length per Caltrans’ request to provide more storage due to traffic demand at this interchange. This concept will also provide six lanes at La Paz Road within Caltrans ROW per MPAH established in 2007.

In addition to MPAH, Oso Parkway will be widened by one lane in each direction for a total width of eight lanes. La Paz will have a total of six lanes, and Los Alisos will be reconstructed to also have a total of six lanes.

6.2.4 Segment 4: From La Paz Rd. UC to Alicia Parkway OC

Northbound: With the exception of the areas within the interchanges at Alicia Parkway and La Paz Road, the corridor is adjacent to residential developments on both sides. Within this area, the only major north/south arterials are Muirlands Boulevard and Paseo De Valencia located approximately one mile away from I-5 in each direction respectively. As a result, I-5 freeway is heavily congested within this segment both in the north/south directions. The single family homes in the NB direction are elevated approximately 15-20 feet above the freeway grade level and are separated by glass sound walls at the property right-of-way.

To reduce the visual impact of the widening, partial retaining walls and re-grading of the existing slopes are proposed within this segment.

Existing La Paz Road is two lanes (total of 4 lanes) in each direction within the ramp termini.

Existing Alicia Parkway has three lanes in each direction with additional left lane (total of 8 lanes) dedicated for access to and from I-5 freeway.

The existing tie back at NB Alicia Parkway can remain in place by realignment of the NB ramp and non-standard ramp shoulder while eliminating the proposed 4-foot buffer. Typically, non-standard shoulders of the proposed ramps or I-5 mainline left side shoulder at the pinch points (within columns and bents) would not require reconstruction of the existing bridges unless the proposed minimum vertical clearances do not meet Caltrans standards.

There is an existing slope under Alicia bridge in the SB direction that is proposed to be reconstructed and replaced with a tie back wall due to the widening.

All proposed construction work will be within the existing ROW.

Southbound: There is approximately 1,600 feet of existing sound wall located along the edge of the SB shoulder, beginning from the SB on-ramp and continuing along the existing right of way. There is an existing concrete trapezoid channel collecting the freeway surface drainage in the SB direction. The proposed widening will necessitate the reconstruction of the existing sound wall in the vicinity of Alicia Parkway and reconstruction of the concrete channel with re-grading of the existing fill between the sound wall and the channel.

All proposed construction work will be within the existing ROW.

6.2.5 Segment 5: From Alicia Parkway OC to El Toro Road UC

Northbound: There are five existing GP lanes, an auxiliary lane, and one HOV lane in the NB direction. The proposed improvement will provide the second HOV from Alicia Parkway to the El Toro Interchange instead of the new sixth general purpose lane per Caltrans direction.

Previously, the existing second HOV was removed and replaced by the fifth GP lane. Per FHWA requirements, this second HOV was agreed to be replaced when the I-5 corridor was planned to be widened in the future. As the result, Caltrans required this PSR/PDS to provide for the second HOV lane in addition to the existing five GP lanes and auxiliary lane.

The proposed second HOV begins from Alicia Parkway to the El Toro Interchange. To minimize the ROW impact to the existing residential community within this segment non-standard left shoulders with varying widths from 10 feet to 2 feet and a 2-foot buffer in this segment are proposed to be constructed.

Additionally, the local arterial road Bridger Road impacted by the new widening will be shifted easterly and constructed per the city of Lake Forest standards plans as shown in Exhibit E. The existing on and off ramps at Alicia Parkway and El Toro Road will be realigned per Caltrans standards while providing the additional 500-foot storage.

Southbound: The Laguna Hills Mall is located along SB I-5 from El Toro to Los Alisos. The frontage road Avenida de la Carlota, which separates the freeway from the mall, is a 4-lane roadway with left turn lanes to and from the mall to the road, with a 10-foot raised median. The I-5 right shoulder along this segment varies from 10 feet to 18 feet. The existing retaining wall, which is 10 feet to 15 feet high, is located between the frontage road and I-5.

The existing I-5 SB freeway provides for five GP lanes, one HOV lane, and one auxiliary lane. The proposed widening will provide a second HOV lane based on the Caltrans and FHWA agreement discussed in section 6.2.5 above.

The addition of the new HOV lane will impact the Avenida de la Carlota frontage road. However, the width of the existing shoulder and the area between the back of the retaining wall and Avenida de la Carlota would accommodate some of the proposed widening. Avenida de la Carlota will need to be realigned as shown in Exhibit E with minimum ROW take. In addition, to minimizing the ROW impact, the sidewalk will be on the SB side of Avenida de la Carlota only since pedestrians have no need to cross from NB Avenida de la Carlota.

The existing Los Alisos Overcrossing currently has closed-end abutments in the NB and SB directions. Thus, it would not allow for additional HOV lane widening. As an option to the standard geometry configuration as shown on Exhibit E, L- 25, the left shoulder adjacent to the HOV lane can be reduced from 10 feet to 2 feet with a 0-foot buffer (reduced from 4 feet) at the structure location (pinch points typically). However, per Caltrans direction, the plans for new widening have to be assumed as standard except at the connector column location at the north and south of the project limit. This assumption will result in the most conservative construction cost estimate to adequately plan for project funding. Further analysis should be provided during PA-ED phase for impacts to Los Alisos OC.

6.3 Alternative 3—Addition of Two General Purpose Lanes in Each Direction and Extension of Second HOV Lane

This alternative widens I-5 freeway from four lanes to six general purpose lanes in each direction and replaces auxiliary lanes that are displaced by the new general purpose. However, the improvements in the southern and northern project limit will be the same as Alternative 2, providing only one general purpose in each direction due to the existing SR-73 connector columns and the limited R/W.

The two additional lanes will result in the reconstruction of several existing structures due to the location of the bents. As an option, reduced nonstandard left (10 feet reduced to 2 feet) and right shoulders (10 feet reduced to 4 feet) with no buffer (4 feet reduced to 0 foot) could minimize the impact to the structures while providing for the capacity due to the traffic demand. However, per

Caltrans requirements, only standard alternatives have been developed for this alternative improvement. The nonstandard options will be developed and further studied during PA-ED phase per OCTA and Caltrans request.

In summary, the additional lanes and auxiliary lanes would be as follows:

Northbound

- A new auxiliary lane for the Avery Parkway off-ramp is added.
- Two general purpose lanes from the Avery Parkway on-ramp to La Paz Road off-ramp.
- Reestablished auxiliary lane replaced by two new general purpose lanes will be reconstructed between the Avery Parkway on-ramp to the Crown Valley Parkway off-ramp, Crown Valley Parkway on-ramp to Oso Parkway off-ramp, and La Paz Road on-ramp to Alicia Parkway off-ramp.
- Reestablished auxiliary lane replaced by new HOV lane from Alicia Parkway on-ramp to El Toro Road off-ramp is the same as Alternative 2.

Southbound:

- Two general purpose lanes on southbound I-5 from Avery Parkway to Alicia Parkway.
- Reestablished auxiliary lane replaced by two new general purpose lanes will be reconstructed between Crown Valley Parkway on-ramp to Avery Parkway off-ramp, from Oso Parkway on-ramp to Crown Valley Parkway off-ramp, from La Paz on-ramp to Oso off -ramp, from Alicia Parkway on-ramp to La Paz Road off-ramp
- Reestablished auxiliary lane replaced by new HOV lane from El Toro Road on-ramp to Alicia Parkway off-ramp is the same as Alternative 2.

6.4 Transportation System Management/Transportation Demand Management (TSM/TDM) Improvements

To provide lower cost improvements that can be implemented relatively quickly in the study area, TSM/TDM improvements are proposed in conjunction with Alternatives 2 and 3 to maximize the use of existing transportation infrastructure. These improvements do not include major increases in freeway capacity. However, the proposed realignment of all on-ramps will provide 500 feet of storage length in addition to the standard 300-foot length for a 2-lane on-ramp per HDM standard 504.3L.

The general examples of TSM/TDM improvements include:

- Improve freeway chokepoints as planned by OCTA under "Project D"
- Use "Smart Street" elements such as signal coordination along major arterials
- Enhance technology monitoring traffic by improving response to traffic incidents
- Implement Advanced Traffic Management Systems (ATMS) to monitor and control both freeway and arterial traffic systems based on existing conditions
- Monitor traffic conditions through an Automated Video Detection System
- Create data links among local cities and Caltrans Traffic Management Centers
- Improve Advanced Traveler Information Systems (ATIS) to provide reliable, accurate, and timely information on current traffic conditions to commuters
- Distribute continuous, real-time information on traffic conditions via changeable message signs (CMS), internet, and in-vehicle systems
- Improve travelers' ability to choose the quickest route, potentially reducing travel times

- Provide minor interchange improvements as shown in Exhibits E and F for Alternatives 2 and Alternative 3
- Improve operations on major arterials (streets) to reduce delay and improve traffic flow per MPAH plans
- Add additional turn lanes at ramp intersections to provide additional storage to remove traffic from local arterials

6.5 Traffic Improvements for Build Alternatives

A Traffic Operation Analysis Report was prepared and is provided as a separately bound report.

The existing deficiencies and the future deficiencies for 2040 under the No-Build Alternative would indicate clearly that there is insufficient capacity on the freeway mainline (GP and HOV lanes) for 2040 No-Build conditions, with a projected LOS “E” or “F” in many sections during the AM and PM peak hours. Factors contributing to the noted conditions include limited mainline capacity and high merging, diverging, and weaving volumes at the on - and off-ramps.

The two Build Alternatives address these existing and future deficiencies along the corridor with the addition of mainline lanes and ramp lanes. In this section, performance results are presented, and comparisons are made between the No-Build and Build Alternatives.

The traffic forecasts for the two Build Alternatives use the same 2040 demand volumes as the No-Build Alternative. While it was demonstrated that the No-Build Alternative does not have adequate capacity to serve that demand, use of the same set of forecasts allows a direct comparison to be made between the performance results for the No-Build and Build Alternatives.

6.5.1 Design Year (2040) Alternative 2 Freeway Operations

Table 21 summarizes the 2040 freeway segment analysis results for Alternative 2. Two segments in the AM and four segments in the PM show LOS “E” or “F.” For the HOV lanes, four northbound segments and five southbound segments show LOS “E” or “F.” This is a significant reduction in the number of segments at LOS “E” or “F” under the No-Build Alternative.

6.5.2 Design Year (2040) Alternative 3 Freeway Operations

Table 22 shows the results of the 2040 freeway segment analysis for Alternative 3. One segment in the AM and two segments in the PM show LOS “E” or “F.” This is an improvement over Alternative 2 and a substantial improvement over the No-Build Alternative. Subsection 6.7.8 provides a direct comparison among the three alternatives. The HOV lanes show results similar to Alternative 2 (four northbound segments and five southbound segments at LOS “E” or “F”) since no additional HOV lanes are added beyond what is proposed in Alternative 2 with this alternative.

Table 21
Mainline LOS Summary—2040 Conditions, Project Alternative 2

Location	AM Peak Hour				PM Peak Hour										
	Mainline		HOV		Mainline		HOV								
	HOV	GP	Aux	Vol	Speed	Density	LOS	Vol	V/C	Speed	Density	LOS	Vol	V/C	
NORTHBOUND															
NB s/o Avery Pkwy	1	4	1	7,920	67.9	26.5	D	1,240	.564	7,420	68.9	24.5	C	1,420	.645
NB s/o Crown Valley	1	5	1	7,870	69.8	21.3	C	1,370	.623	7,320	70.0	19.8	C	1,480	.673 E
NB s/o Oso Pkwy	1	5	1	9,010	68.8	24.8	C	1,550	.705 E	8,890	68.9	24.4	C	1,750	.795 F
NB s/o La Paz Rd	1	5	1	10,340	65.6	29.8	D	1,850	.841 F	8,710	69.2	23.8	C	2,090	.950 F
NB s/o Alicia Pkwy	1	5	1	11,960	58.2	38.9	E	1,950	.886 F	8,850	69.0	24.3	C	2,040	.927 F
NB s/o El Toro Rd	2	5	1	15,000	n/a	n/a	F	2,060	.468	10,340	65.6	29.8	D	1,970	.448
SOUTHBOUND															
SB s/o Avery Pkwy	1	4	0	6,830	65.9	29.4	D	1,590	.723 E	8,200	56.0	41.6	E	1,700	.773 F
SB s/o Crown Valley	1	5	1	7,040	70.0	19.0	C	1,800	.818 F	8,350	69.5	22.7	C	1,860	.845 F
SB s/o Oso Pkwy	1	5	1	8,680	69.2	23.7	C	1,700	.773 F	10,540	64.9	30.7	D	2,150	.977 F
SB s/o La Paz Rd	1	5	1	8,640	69.2	23.6	C	1,750	.795 F	11,390	61.3	35.2	E	2,300	1.045 F
SB s/o Alicia Pkwy	1	5	1	9,010	68.8	24.8	C	1,530	.695 E	12,200	56.7	40.7	E	2,400	1.091 F
SB s/o El Toro Rd	2	5	1	10,010	66.6	28.4	D	1,600	.364	13,700	n/a	n/a	F	2,500	.568

Bold = Level of service (LOS) "E" or "F"

Table 22
Mainline LOS Summary—2040 Conditions, Project Alternative 3

Location	AM Peak Hour						PM Peak Hour								
	Mainline			HOV			Mainline			HOV					
	HOV	GP	Aux	Vol	Speed	Density	LOS	V/C	Vol	V/C	LOS	Density	LOS	V/C	
NORTHBOUND															
NB s/o Avery Pkwy	1	4	1	7,920	67.9	26.5	D	1,240	.564	7,420	68.9	24.5	C	1,420	.645
NB s/o Crown Valley	1	6	1	7,870	70.0	18.2	C	1,370	.623	7,320	70.0	17.0	B	1,480	.673
NB s/o Oso Pkwy	1	6	1	9,010	69.9	20.9	C	1,550	.705	8,890	69.9	20.6	C	1,750	.795
NB s/o La Paz Rd	1	6	1	10,340	69.0	24.3	C	1,850	.841	8,710	70.0	20.2	C	2,090	.950
NB s/o Alicia Pkwy	1	6	1	11,960	65.9	29.4	D	1,950	.886	8,850	69.9	20.5	C	2,040	.927
NB s/o El Toro Rd	2	5	1	15,000	n/a	n/a	F	2,060	.468	10,340	65.6	29.8	D	1,970	.448
SOUTHBOUND															
SB s/o Avery Pkwy	1	4	0	6,830	65.9	29.4	D	1,590	.723	8,200	56.0	41.6	E	1,700	.773
SB s/o Crown Valley	1	6	1	7,040	70.0	16.3	B	1,800	.818	8,350	70.0	19.4	C	1,860	.845
SB s/o Oso Pkwy	1	6	1	8,680	70.0	20.1	C	1,700	.773	10,540	68.7	24.9	C	2,150	.977
SB s/o La Paz Rd	1	6	1	8,640	70.0	20.0	C	1,750	.795	11,390	67.3	27.5	D	2,300	1.045
SB s/o Alicia Pkwy	1	6	1	9,010	69.9	20.9	C	1,530	.695	12,200	65.2	30.3	D	2,400	1.091
SB s/o El Toro Rd	2	6	0	10,010	66.6	28.4	D	1,600	.364	13,700	n/a	n/a	F	2,500	.568

Bold = Level of service (LOS) "E" or "F"

6.5.3 Ramp Junction Analysis

The Build Alternatives feature improvements at a number of the ramp junctions, primarily in the form of additional merge or diverge lanes. Table 23 shows the changes compared to the No-Build Alternative.

Table 23---2040 Ramp Lanes Comparison													
Northbound Lanes							Southbound Lanes						
Location	No-Build		Alt. 2		Alt. 3		Location	No-Build		Alt. 2		Alt. 3	
	R	Aux	R	Aux	R	Aux		R	Aux	R	Aux	R	Aux
Avery NB Off	1	0	1	1	1	1	Avery SB On	1	0	1	0	1	0
Avery NB On	1	1	1	1	1	1	Avery SB Off	1	1	1	1	2	2
Crown Valley NB Off	1	1	1.5	1	1.5	1	Crown Valley SB On	1	1	1.5	1	1.5	1
Crown Valley NB Loop On	1	0	1	0	1	0	Crown Valley SB off	1.5	1	1.5	1	1.5	1
Crown Valley NB Direct On	1	1	1.5	1	1.5	1							
Oso NB Off	1.5	1	1.5	1	1.5	1	Oso SB Direct On	1	0	1.5	1	1.5	1
Oso NB Loop On	1	0	1	0	1	0	Oso SB Loop On	1	0	1	0	1	0
Oso NB Direct On	1	0	1.5	1	1.5	1	Oso SB Off	1	0	1.5	1	1.5	1
La Paz NB Off	1	0	1.5	1	1.5	1	La Paz SB Direct On	1	0	1.5	0	1.5	1
La Paz NB Loop On	1	0	1	0	1	0	La Paz SB Loop On	1	0	1	0	1	0
La Paz NB Direct On	1	1	1	1	1	1	La Paz SB Off	1	1	1.5	1	1.5	1
Alicia NB Off	1	0	1.5	1	1.5	1	Alicia SB Direct On	1	0	1.5	1	1.5	1
Alicia NB Loop On	1	1	1	1	1	1	Alicia SB Loop On	1	1	1	0	1	0
Alicia NB Direct On	1	0	1.5	1	1.5	1	Alicia SB Off	2	2	1.5	1	1	0
El Toro NB Off	1	1	1	1	1	1	El Toro SB Direct On	1	0	1.5	1	1.5	1
El Toro NB Loop On	1	0	1	0	1	0	Avd. Carlota SB Loop On	1	0	1	1	1	1
El Toro NB Direct On	1	1	1	1	1	1	Avd. Carlota SB Off	1.5	1	1.5	1	1.5	1

Bold = change from No-Build Alternative
 R = Ramp termini lanes – 1.5 denotes a two lane off ramp with one dedicated lane (auxiliary lane) and one optional lane, or a two lane on ramp entering the freeway as one merge lane and one auxiliary lane
 Aux = Auxiliary lanes

Table 24 summarizes the merge/diverge results for Alternative 2. Several ramp junctions are at LOS "E" or "F" but less than for the No-Build Alternative.

Table 24-Interchange Merge/Diverge Analysis—2040 Conditions, Project Alternative 2								
Location	AM Peak Hour				PM Peak Hour			
	Volumes		Density	LOS	Volumes		Density	LOS
	Fwy.	Ramp			Fwy.	Ramp		
Interstate-5 at Lake Forest								
NB Diverge	15,980	1,000	50.6	F	11,100	590	27.8	C
SB Merge	10,800	230	29.9	D	13,440	610	n/a	F
Interstate-5 at El Toro								
NB Diverge	15,000	1,380	61.5	F	10,340	1,360	33.5	D
NB Merge	14,660	1,320	51.2	F	10,210	890	n/a	F
SB Diverge	11,030	2,050	n/a	F	14,050	2160	54.1	F
SB Merge	9,740	270	19.3	B	13,210	490	n/a	F
Interstate-5 at Alicia								
NB Merge	11,210	1,550	n/a	F	7,750	1,040	39.9	B
SB Diverge	10,010	2,330	n/a	F	13,700	3,060	54.3	F
Interstate-5 at La Paz								
NB Diverge	10,340	370	28.0	D	8,710	890	25.3	C
SB Merge	8,490	150	7.0	A	11,290	100	n/a	F
Interstate-5 at Oso								
NB Diverge	9,010	890	26.3	C	8,890	1,310	28.2	D
NB Merge	8,610	1,730	33.2	D	7,640	1,070	24.3	C
SB Diverge	8,640	1,150	26.5	C	11,390	1,990	n/a	F
SB Merge	8,300	380	20.8	C	10,060	480	27.9	C
Interstate-5 at Crown Valley								
NB Merge	7,570	1,440	27.1	C	7,330	1,560	27.6	C
SB Diverge	8,680	2,350	n/a	F	10,540	3090	45.9	F
Interstate-5 at Avery								
NB Diverge	7,920	730	28.5	D	7,420	980	27.7	C
SB Merge	6,790	540	33.4	D	7,460	710	37.2	E
Interstate-5 at SR-73								
NB Diverge	12,310	4,390	n/a	F	10,000	2,580	n/a	F
SB Merge	7,510	1,350	22.4	C	9,670	2,950	43.4	F
Interstate-5 at Juniper Serra								
NB Diverge	11,550	460	47.2	F	9,620	390	38.3	E
NB Merge	11,130	1,180	n/a	F	9,010	990	28.4	D
SB Diverge	8,860	850	25.6	C	12,620	1,460	n/a	F
SB Merge	7,760	420	27.7	C	11,360	510	n/a	F

The ramp junction LOS results for Alternative 3 are given in Table 25. This shows even less junctions at LOS "E" or "F" than for Alternative 2. Subsection 6.7.8 later in this section provides a direct comparison between these two alternatives and the No-Build Alternative.

Table 25-Interchange Merge/Diverge Analysis—2040 Conditions, Project Alternative 3

Location	AM Peak Hour				PM Peak Hour			
	Volumes		Density	LOS	Volumes		Density	LOS
	Fwy.	Ramp			Fwy.	Ramp		
Interstate-5 at Lake Forest								
NB Diverge	15,980	1,000	50.6	F	11,100	590	27.8	C
SB Merge	10,800	230	29.9	D	13,440	610	n/a	F
Interstate-5 at El Toro								
NB Diverge	15,000	1,380	61.5	F	10,340	1,360	33.5	D
NB Merge	14,660	1,320	51.2	F	10,210	890	n/a	F
SB Diverge	11,030	2,050	n/a	F	14,050	2,160	54.1	F
SB Merge	9,740	270	17.7	B	13,210	490	n/a	F
Interstate-5 at Alicia								
NB Merge	11,210	1,550	n/a	F	7,750	1,040	13.9	B
SB Diverge	10,010	2,330	n/a	F	13,700	3,060	54.3	F
Interstate-5 at La Paz								
NB Diverge	10,340	370	22.1	C	8,710	890	20.4	C
SB Merge	8,490	150	2.6	A	11,290	100	9.8	A
Interstate-5 at Oso								
NB Diverge	9,010	890	21.2	C	8,890	1,310	23.2	C
NB Merge	8,610	1,730	28.7	D	7,640	1,070	21.4	C
SB Diverge	8,640	1,150	21.6	C	11,390	1,990	n/a	F
SB Merge	8,300	380	16.8	B	10,060	480	22.0	C
Interstate-5 at Crown Valley								
NB Merge	7,570	1,440	24.4	C	7,330	1,560	24.9	C
SB Diverge	8,680	2,350	n/a	F	10,540	3,090	n/a	F
Interstate-5 at Avery								
NB Diverge	7,920	730	28.5	D	7,420	980	27.7	C
SB Merge	6,790	540	33.4	D	7,460	710	37.2	E
Interstate-5 at SR-73								
NB Diverge	12,310	4,390	n/a	F	10,000	2,580	n/a	F
SB Merge	7,510	1,350	22.4	C	9,670	2,950	43.4	F
Interstate-5 at Juniper Serra								
NB Diverge	11,550	460	47.2	F	9,620	390	38.3	E
NB Merge	11,130	1,180	n/a	F	9,010	990	28.4	D
SB Diverge	8,860	850	25.6	C	12,620	1,460	n/a	F
SB Merge	7,760	420	27.7	C	11,360	510	n/a	F
LOS Criteria based on Density (pc/mi/ln):								
A ≤ 10		D > 28 - 35						
B > 10 - 20		E > 35						
C > 20 - 28		F Demand exceeds capacity						
Bold = Level of service (LOS) "E" or "F"								

6.5.4 Weaving Analysis

The weaving section results for Alternative 2 are identified in Table 26 below.

Table 26						
Weaving Section LOS Summary—2040 Conditions, Project Alternative 2						
Location	AM Peak Hour			PM Peak Hour		
	Speed	Density	LOS	Speed	Density	LOS
NORTHBOUND						
NB – Avery to Crown Valley	50.7	29.8	D	52.1	27.0	C
NB – La Paz to Alicia	61.8	36.3	E	63.6	26.2	C
SOUTHBOUND						
SB – Crown Valley to Avery	47.2	28.7	D	43.7	36.8	E
SB – Alicia to La Paz	63.2	26.6	C	58.2	39.3	E
Bold = Level of service (LOS) “E” or “F”						

As shown in the table, three of the weave segments are projected to operate at LOS “E” or “F” during at least one of the AM/PM peak hours.

Table 27 shows the projected operations of the weave sections under Alternative 3.

Table 27						
Weaving Section LOS Summary—2040 Conditions, Project Alternative 3						
Location	AM Peak Hour			PM Peak Hour		
	Speed	Density	LOS	Speed	Density	LOS
NORTHBOUND						
NB Avery to Crown Valley	57.2	23.3	C	58.3	21.2	C
NB La Paz to Alicia	60.5	29.6	D	62.4	21.3	C
SOUTHBOUND						
SB Crown Valley to Avery	53.2	21.0	C	50.1	26.6	C
SB Alicia to La Paz	62.6	23.0	C	57.2	34.5	D

No sections are projected to operate at worse than LOS “D” during either of the AM and PM peak hours.

6.5.5 HOV Analysis

The HOV analysis results for the design year (2040) Alternatives 2 and 3 were included in the mainline analysis as discussed above. The results showed four northbound segments and five southbound segments at LOS “E” or “F” for both Build Alternatives.

The HOV merge location within the corridor was analyzed using a modified ramp merge analysis as described for the No-Build Alternative. The two Build Alternatives move the merge point further south, with the result that the merging volumes are lower than for the No-Build Alternative. The LOS results are:

AM Peak Hour	LOS "C"
PM Peak Hour	LOS "D"

6.5.6 Intersection Analysis Results—2040 Build Alternatives 2 and 3

The intersection lane configurations for the No-Build Alternative show some minor improvements compared to existing (currently committed improvements). Additional improvements are then added for the two Build Alternatives, primarily at the ramp intersections. Table 28 summarizes the existing and future intersection lane configurations for the intersections studied.

The same intersection forecasts were used for the two Build Alternatives as applied to the No-Build Alternative. The actual turn movement volumes for the AM and PM peak hours are graphically illustrated in Appendix C of the traffic report.

The LOS results for the study intersections under the two design year (2040) Build Alternatives are summarized in Table 29 and the LOS calculation worksheets are contained in Appendix F of the traffic report.

In the AM peak hour, no ramp intersections are at LOS "E" or "F" and in the PM peak hour three ramp intersections are at LOS "E" or "F."

6.5.7 Queuing Analysis

This section evaluates queuing for the design year (2040) Build Alternatives at the off-ramp intersections and at the on-ramp meters. For the off-ramps, the results show the potential for vehicle queuing to extend back to the freeway mainline. For the ramp meters, the analysis shows the meter discharge rates needed for the ramp to have adequate storage without queuing back onto the surface streets.

Table 30 summarizes the 95th percentile queue lengths in feet compared to the off-ramp storage provided in the Build Alternative configurations. Queuing calculation worksheets are contained in Appendix G at the traffic study.

Table 28---Intersection Lane Geometry---Existing and 2040 Conditions

Intersection	Southbound			Westbound			Northbound			Eastbound			Source
	Lt	Thru	Rt	Lt	Thru	Rt	Lt	Thru	Rt	Lt	Thru	Rt	
Avenida de la Carlota & I-5 SB Ramps													
Existing	2	2	1	2	2	0	1	2	1	2	1	1	
2040 Alternative 1	2	2	1	2	2	0	1	2	1	2	1	1	
2040 Alternatives 2 & 3	2	2	1	2	2	0	1	2	1	2	1	1	
Bridger/I-5 NB Ramps & El Toro													
Existing	1	1	1	0	4	1	1.5	0	1.5	1	2.5	1.5	
2040 Alternative 1	1	1	1	0	4	1	1.5	0	1.5	1	2.5	1.5	
2040 Alternatives 2 & 3	1	1	1	0	4	1	1.5	.5	2	1	2.5	1.5	
I-5 SB Ramps & Alicia													
Existing	1.5	0	1.5	0	3	f	0	0	0	0	4	f	
2040 Alternative 1	1.5	0	1.5	0	3	f	0	0	0	0	4	f	
2040 Alternatives 2 & 3	2	0	2	0	3	f	0	0	0	0	4	f	
I-5 NB Ramps & Alicia													
Existing	0	0	0	0	3	f	1.5	0	1.5	0	3	f	
2040 Alternative 1	0	0	0	0	3	f	1.5	0	1.5	0	3	f	
2040 Alternatives 2 & 3	0	0	0	0	3	f	2	0	2	0	3	f	
Cabot/I-5 SB Ramps & La Paz													
Existing	1.5	.5	1	1	2	0	1	0	2	0	2	1	
2040 Alternative 1	1.5	.5	1	1	2	0	1	0	2	0	2	1	
2040 Alternatives 2 & 3	2	5	1.5	2	2	1	1.5	0	1.5	0	2	1	(1)
Muirlands/I-5 NB Ramps & La Paz													
Existing	2	0	2	0	3	0	1.5	1	1.5	2	2	f	
2040 Alternative 1	2	0	2	0	3	0	1.5	1	1.5	2	2	f	
2040 Alternatives 2 & 3	2	0	2	0	3	0	1.5	1	1.5	2	2	f	
I-5 SB Ramps & Oso													
Existing	2	0	f	0	3	f	0	0	0	0	3	f	
2040	2	0	2	0	3	f	0	0	0	0	3	f	(2)
2040 Alternatives 2 & 3	2	0	2	0	4	f	0	0	0	0	3	f	
I-5 NB Ramps & Oso													
Existing	0	0	0	0	3	f	1	0	1	0	3	f	
2040	0	0	0	0	4	f	1.5	0	1.5	0	3	f	(2)
Existing	0	0	0	0	3	f	1	0	1	0	3	f	
2040	0	0	0	0	4	f	1.5	0	1.5	0	3	f	(2)
2040 Alternatives 2 & 3	0	0	0	0	4	f	1.5	0	1.5	0	3	f	

Table 28---Intersection Lane Geometry—Existing and 2040 Conditions

Intersection	Southbound			Westbound			Northbound			Eastbound			Source
	Lt	Thru	Rt	Lt	Thru	Rt	Lt	Thru	Rt	Lt	Thru	Rt	
Forbes Rd & Crown Valley													
Existing	1	1	1	1	3	1	1	1	1	1	4	0	
2040	1	1	1	1	3	1	1	1	1	2	4	0	(3)
2040 Alternatives 2 & 3	1	1	1	1	3	1	1	1	1	2	4	0	
I-5 SB Ramps & Crown Valley													
Existing	2.5	0	1.5	2	3	0	0	0	0	0	4	1	
2040	2.5	0	1.5	2	3	0	0	0	0	0	5	1	(3)
2040 Alternatives 2 & 3	2.5	0	1.5	2	3	0	0	0	0	0	5	1	
I-5 NB Ramps & Crown Valley													
Existing	0	0	0	0	3	f	1.5	0	1.5	0	3	f	
2040	0	0	0	0	3	f	2	0	1	0	4	f	(3)
2040 Alternatives 2 & 3	0	0	0	0	3	f	2	0	2	0	4	f	
Camino Capistrano & Avery													
Existing	2	1	0	1	0	2	0	1	1	0	0	0	
2040	2	1	0	1	0	2	0	1	1	0	0	0	
2040 Alternatives 2 & 3	2	1	0	2	0	2	0	.5	1.5	0	0	0	
I-5 SB Ramps & Avery													
Existing	1.5	0	.5	1	1	0	0	0	0	0	2	1	
2040	1.5	0	.5	1	1	0	0	0	0	0	2	1	
2040 Alternatives 2 & 3	1.5	.5	2	2	3	0	0	0	0	0	4	0	(4)
I-5 NB Ramps & Avery													
Existing	0	0	0	0	1	f	.5	.5	1	1	2	0	
2040 Alternative 1	0	0	0	0	1	f	.5	.5	1	1	2	0	
2040 Alternatives 2 & 3	0	0	0	0	2.5	1.5	.5	.5	2	2	2	0	(4)
Marguerite & Avery													
Existing	1	2	d	1	2	d	1	2	d	2	2	0	
2040 Alternative 1	1	2	d	1	2	d	1	2	d	2	2	0	
2040 Alternatives 2 & 3	1	2	d	1	2	d	1	2	d	2	2	1	(4)
Bold denotes added or changed lane configuration. ,d – defacto right turn lane,f – free-flow right turn lane Source: (1) La Paz Project Report ,(2) Oso Project Study Report,(3) Crown Valley PS&E,(4) Avery Proposed Layout/City of Laguna Niguel													

Table 29
Intersection LOS Summary—2040 Conditions, Project Alternatives 2 and 3

Location	Int. Type	AM Peak Hour		PM Peak Hour	
		Delay	LOS	Delay	LOS
Avenida de la Carlota & Paseo Valencia/SB Ramps	Ramp	36.5	D	47.9	D
Avenida de la Carlota & El Toro Rd	Local	43.3	D	122.5	F
Bridger/NB Ramps & El Toro Rd	Ramp	40.5	D	65.6	E
Rockfield & El Toro Rd	Local	12.6	B	45.0	D
Alicia Pkwy & Paseo Alicia/Hon	Local	30.2	C	26.8	C
Alicia Pkwy & SB Ramps	Ramp	21.3	C	35.4	D
Alicia Pkwy & NB Ramps	Ramp	6.3	A	14.3	B
Alicia Pkwy & Charlinda	Local	14.5	B	14.9	B
McIntyre & La Paz Rd	Local	26.2	C	20.6	C
Cabot/SB Ramps & La Paz Rd	Ramp	33.0	C	78.2	E
NB Off ramp/Muirlands & La Paz Rd	Ramp	53.8	D	33.9	C
Chrisanta & La Paz Rd	Local	93.6	F	68.0	E
Cabot & Oso Pkwy	Local	52.8	D	45.9	D
SB Ramps & Oso Pkwy	Ramp	8.6	A	31.1	C
NB Ramps & Oso Pkwy	Ramp	9.1	A	47.6	D
Montanoso & Oso Pkwy	Local	156.2	F	44.7	D
Forbes Rd & Crown Valley	Local	43.7	D	50.9	D
SB Ramps & Crown Valley	Ramp	36.7	D	129.5	F
NB Ramps & Crown Valley	Ramp	10.3	B	9.4	A
Kaleidoscope & Crown Valley	Local	16.7	B	27.9	C
Camino Capistrano & Avery Pkwy	Local	52.2	D	68.6	E
SB Ramps & Avery Pkwy	Ramp	16.1	B	17.6	B
NB Ramps & Avery Pkwy	Ramp	13.3	B	21.4	C
Marguerite & Avery Pkwy	Local	51.5	D	68.4	E
Int. Type = Intersection Type Ramp = Ramp intersection		Local = Adjacent local intersection Bold = exceeds performance criteria			

Table 30
Off Ramp Queuing Analysis—2040 Conditions, Project Alternatives 2 and 3

Location	Northbound			Southbound		
	AM	PM	Storage	AM	PM	Storage
I-5 Off ramp at:	AM	PM	Storage	AM	PM	Storage
Avenida de la Carlota	--	--	--	440'	628'	920'
El Toro Road	401'	414'	1,200'	--	--	--
Alicia Parkway	143'	299'	1,400'	473'	864'	1,650'
La Paz Road	206'	314'	1,340'	294'	502'	1,400'
Oso Parkway	218'	486'	1,780'	307'	722'	1,650'
Crown Valley Parkway	171'	259'	1,425'	658'	908'	970'
Avery Parkway	253'	801'	880'	142'	304'	1,030'

Many off-ramps in the project area have been modified/widened out to provide additional storage where feasible within the existing right-of-way (see summary of changes in Table 22). The queuing analysis indicates that vehicle queues will not extend onto the mainline freeway.

The eleven on-ramps along the project corridor were also analyzed for ramp meter queuing in the design year (2040) Build Alternatives. Appendix H of the traffic report contains the ramp meter queuing analysis worksheets. As identified in the Highway Design Manual (HDM), ramp meters have practical lower and upper metering rates of 240 and 900 vehicles per hour per lane (vph/lane), respectively. Using these criteria, a minimum ramp metering discharge rate is selected until the calculated queue per lane is just less than the available storage, thus giving a rate that will prevent queues extending back into the local intersections.

Table 31 presents the ramp metering queuing analysis results for each of the on-ramps within the corridor. At one location, the Alicia Parkway northbound loop on-ramp, 2040 traffic volumes exceed the volume that can be serviced by a 900 vph/lane metering rate. To accommodate these volumes, a metering rate of 1,050 vph/lane would be required unless a third lane is added to the ramp.

6.5.8 No-Build and Build Alternative Comparisons

This section provides comparisons between the No-Build and Build Alternatives. The various performance results presented in Sections 4 and 6 above are summarized here to show the operational improvements provided by the Build Alternatives.

Table 31
On-Ramp Metering Queue Analysis—2040 Conditions, Project Alternatives 2 and 3

NORTHBOUND										SOUTHBOUND				
Location	Peak Hour	Volume	Lanes	Max Q/Lane		Meter Rate per Hour*	Location	Peak Hour	Volume	Lanes	Max Q/Lane		Meter Rate per Hour*	
				Vehicles	Feet						Vehicles	Feet		
Avery NB On	PM	940	2	1	43'	500	Avery SB On	PM	710	2	0	0'	450	
Crown Valley NB Loop On	PM	1,070	2	7	205'	550	Crown Valley SB On	PM	1,190	2	12	351'	600	
Crown Valley NB Direct On	PM	1,560	2	10	312'	800								
Oso NB Loop On	AM	760	2	0	0'	450	Oso SB Direct On	PM	480	2	0	0'	450	
Oso NB Direct On	AM	1,730	2	2	46'	900	Oso SB Loop On	AM	760	2	0	0'	450	
La Paz NB Loop On	AM	810	2	0	0'	450	La Paz SB Direct On	AM	150	2	0	0'	450	
La Paz NB Direct On	AM	1,280	2	7	198'	650	La Paz SB Loop On	AM	450	2	0	0'	450	
Alicia NB Loop On	AM	2,070	2	11	337'	1,050	Alicia SB Direct On	PM	300	2	0	0'	450	
Alicia NB Direct On	AM	1,550	2	3	96'	800	Alicia SB Loop On	PM	1,170	2	8	235'	600	
El Toro NB Loop On	PM	1,190	2	12	351'	600	El Toro SB Direct On	PM	490	1	7	219'	500	
El Toro NB Direct On	AM	1,320	2	0	0'	700	Avd. Carlota SB Loop On	PM	1,180	2	9	285'	600	

*Meter Rate in vehicles per lane per hour
 Bold = Exceeds 900 vph/lane metering rate

Table 32 summarizes the freeway mainline LOS by segment for the No-Build versus Build Alternatives.

Table 32- 2040 Mainline LOS Comparison						
	AM Peak Hour LOS			PM Peak Hour LOS		
	No-Build	Alt. 2	Alt. 3	No-Build	Alt. 2	Alt. 3
NORTHBOUND						
NB s/o Avery Pkwy	E	D	D	D	C	C
NB s/o Crown Valley	D	C	C	C	C	B
NB s/o Oso Pkwy	D	C	C	D	C	C
NB s/o La Paz Rd	F	D	C	F	C	C
NB s/o Alicia Pkwy	F	E	D	D	C	C
SOUTHBOUND						
SB s/o Crown Valley	C	C	B	D	C	C
SB s/o Oso Pkwy	D	C	C	E	D	C
SB s/o La Paz Rd	D	C	C	F	E	D
SB s/o Alicia Pkwy	D	C	C	F	E	D
SB s/o El Toro Rd	E	D	D	F	F	F
Bold = Level of service improved compared to the No-Build Alternative						

Most of the segments are improved in Alternative 2 and further improved in Alternative 3 such that all but the northernmost segment are at LOS "D" or better in that alternative.

For the 2040 merge/diverge analysis, Table 33 compares the LOS results for the No-Build versus Build Alternatives.

Table 33-2040 Interchange Merge/Diverge Comparison						
Location	AM Peak Hour			PM Peak Hour		
	No-Build	Alt. 2	Alt 3	No-Build	Alt. 2	Alt 3
I-5 at El Toro						
NB Diverge	F	F	F	D	D	D
NB Merge	F	F	F	F	F	F
SB Diverge	F	F	F	F	F	F
SB Merge	D	D	D	F	F	F
I-5 at Alicia						
NB Merge	F	F	F	D	D	D
SB Diverge	F	F	F	F	F	F
I-5 at La Paz						
NB Diverge	F	D	C	F	C	C
SB Merge	F	B	B	F	F	C
I-5 at Oso						
NB Diverge	C	C	C	D	D	C
NB Merge	F	D	D	F	C	C
SB Diverge	C	C	C	F	F	F
SB Merge	F	C	B	F	C	C
I-5 at Crown Valley						
NB Merge	F	C	C	F	C	C
SB Diverge	F	F	F	F	F	F
I-5 at Avery						
NB Diverge	E	D	D	E	C	C
SB Merge	D	D	D	E	E	E
I-5 at SR 73						
NB Diverge	F	F	F	F	F	F
SB Merge	C	C	C	F	F	F
Bold = Level of service (LOS) improved compared to No-Build						

The ramp intersection improvements for the Build Alternatives in Section 6 above result in improved LOS at many of the ramp intersections..

For the HOV merge (i.e., the I-5 and I-405 HOV lanes), the merge point is moved to the south under the Build Alternatives. This improves the PM peak hour LOS from “E” to “D” (the AM peak hour LOS is unchanged at LOS “C”).

With respect to the weaving sections, Table 34 compares the two Build Alternatives with the No-Build.

Table 34-2040 Weaving Analysis Comparison						
Location	AM Peak Hour			PM Peak Hour		
	No-Build	Alt. 2	Alt. 3	No-Build	Alt. 2	Alt. 3
NORTHBOUND						
NB Avery to Crown Valley	D	D	C	D	C	C
NB La Paz to Alicia	F	E	D	D	C	C
SOUTHBOUND						
SB Crown Valley to Avery	D	D	C	E	E	C
SB Alicia to La Paz	D	C	C	F	E	D
Bold = Level of service (LOS) improved compared to No-Build						

As can be seen, LOS is improved in three of the weave sections with Alternative 2 and in all four weave sections for Alternative 3 (all sections operate at LOS “D” or better for that alternative).

Several intersections in the design year (2040) No-Build Alternative are projected to operate at LOS “E” or “F” in one or both peak hours, and listed in Table 35 are those ramp intersections that are improved under the Build Alternatives.

Table 35-2040 Intersection LOS Comparison			
Intersection	Peak Hour	No-Build	Build
Bridger/NB Ramps & El Toro Rd	AM	E	D
Alicia Pkwy & SB Ramps	AM	E	C
Alicia Pkwy & SB Ramps	PM	F	D
Cabot/SB Ramps & La Paz Rd	AM	E	C
Cabot/SB Ramps & La Paz Rd	PM	F	E

Table 35-2040 Intersection LOS Comparison			
Intersection	Peak Hour	No-Build	Build
NB Off Ramp/Muirlands & La Paz Rd	PM	D	C
SB Ramps & Avery Pkwy	AM	C	B
SB Ramps & Avery Pkwy	PM	C	B
NB Ramps & Avery Pkwy	AM	D	B
NB Ramps & Avery Pkwy	PM	E	B

6.6 Non-Standard Design Features

Alternative 2— Addition of One General Purpose Lane in Each Direction and Extension of Second HOV Lane: This alternative will have the following advisory non-standard features:

- Standard 201.7 (HDM) Decision Sight Distance- On freeway and expressways the decision sight distances values in Table 201.7 should be used at the lane drops and off-ramp noses to interchanges .

Decisions sight distance at the NB El Toro off ramp is approximately 350 feet which is less than standard length 865 feet required for 55 mph design speed at the nose.

- Standard 302.1 (HDM) The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of paved shoulder.

Shoulder widths between NB SR 73 off-ramp and NB I-5 SB has have outside (right) shoulder and inside (left) shoulder width varying from 6 feet to 10 feet due to existing SR-73 connector's column to be protected in place.

- Standard 501.3 Spacing (HDM)- The minimum interchange spacing shall be one mile in urban areas.

Existing Interchange spacing between Avery Parkway and Crown valley Parkway is 0.82 miles.

Existing Interchange spacing between La Paz and Alicia Parkway is 0.93 miles.

- Standard 504.2 (2) (HDM) Design of freeway entrances and exits should conform to the standard design illustrated in Figure 504.2A-B (single lane) and Figure 504.3L (two-lane entrances and exits) and/or Figure 504.4 (diverging branch connections, as appropriate).
- Northbound Crown Valley Parkway off-ramp "CVP-2" has a radius of 430 feet and a deceleration length of 348 feet.
- Northbound Alicia Parkway off-ramp "AL-2" has a radius of 554.6 feet and a deceleration length of 273 feet.
- Northbound El Toro Road off-ramp "EL-1" has a radius of 300 feet and a deceleration length of 459 feet.

- Southbound El Toro Road off-ramp "El-5" has a radius of 265 feet and a deceleration length of 554 feet.
- Standard 504.3(9) (HDM) The distance between successive on-ramps should be about 1,000 feet unless the upstream ramp adds an auxiliary lane in which case the downstream ramp should merge with the auxiliary lane in a standard 50:1 convergence
- The distance between SB Oso Parkway on-ramp to SB Oso Parkway loop on-ramp "OSO-1 to OSO-6" is 771 feet.
- The distance between NB Alicia Parkway loop on-ramp to NB Alicia Parkway on-ramp "AL-5 to AL-3" 848 feet.
- The distance between SB Alicia Parkway on-ramp to SB Alicia Parkway Loop on-ramp "AL-1 to AL-6" is 448 feet.

Alternative 3- Addition of Two General Purpose Lanes in Each Direction and Extension of Second HOV Lane: This alternative will have the following advisory non-standard features:

- Standard 201.7 (HDM) Decision Sight Distance- On freeway and expressways the decision sight distances values in Table 201.7 should be used at the lane drops and off-ramp noses to interchanges .

Decisions sight distance at the NB El Toro off ramp is approximately 350 feet which is less than standard length 865 feet required for 55 mph design speed at the nose.

- Standard 302.1 (HDM) The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of paved shoulder.
- Shoulder widths between NB SR 73 off-ramp and NB I-5 SB has outside (right) shoulder and inside (left) shoulder width varying from 6 ft. to 10 ft due to existing bents to be protected in place.
- Standard 501.3 Spacing (HDM)- The minimum interchange spacing shall be one mile in urban areas.

Existing Interchange spacing between Avery Parkway and Crown valley Parkway is 0.82 miles.

Existing Interchange spacing between La Paz and Alicia Parkway is 0.93 miles.

- Standard 504.2 (2) (HDM) Design of freeway entrances and exits should conform to the standard design illustrated in Figure 504.2A-B (single lane) and Figure 504.3L (two-lane entrances and exits) and/or Figure 504.4 (diverging branch connections, as appropriate.
- Northbound Crown Valley Parkway off-ramp "CVP-2" has a radius of 430 feet and a deceleration length of 296 feet.
- Northbound Oso Parkway off-ramp "OS-2" has a radius of 500 feet and a deceleration length of 276 feet.
- Southbound Oso Parkway off-ramp "OS-4" has a radius of 625 feet and a deceleration length of 318 feet
- Southbound Alicia Parkway off-ramp "AL-4" has a radius of 440.58 feet and a deceleration length of 271 feet.

- Southbound Alicia Parkway off-ramp “AL-2” has a radius of 500 feet and a deceleration length of 383 feet.
- Northbound El Toro Road off-ramp “EL-1” has a radius of 300 feet and a deceleration length of 459 feet.
- Southbound El Toro Road off-ramp “El-5” has a radius of 265 feet and a deceleration length of 554 feet.
- Standard 504.3(9) (HDM) The distance between successive on-ramps should be about 1,000 feet unless the upstream ramp adds an auxiliary lane in which case the downstream ramp should merge with the auxiliary lane in a standard 50:1 convergence
- The distance between SB Oso Parkway on-ramp to SB Oso Parkway loop on-ramp “OSO-1 to OSO-6” is 625 feet.

6.7 Right-of-Way

The I-5 freeway right of way is bordered on both sides by commercial and residential development. The ATSF railroad easement crosses I-5 at El Toro OH.

The proposed right-of-way for alternative 2 and are listed below:

- **Alternative 2:** Right of Way: 321,164 Square Foot (SF), Temporary Construction Easement (TCE): 15,766 SF, and 66 parcels impacted.
- **Alternative 3:** Right of Way: 534,844 SF, TCE: 6, 807 SF, and 74 parcels impacted.

As an option, to eliminate the right-of-way acquisitions, the I-5 mainline and ramp lane width and shoulders could be reduced from standard design by reducing buffer from 4 feet to 0 foot and reducing the left shoulder from 10 feet to 2 feet (8 feet extra width) to provide for two GP lanes in each direction. Any non- standard alternative should be discussed with Caltrans to be studied further in the PA-ED phase.

Several Parking spaces adjacent to Laguna Hills Mall along Ave De La Carlota will be impacted by both alternatives 2 and 3 as shown on ROW-26, ROW-27, and ROW-28. Appropriate mitigation measures will be studied and evaluated in the PA-ED phase for this location.

Temporary Construction Easements (TCE) of 5 feet is assumed for the construction of several retaining walls footing easement along the proposed right-of-way, as listed below in Table 36. (Not all retaining walls require TCE since they are within existing right-of-way.)

Table 36							
TCE of Retaining Wall Footing Easement							
Retaining Wall	NB		SB		Length (ft)	No. Of Parcels Affected	Temporary Construction Easement Area (SF)
	Begin Sta.	End Sta.	Begin Sta.	End Sta.			
Alternative 2							
CL I-5	676+56	681+68	N/A	N/A	512	0	4380
CL I-5	748+35	762+97	N/A	N/A	1462	3	5815
CL I-5	167+35	169+79	N/A	N/A	244	0	827

Table 36							
TCE of Retaining Wall Footing Easement							
Retaining Wall	NB		SB		Length (ft)	No. Of Parcels Affected	Temporary Construction Easement Area (SF)
	Begin Sta.	End Sta.	Begin Sta.	End Sta.			
Alternative 3							
CL I-5	676+56	681+68	N/A	N/A	512	0	4380

6.8 Transportation Management Plan (TMP)

A Transportation Management Plan (TMP) will be required for this project due to the expected impact on traffic during construction. The TMP will identify methods to reduce traffic delay, maintain the traffic flow through this SB SR-55 corridor, and provide a safe environment for the work force and motoring public. A traffic analysis should be performed as part of the TMP to evaluate the potential impact that the project will have on traffic and to identify the benefit of implementing a TMP.

A TMP will be developed for this project during the PA-ED and in PS&E stages. The report would include the following elements:

- Public awareness campaign
- Traffic system and signing package
- Construction Zone Enforcement Enhancement Program (COZEEP)
- Traffic management team
- Advance Transportation Management System (ATMS)

During construction of this project, no significant traffic delays are anticipated and the existing number of mainline lanes will be maintained during construction. There will be some lane closures due to temporary traffic striping at night for the construction of overhead signs. The cost of traffic management is included in the cost estimate.

6.9 Stage Construction and Temporary Detours

The project proposes to be constructed by temporary striping of the mainline freeway to create a buffer zone for placement of temporary K-railing along existing travel lanes. The existing four GP freeway lanes would be striped to 11-foot lanes to provide for 4 feet of widening required during construction.

The existing ramps may be closed temporarily for reconstruction of the on-ramps and off-ramps at gore areas and street intersections. However, closure will be kept to a minimum at night and/or on weekends. Traffic attempting to get to and from local roads would have to detour using the next existing interchanges. Consecutive ramps shall not be closed unless full freeway closure is required.

The project will require constructability review during the design phase. This will require safety and constructability reviews after the PID review at the 35% and 95% design reviews, depending on the selected alternative for this project. It is not considered a complex roadway project (including widening projects with minimal staging/traffic handling requirements) and includes non-complex structure widening.

6.10 Structures

6.10.1 Structures for Alternative 2

- **Avery Parkway UC:** Currently, this structure has a non-standard vertical clearance (14'-8"). It will be reconstructed with new PC/PS rectangular girders to accommodate the additional widening on Avery Parkway per MPAH plans.
- **Crown Valley Parkway OC:** Standard retaining walls approximately 180 feet long and 110 feet (97 feet) from centerline of freeway are proposed to accommodate I-5 widening.
- **Oso Creek Bridge:** The bridge will be widened using a CIP/RC slab similar to the existing structure.
- **Oso Parkway OC:** Standard retaining walls approximately 630 feet long and 110 feet from centerline of freeway are proposed to accommodate the I-5 NB widening and realigned on-ramp. Standard retaining walls approximately 170 feet long and 108 feet from centerline of freeway are proposed to accommodate the I-5 SB widening.
- **El Toro OH:** The overhead will be widened using PC/PS rectangular girders. The off-ramp at El Toro OH will be replaced. Replacement is warranted because the new ramp alignment has been shifted in the east direction. A three-span PC/PS I-girder bridge, 239 feet long and 39 feet wide is proposed.
- **La Paz Road UC:** Currently, this structure has a non-standard vertical clearance (14'-10"). As a result it will be reconstructed. A PC/PS slab on the west side and PC/PS I-girders on the east side are proposed.
- **Alicia Parkway OC:** Currently, there is a standard retaining wall located adjacent to the NB on-ramps. To protect the existing retaining wall, the proposed 4' buffer and 10 feet standard left shoulder at this location are reduced to 0.0' and 2 feet respectively to provide the additional fifth general purpose lane. However, the existing paved slope in the SB direction will be reconstructed and replaced with a tie back wall for the new fifth general purpose lane. Standard retaining wall cost is included in the project cost estimate.
- **Aliso Creek Bridge:** The bridge will be widened using a CIP/RC slab similar to the existing structure.
- **Los Alisos Boulevard OC:** The overcrossing will be replaced. Replacement is warranted because the widened I-5 interferes with the bridge abutments. A two-span CIP/PS box girder, 295 feet long and 88 feet wide is proposed.
- **El Toro Road UC:** The undercrossing will be widened using PC/PS rectangular girders. The seismic retrofit cost is included in the cost estimate.

6.10.2 Structures for Alternative 3

- **Avery Parkway UC:** Currently, this structure has a non-standard vertical clearance (14'-8"). It will be reconstructed with new PC/PS rectangular girders to accommodate the additional widening on Avery Parkway per MPAH plans.
- **Crown Valley Parkway OC:** The overcrossing will be replaced. Replacement is warranted because the widened I-5 interferes with the bridge west abutment. A two-span, 288 feet long and 141 feet wide bridge with California Wide Flange girders is proposed. Stage construction is anticipated. The profile of the new Crown Valley Parkway OC will be raised to comply with the minimum vertical clearance requirement at the widened I-5 SB.

- **Oso Creek Bridge:** The bridge will be widened using a CIP/RC slab similar to the existing structure.
- **Oso Parkway OC:** Standard retaining walls approximately 630 feet long and 120 feet from centerline of freeway are proposed to accommodate the I-5 NB widening and realigned on-ramp. A tie back retaining wall approximately 110 feet long and 120 feet from centerline of freeway is proposed to accommodate the I-5 SB widening. Standard retaining walls are required adjacent to the proposed tie back wall. Standard retaining wall cost is included in the project cost estimate.
- **El Toro OH:** The same as Alternative 2
- **La Paz Road UC:** The same as Alternative 2
- **Alicia Parkway OC:** The same as Alternative 2
- **Aliso Creek Bridge:** The same as Alternative 2
- **Los Alisos Boulevard OC:** The same as Alternative 2
- **El Toro Road UC:** The same as Alternative 2.

6.11 Drainage

The general drainage flow-direction is from the northeast to the southwest. Between El Toro Road and La Paz Road, drainage is tributary to Aliso Creek by route of the Munger Creek Diversion Storm Drain and Aliso Creek Channel. For the remaining portion of the alignment south of La Paz Road, drainage is tributary to San Juan Creek by route of the La Paz Channel, Oso Creek, and Trabuco Creek.

The proposed project will not change the drainage pattern. All existing inlets along the edge of the shoulders will be relocated to the new edge of the shoulders, and existing inlets will be capped. The existing longitudinal drainage systems, which are located along the edge of shoulders, will be removed or abandoned. New longitudinal drainage systems will be constructed along the shoulders with additional inlets to carry the additional drainage, due to the widening. This assumption will assure that the flooded widths along the proposed shoulders do not encroach the mainlines.

Major off-site existing drainage structures carrying the onsite drainage within the project limit include:

STA 210+00

- Munger Diversion Storm Drain/Munger Creek Channel (J01P01/J01P02)
- Crosses just south of El Toro

STA 171+00

- Aliso Creek Channel (J01)
- Crosses between El Toro and Los Alisos
- Flow-direction is northeast to southwest

STA 140+50

- Alicia Storm Drain (J05P03)
- Crosses just south of Alicia Parkway
- Flow-direction is northeast to southwest

STA 129+00 to 139+00

- Costeau Storm Drain (J05P04)
- Parallels I-5 between La Paz Road and Alicia Parkway

STA 97+00

- La Paz Channel (L04)
- Triple 6'X5' RCB
- Flow-direction is north to south

STA 15+00

- Oso Creek
- Crosses just south of Oso Parkway
- Flow-direction is northeast to southwest.
- Parallels I-5 south past the SR-73 junction; flow direction is generally north to south to confluence with Trabuco Creek

Between El Toro Road and Los Alisos Boulevard, drainage converges to the Munger Creek Storm Drain, which eventually confluent with Aliso Creek a couple miles southwest of the El Toro interchange. Between Aliso Creek Boulevard and Alicia Parkway, flows are directly tributary to Aliso Creek Channel. Between Aliso Creek Boulevard and La Paz Road, drainage flows converge to the Costeau Storm Drain and the Alicia Storm Drain, which eventually confluence with Aliso Creek a couple miles southwest of the Alicia Parkway interchange. Between La Paz Road and SR-73, drainage generally flows in the southwest direction towards the La Paz Channel and the Oso Creek Channel. The La Paz Channel crosses I-5 just south of La Paz Road and parallels along the west side I-5 from this point to the confluence with Oso Creek Channel. Oso Creek crosses I-5 just south of Oso Parkway and parallels along the west side of I-5 south of the project limits to Trabuco Creek which finally routes to San Juan Creek.

Onsite drainage systems along the right existing shoulders within the project limits will require relocation due to the freeway widening. In addition, major existing box culverts and RCB, which carry the onsite drainage system to the offsite drainage system, will also require extension due to the freeway widening.

6.12 Utilities : Existing utilities within Caltrans right-of-way are to be protected in place or relocated during the construction of the project as shown in EXHIBIT J "Utility Plan." The existing overhead utility line and existing underground utility lines will be protected in place and/or relocated by the utility agencies. Further investigation of the existing utility facilities will be at the Project Report phase and contained in the Utility Sheets. The following is a list of utility owners that will be notified:

AT&T Distribution	ATT Transmission TCG
Capistrano Valley Water District	Cox Communications
City of Lake Forest	Eller Media Company (Clear Channel Outdoor)
El Toro Water District	Kinder Morgan Energy Partners/SFPP
City of Laguna Hills	City of Laguna Niguel
Level 3 Communications	MCI (Verizon Business)
City of Mission Viejo	Moulton Niguel Water Dist
County of Orange, RDMD	QWEST
San Diego Gas & Electric	SDG&E- Electric Transmission
City of San Juan Capistrano	Santa Margarita Water District
Southern California Edison	SC Gas-Aliso Viejo
SC Gas Aliso Viejo-Transmission	Transportation Corridor Agency
Verizon Huntington Beach	Caltrans District 12

Table 37 lists only utility impacts that will occur in newly acquired ROW. Utilities impacted in previously owned Caltrans ROW are not shown. All stationing is based on I-5 mainline stations. See Exhibit G for Utility Plans.

Table 37 - Alternate 2 and 3 Utility Impacts with Right of Way Acquisition			
Sheet	Station	Description	Impact
U-1		No impact	
U-2	675+75	8" Water w/ sewer	Pothole required
U-3,U-4,U-5		No impact	
U-7	744+50	10" sewer line in sleeve	Pothole required
	750+50	Steel power pole west side	Relocate
U-8	751+10	Tower and steel power pole west side	Relocate
U-9	768+00	10" sewer line in 30" sleeve	Pothole required
	775+18	16" fuel line in sleeve	Relocate
U-10		No impact	
U-11	21+60	12" sewer line in 47" sleeve	Pothole required
U-12	43+00 - 43+50	Telephone line on west side	Relocate
U-13	43+50 - 49+00	2 telephone lines on west side	Relocate
	50+90 - 56+50	2 telephone lines on west side	Relocate
U-14	56+50 - 70+50	2 telephone lines on west side	Relocate
U-15	70+50 - 72+00	2 telephone lines on west side	Relocate
	76+50 - 84+50	16" fuel line east side	Relocate
U-16	84+50 - 98+00	16" fuel line east side	Relocate
	97+90	Pole west side	Relocate
U-17,U-18,U-19		No impact	
U-20	131+70 - 134+70	Telephone lines on west side	Relocate
U-21,U-22, U-23		No impact	
U-24	171+70	Joint pole north east side	Relocate
U-25	175+30	Joint pole north east side	Relocate
	175+90	Joint pole north east side	Relocate
	186+00 - 188+50	Electrical lines east side	Relocate
	184+50	Power pole south west side	Relocate
	186+75	Power pole south west side	Relocate
U-26	188+90	Power pole south west side	Relocate

Table 37 - Alternate 2 and 3 Utility Impacts with Right of Way Acquisition			
Sheet	Station	Description	Impact
	191+00	Power pole south west side	Relocate
	197+80	Power pole south west side	Relocate
	198+80	Power pole south west side	Relocate
	188+50 - 196+80	Electrical line on north east side	Relocate
	197+00 - 201+50	42" water lines on south west side	Relocate
	197+00 - 201+50	Telephone lines on south west side	Relocate
	199+10 - 201+50	Telephone lines on south west side	Relocate
	198+80 - 201+50	Electrical lines on south west side	Relocate
U-27	201+50 - 208+00	Electrical lines on south west side	Relocate
	201+50 - 213+00	Telephone lines on south west side	Relocate
U-28,U-29	No Impact		

6.13 Retaining Walls

Retaining walls will be required to retain new embankment fills for the outboard widening or to retain abutments of the overcrossings. For retaining embankment fills, Type 1 through Type 7 walls or Mechanically Stabilized Earth (MSE) walls may be more appropriate depending on cost, height of wall, anticipated settlement and need for pile foundations, and bearing capacity requirements based on local soil conditions. Cut walls below abutment foundations will typically require tiebacks.

The existing MSE wall between stations 675+00 to 682+00 as shown on layout sheet L-2, adjacent to Marguerite Parkway will be replaced and reconstructed due to existing pavement settlement condition. Full geotechnical analysis regarding settlement along this existing MSE wall shall be performed for stability of existing retained slope. Based on the new findings, a new MSE walls may not be able to be used for this location.

Retaining walls for Alternative 2 will be at:

- Crown Valley Parkway OC: Type 1 Retaining Wall
- Oso Parkway OC: Type 1 Retaining Wall
- Alicia Parkway OC: Type 1 Retaining Wall and Tieback Wall
- Type 1 Retaining Wall or similar wall up to 15 feet high
- Type 1 Retaining Wall or MSE where embankment cuts are required and limited right-of-way is available for the new auxiliary or GP lanes
- A Type 60 concrete barrier with chain link fence with MSE wall would be constructed along NB I-5 from Sta 676+00 to Sta 682+19
- A Type 60C concrete barrier with chain link fence would be constructed along SB I-5 from Sta 190+00 to Sta 214+50

Retaining walls for Alternative 3 will be at:

- Oso Parkway OC: Type I Retaining Wall and Tieback Wall

- Alicia Parkway OC: Type 1 Retaining Wall and Tieback Wall
- Type 1 or similar wall up to 18 feet high
- Type 1 or MSE where embankment cuts are required and limited right-of-way is available for the new auxiliary or GP lanes
- A Type 60 concrete barrier with chain link fence with MSE wall would be constructed along NB I-5 from Sta 676+00 to Sta 682+19
- A Type 60C concrete barrier with chain link fence would be constructed along SB I-5 from Sta 190+00 to Sta 214+50

6.14 Noise Impacts

According to the Traffic Noise Analysis Protocol, this project is a Type 1 project and will require traffic noise impact evaluations for all alternatives under consideration. The proposed project would result in higher freeway average daily traffic (ADT) through the corridor than under the No Build Alternative. It is possible that all proposed alternatives would result in a permanent increase in freeway noise levels due to additional traffic lanes and related volumes and changes in roadway geometry. Elevated noise levels would also be experienced during construction activities.

Residences adjacent to the freeway would be particularly sensitive to noise levels. Sound walls exist intermittently along the entire project freeway segment. Some existing sound walls may have additions. New sound walls may be constructed to attenuate traffic noise. Some existing sound walls may be removed to accommodate the proposed project, but they would be replaced if found reasonable and feasible in the traffic noise study. Determination of where new sound walls would be constructed, if necessary, will be made during the project approval and environmental approval (PA&ED) stage based on the traffic noise study report.

6.15 Fills

Where the freeway is elevated above surrounding grades, fills will be required to widen the freeway on the outboard sides. Retaining walls will be required to retain the fills where right-of-way is limited. Fills will also be required for grading of ramps and other improvements. A summary of fill areas for Alternate 3 is shown in Table 38. Based on existing freeway and surrounding grades, maximum height of fill slopes or walls may be about 20 to 30 feet. Fill slopes will typically be inclined at 2h:1v or flatter. Where possible, Caltrans requires slopes to be 4h:1v, or a design exception will be needed.

Cut slopes or walls will be required in many areas, primarily on the northbound side. Due to limited right-of-way, most cuts will likely require retaining walls. A summary of cut/fill areas for Alternative 3 is shown in Geotechnical Assessment Report (separately bounded report).

Table 38 -Summary of Fill Areas for Alternate 3

Location	Northbound		Southbound		Structure Name	Work
	From	To	From	To		
Avery Parkway	695+00				Avery Parkway OC	Widen NB and SB. Small fill walls required at approach
	699+00	705+75			Avery Parkway NB on ramp	Fill
Crown Valley Parkway	718+75	737+00			NB Crown Valley Pkwy off ramp	Cut Right of way required
	738+50				Crown Valley Pkwy OC	Tieback wall under abutment by cut in to existing unpaved slope at NB and continue with RW on both side
			744+50	757+00	SB Crown Valley Pkwy off ramp	Fill Right of way required
Oso Parkway	31+00	36+20			Oso Parkway NB on ramp	Cut Demo existing RW and build new RW
	36+70				Oso Parkway OC	Tieback wall under abutment by cut in to existing unpaved slope at NB and continue with weight of way on both side
La Paz Road	101+50	107+00			NB La Paz Road off ramp	Fill
	105+00	106+20			NB La Paz Road on ramp	Fill
	106+50				La Paz Road UC	Widen both NB and SB side and widen NB on ramp portion of the bridge. (Existing unpaved slope is in poor condition)
	107+40	114+00			NB La Paz Road on ramp	Fill
			106+85	109+20	SB La Paz Road on ramp	Fill
			106+50	110+00	SB La Paz Road off ramp	Cut up to 8 feet
			111+50	126+00	SB La Paz Road off ramp	Cut up to 10 feet
	115+00	132+00			NB La Paz Road on ramp	Cut
Alicia Parkway	141+00	149+50			NB Alicia Pkwy off ramp	Cut
			133+25	153+00	SB Alicia Pkwy on ramp	Fill Demo existing SW and build new SW
			152+25	154+50	SB widen and slope under abutment approach	Cut RW required
	153+75	154+75			NB Alicia Pkwy on ramp	small cut and continue existing RW

Table 38 -Summary of Fill Areas for Alternate 3						
Location	Northbound		Southbound		Structure Name	Work
	From	To	From	To		
	155+50				Alicia Pkwy OC	Tieback wall for widen under abutment 1
			156+00	158+00	SB Alicia Pkwy on ramp	Cut RW under abutment approach
Los Alisos Boulevard	181+15				Los Alisos Blvd. OC	Tieback wall under abutment 1 and 3. Existing should be demolished and construct new tieback wall
El Toro Road	215+75	219+70			NB El Toro on ramp	Minor fill
	220+30				El Toro Road UC	Widen both NB and SB side. Extend tieback wall under abutment 1 & 3 approaches
			221+00	226+00	SB El Toro on ramp	Fill Relocate portion of existing RW

Placement of new fills may add new load to existing buried drainage facilities. Analysis of additional loading will be considered on the culverts during PA-ED phase. Where embankments are placed above existing open channels, slope stability will need to be evaluated. The following channels, and others, will be affected:

Table 39 Major Existing Drainage Facility		
STA (NB)	STA (SB)	Crossing Facility Description
697+00	697+00	DBL 6'X3' RCB
717+25	717+25	4'X4' RCB
729+50	728+00	DBL 5'X3' RCB
741+50	741+50	TRIPLE 5'X6' RCB
758+50	757+00	DBL 36" RCP
768+00	768+00	5'X3' RCB
8+00	7+00	DBL 36" RCP
15+50	15+50	OSO Creek Bridge
78+50	78+50	42" RCP
98+00	98+00	TRIPLE 6'x5' RCB (LA PAZ CHANNEL)
133+25	133+25	4'X3' RCB

Table 39		
Major Existing Drainage Facility		
STA (NB)	STA (SB)	Crossing Facility Description
150+25	150+25	4'X4' RCB
171+00	171+00	40'X7.5' (Aliso Creek Channel)
191+75	191+75	TRIPLE 5'X2' RCB
198+00	204+00	42" Storm Drain (Munger Diversion)
200+75	200+75	4'X2' RCB
204+00	210+00	63" Storm Drain (Munger Diversion)
209+00	210+00	6'X3' RCB
210+00	210+00	8'X3' RCB (Munger Creek Channel)

6.16 Ramp Termini , Maintenance Vehicle Pullout (MVP), ADA

6.16.1 Portland Cement Concrete (PCC) ramp termini would be constructed at the off-ramp termini impacted by widening, as shown in Exhibit E and F Layouts. The length of ramp termini section will follow HDM guidelines and include signal queuing length for final ramp termini length.

6.16.2 Maintenance Vehicle Pullout (MVP) will be constructed at the locations listed below:

Northbound:

- NB Avery Parkway on-ramp
- EB to NB Crown Valley Parkway on-ramp
- WB to NB Crown Valley Parkway on-ramp
- EB to NB Oso Parkway on-ramp
- WB to NB Oso Parkway on-ramp
- EB to NB La Paz Road on-ramp
- EB to NB El Toro Road

Southbound:

- SB Crown Valley Parkway on-ramp
- SB Oso Parkway off-ramp
- EB to SB Oso Parkway on-ramp
- WB to SB Oso Parkway on-ramp
- SB between La Paz Road on-ramp and Oso Parkway off-ramp
- EB to SB La Paz Road on-ramp
- WB to SB La Paz Road on-ramp
- EB to SB Alicia Parkway on-ramp
- WB to SB Alicia Parkway on-ramp
- WB to SB El Toro Road

Final locations will be determined by Caltrans maintenance and Operational Review during PA-ED and PS&E phases.

6.16.3 Nonmotorized and Pedestrian Facilities -Existing sidewalks and curb ramps, within the State highway right-of-way, will be reconstructed per Caltrans Standard Plan to comply with American with Disabilities Act (*ADA*) requirements.

Bicycle traffic shall be considered at all freeway crossing locations. Consideration of "Complete Streets" criteria during PA-ED shall be incorporated into the project.

6.17 Ramp Metering

Over the years, Caltrans has implemented ramp and freeway to freeway connector metering as an effective traffic management strategy. Ramp meters operate most effectively when upstream mainline traffic is controlled. This control has been accomplished on this corridor by metering on-ramp to freeways and proposed metering freeway-to-freeway connectors. Therefore, all existing ramp metering and fiber optic communication systems will be adjusted at impacted on-ramps and the mainline due to widening. Relocation of changeable message sign (CMS) system, Closed Circuit Television (CCTV), loop detector, and cabinets will be determined during the PS&E stage.

Existing loop detectors on the mainline would be impacted with the addition of the new GP and new auxiliary lane on the mainline. Loop detectors will be installed; centered on each lane. Loop detectors, CCTV, CMS, transportation management system (TMS), ramp metering system (RMS), and fiber optics will be operated during construction. Adaptive ramp metering system (ARMS) and lane gantry management signs will be incorporated as a part of PS&E.

6.18 Overhead Sign and Signs

All existing overhead signs at the exit ramps will be located to the new edge of shoulders auxiliary lane or GP lanes. Any overhead signs to be installed on new retaining wall or concrete barrier will be designed per Caltrans Standard Design Guidelines.

In addition, there will be nighttime full closure due to relocation of the overhead sign structure when widening the freeway. All the signs, sign structures, pavement delineation, metal beam guard rails (MBGRs), and call boxes affected by the proposed work would be removed and replaced following the current standards.

6.19 Geotechnical Assessment Site and Subsurface Conditions

6.19.1 Site Conditions

I-5 generally trends north/south from SR-73 to La Paz Road, and then trends generally southeast/northwest from La Paz to the El Toro "Y".

Between SR-73 and Oso Parkway, the alignment runs along the foothills at the east edge of the valley of south flowing Oso Creek. From Oso Parkway to Lake Forest Drive the roadway runs through moderately hilly terrain. From Lake Forest to the El Toro "Y" I-5 runs through a relatively level plain. Significant drainages crossing the alignment include Trabuco Creek, Oso Creek, Aliso Creek, San Diego Creek, and Serrano Creek, all of which generally flow to the southwest or to the south at the location of I-5. Regional drainage is to the west and north in the area north of El Toro Road. South of El Toro Road the regional drainage is toward the south and southwest.

I-5 elevations along the corridor at the beginning of project runs at elevations of El. 240 feet (N5-N73 Connector Viaduct), El. 250 feet (Avery Pkwy.), El. 280 feet (Crown Valley Pkwy.), El. 310 feet (Oso Creek Bridge), El. 345 feet (Oso Pkwy.), reaching a high point of about El. 400 feet (La Paz Rd.), El. 385 feet (Alicia Pkwy), El. 370 feet (Aliso Creek Bridge), El. 380 feet (El Toro Rd.), then dropping again to near El. 260 feet at the El Toro "Y".

Due to the hilly topography and intervening alluvial drainages, substantial cuts and fills were made to create the I-5 roadbed and to facilitate the grade separations at Overcrossings and Undercrossings.

6.19.2 Geology

The geology of the corridor is mainly is located within or adjacent to the eastern portion of the San Joaquin Hills, and the northern end drops into the flat-lying alluvial fan of the Tustin Plain. The hills are generally comprised of sedimentary soft rock of Tertiary-age, flanked by older alluvial terrace deposits. The hills and terraces are dissected by relatively narrow alluvial drainages.

6.19.3 Subsurface Data from as-Built Log of Test Borings at Bridges

Subsurface conditions in the area generally consist of fill soils, young alluvium, older alluvium, and sedimentary soft rock materials. Fill soils are generally relatively shallow (up to a maximum of about 20 to 30 feet) and were placed at abutment approaches, as canyon fills, or to raise the freeway embankment above the alluvial valley floor. Fills have been placed over variable materials, including older and younger alluvial soils, and sedimentary soft rock materials. Where alluvial soils are present, they may consist of old well consolidated alluvium or alluvial fans in the elevated terraces, or may be young poorly consolidated alluvial deposits within or adjacent to the active drainages. Underlying the alluvial deposits the materials at the site are generally sedimentary soft rocks of the Niguel Formation (Tn), Capistrano Siltstone (Tcs), and Monterrey Formation (Tm). As-built LOTBs for the bridges are presented in the Geotechnical Report (Attachment xx) in Figures 5A through 5N.

6.19.4 Liquefaction Potential

In summary, overall liquefaction potential in the project area is generally low, except in the alluvial canyons where it may be low to high, depending on soil type (sand versus clay), depth of loose materials, and actual groundwater levels. All structures sites within alluvial areas or where shallow groundwater is present should be quantitatively investigated for liquefaction potential in the final design studies.

Based on as-built LOTB, high and low liquefaction potential at each bridge site is classified as:

- **Liquefaction potential is high for:** Avery Pkwy UC, Oso Creek, El Toro OH Aliso Creek Bridge
- **Liquefaction potential is low for:** Crown Valley Pkwy OC, Oso Pkwy OC, La Paz Rd UC, Alicia Pkwy OC, Los Alisos Blvd, El Toro Road UC

6.19.5 Pavements

The project engineer shall request a Materials Report in the early stage of the Project Report preparation. The Materials Report shall include the results of field tests and sampling for R-Value, sieve analysis, sand equivalent, expansion, plasticity index, corrosion and structural sections

recommendations. Structural sections will be calculated based on R-values obtained from sampling and testing of the native materials and traffic index. Caltrans District 12 Materials Division recommends that for ramps and existing mainline pavements exploratory cores be performed to determine as-built existing sections, and that a deflection study be performed in accordance with Caltrans Test Method 356 (June 2004) where pavement rehabilitation or upgrade of existing pavements is required.

The proposed structural pavement sections are shown in Exhibit D, typical sections per as-built plans. No data are available on Traffic Index or R-Values used to develop these sections.

New pavements for the project may be Jointed Plain Concrete Pavement (JPCP) or Asphalt Concrete Pavements (ACP), and will be designed in accordance with the latest Caltrans Highway Design Manual, considering the actual tested R Value of the site subgrade and the design traffic index. Near surface soils and formations in the project area are highly variable and ranges from high R-Value granular soils to low R-Value clays and silts. Final design sections should be based on the latest Highway Design Manual and actual design TI and R-Value. Caltrans District 12 requires removal up to 4 feet below the top of pavement, if the plasticity index (PI) is greater than 12. Significant portions of this alignment are expected to have PI greater than 12 within 4 feet of the top of the pavement.

No current TI values have been provided. Once TI values are available, preliminary sections may be estimated using R-Value of 10, to be confirmed by R-Value testing during PS&E. Prior to actual R-Value determination, preliminary Hot Mix Asphalt (HMA) sections may be determined using the computer program CalFP Version 1.1 (or latest), and preliminary rigid pavements may be selected using Table 723.1E (south coast region, Type II Subgrade Soil [R-Values of 10 to 40]) of the HDM (September 1, 2006).

Typical Cross Sections of the pavement shown on Plans in Appendix C indicate presence of a drainage layer (ATPB) for portions of the outside lanes of existing pavement. If they are correct, then the new pavement may require a subsurface drainage layer to provide continuity for the water to drain. For rigid pavements per Table 623.1E of HDM, if ATPB is needed for TIs > 10.0 to perpetuate an existing treated permeable layer, place the ATPB between the surface layer (JPCP or CRCP) and the base layer, and no deduction is made to the thickness of the base and subbase layers on account of the ATPB. For flexible pavements per HDM Section 633.1, when determining the appropriate safety factor to be added, Asphalt Treated Permeable Base (ATPB) should be considered as part of the surface layer. During the PR phase, detailed analysis of edge drain system with new pavement sections will be engineered to intercept the existing drainage system under the existing shoulders.

In addition, 1 inch Asphalt Concrete Type 1 overlay pavement will be placed for the entire corridor where the existing pavement is Asphalt Concrete. Any surface water due to runoff shall be properly drained into the cross-culvert and inlets or catch basins. The impact of a new drainage system on existing drainage shall be considered.

A life cycle cost analysis (LCCA) is required in the PS&E stage in accordance with the Memorandum to District Directors from Richard D. Land dated March 7, 2007, to evaluate and optimize initial versus long-term costs for various alternatives recommended for design. LCCA is

required for all projects with approval date of July 1, 2007, or later, and shall be performed in accordance with HDM Topics 612 and 619 (September 1, 2006).

It is imperative that special attention is given to the mix design, compaction, and temperature requirements for flexible pavement as stated in Caltrans Standard Specifications and project Standard Special Provisions. For all flexible pavements, special attention must be given to the mix design and compaction requirements. A copy of the approved mix design (plant sampling/laboratory test results from Southern Regional Laboratory) for Hot Mix Asphalt (HMA) shall be provided to the District 12 Materials Office prior to paving operation. A summary of all field compaction records (RAC-G, HMA, HMA Base, and Aggregate Subbase) shall be provided to District 12 Materials Office at the conclusion of the construction activities and during the project closeout. In addition, a copy of all field temperature measurements shall be submitted at project closeout.

Hot Mix Asphalt (HMA) shall be ¾-inch Type "A," Rubberized Hot Mix Asphalt—Gap Graded (RHMA-G) shall be ¾-inch. HMA mix shall follow requirement in section 39 of Caltrans Quality Control and Quality Assurance specifications for Asphalt Concrete (when quantity of AC is over 10,000 Ton), and HMA shall follow section 39 of Caltrans Standard Specifications May 2006. Aggregate Subbase (AS) shall be Class 2 and follow requirements in section 26 of Caltrans Standard Specifications May 2006.

The joint between the existing pavement and the new pavement shall be sealed. A layer of prime coat shall be applied between all bounded and unbounded layers. A layer of tack coat shall be applied to all vertical-cut faces and between subsequent AC lifts.

For further details, see the separately bound "Geotechnical Assessment" report that accompanies this report.

6.20 Electrical

The electrical work involved in this project includes relocation of existing electrical systems such as lighting along the ramps, ramp metering, controller cabinets, splice vaults, CMS system, sign lighting, and fiber optics.

Electrical components shall be relocated outside the 30' clear recovery zone or protected in place with breakway foundations

6.21 Replacement Planting

Existing planting and irrigation systems removed during roadway construction will be replaced. Replacement planting will be split from the roadway project and be a separate follow-up project. Specimen trees will be used to replace mature trees removed by the roadway contract.

6.22 Irrigation Modification

Irrigation modification work shall be included as part of the roadway contract. Irrigation modification work shall include extending irrigation crossovers under roadways and ramps and inside bridge cells and modifying the existing system to maintain water supply to undisturbed planting areas.

All Gore areas will be paved with stamp concrete or AC Min 20 feet in width from nose to minimize maintenance worker exposure to traffic.

6.24 Contiguous HOV Access

Caltrans and OCTA are in the process of converting all HOV limited access striping to contiguous HOV access. The existing HOV striping along this corridor within this project limit will be converted before this project is completed.

The existing 4 feet buffer shall be eliminated and distributed to the existing shoulders. The removal of the buffer shall result in a project savings for R/W and construction during PA-ED phase for this project.

6.25 Operation Safety Analysis

An Operation safety analysis separate from safety review shall be conducted during PA-ED phase to include studying the need for additional lighting, signage, delineation and pavement grinding due to wider urban cross section. The findings may result in inclusion of operational and safety features that would exceed the minimum design standards. Provisions for all signing, lighting, and safety devices will need to be accommodated outside the standard shoulders or clear recovery zone areas which may require changes to the location of proposed walls and right of way. Coordination with design and R/W needs shall be implemented early in the PA-ED phase.

6.26 Final Operational Pavement Surface

About 1" inch Asphalt Concrete Type 1 overlay pavement will be placed for the entire corridor where the existing pavement is Asphalt Concrete. PCC diamond grinding shall occur as base for final striping to remove all existing and ghost striping to provide ultimate pavement delineation.

7. COMMUNITY INVOLVEMENT

No public involvement or hearing was organized for developing the Purpose and range of Alternatives for this PSR/PDS. However, city of Laguna Niguel, Mission Viejo, Laguna Hills, Lake Forest, Laguna Woods, and San Juan Capistrano representatives (Public Works Directors, Transportation Manager, and Deputy Civil Engineers) were included in the alternatives developments and discussions at Technical Advisory Meetings. Formal public hearings will be organized in the Project Report and Environmental Document phase (PA/ED).

8. ENVIRONMENTAL DETERMINATION AND ENVIRONMENTAL ISSUES

8.1 Hazardous Waste Materials

An Initial Site Assessment (ISA) was performed for this project (separately bounded and included as Attachment 3). There are no open case hazardous waste/materials sites located within the existing right-of-way. However, ten adjacent properties were considered to be Recognized Environmental Conditions (RECs), as there is a potential that the soil and groundwater may be impacted by migration of petroleum products releases and Volatile Organic Compounds (VOCs) based on their relatively close distance to the project location. A REC is defined as the "presence or likely

presence of any hazardous substance or petroleum product on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property," (ASTM 1527-05, 2005).

There are several adjoining properties that may need to be partially acquired and two properties that may need to be fully acquired. Of the potential acquisition properties, five potential properties are considered to be RECs (the first two may be subject to full acquisition, and the last three may be subject to partial acquisition):

- Shell Gas Station (former Texaco), 28681 Marguerite Parkway, Mission Viejo
- Avery Station (former Exxon), 28692 Camino Capistrano, Laguna Niguel
- Shell Oil, 28662 Camino Capistrano, Laguna Niguel
- Arco #1956, 26001 La Paz Road, Mission Viejo
- Mobil #18-HL8, 26051 La Paz Road, Mission Viejo

All five open case sites of the adjoining properties are located adjacent to the I-5 on the following streets: Marguerite Parkway, Camino Capistrano, and La Paz Road. All of the sites are related to gas stations containing underground storage tanks (USTs) and/or groundwater contamination with diesel, gasoline, and/or perchloroethylene (PCE). Additionally, a partial take of a narrow zone along the La Paz Road and Cabot Road was proposed as part of Alternatives 2 and 3. The site is a closed Leaking Underground Storage Tank (LUST) and does not currently represent a REC. The need for soil and groundwater sampling in the areas of these properties should be assessed on a case by case basis, once the final design of the project is completed, and the location of the proposed construction is determined.

The ten REC properties also potentially impact five structures proposed for improvement including: El Toro Road UC widening, Alicia Parkway OC replacement, La Paz Roadway UC widening, Oso Parkway OC replacement, and Avery Parkway UC widening.

There are approximately ten bridges within the project study area that may require improvements to accommodate the additional freeway lanes. Asbestos containing materials (ACM) and lead-based paint (LBP) were commonly used as custom building materials for bridges. The use of asbestos in many building products was banned by the U.S. EPA in 1977; however, many asbestos-containing product categories not previously banned may still be in use today. All structures that would be demolished as part of construction shall require an evaluation for the presence of ACM and LBP prior to demolition.

Additional ISA work, including aerielly-deposited lead (ADL) sampling will be required when the project limits are refined during PA/ED. During PA/ED, the ISA will be updated to determine if new leaks/spills have affected the project area. While not anticipated, Preliminary Site Investigations (PSIs) will be conducted for hazardous waste sites that may have resulted in surface, subsurface or groundwater contamination within the project area. Mitigation will be identified as part of the ISA, as well as any required follow-up studies.

A review of the ADL study performed in 2008 for the proposed I-5 Freeway improvements at La Paz Road showed that based on the testing for ADL, the soil from embankments at La Paz Road are considered HW, and should be disposed to a Class I facility. The entire Site route was in use as a freeway since early 60s. Based on the results of the ADL study of the portion of the Site and Site's frequent usage since 1960s it should be assumed that near surface soil in the unpaved areas of the entire Site route are impacted by ADL.

Areas with no vegetation, where herbicides were used as part of the Caltrans landscaping maintenance program, were observed along the Site shoulders during the Site visit. Herbicide residues may be found in the shallow soil in trace concentrations. These are not likely to represent a risk to human health but must be considered a recognized environmental condition as the soil with such trace concentrations would be considered impacted.

A standard white striping was observed on the Site southbound and northbound shoulders and yellow striping on the HOV lanes during Site visit. Based on the history of previous use of LBP for striping of freeways it should be assumed that the freeway striping may contain an LBP.

Regarding the existing traffic stripes removal and especially the yellow stripe removal, it is recommended to use Standard Special Provision (SSP) 15-300 which addresses yellow stripe removal. Yellow stripe removal activity will require critical construction site "Best Management Practices" (BMPs) developed in the PS&E stage.

Soil sampling would be conducted prior to construction for lead investigation for ADL in unpaved locations within the project limits, if these areas have not been previously tested. The analytical results of the soil sampling will determine the appropriate handling of the soil and disposal of surplus materials. Any yellow traffic striping and pavement marking materials should be tested and removed prior to and during construction in accordance with the Caltrans Construction Manual (Chapter 7-106).

Based on preliminary right-of-way acquisition determinations and engineering designs for the build alternatives, both Build Alternatives 2 and 3 would have similar impacts

8.2 NPDES Permit Compliance/Water Quality

The project is located in two separate hydrologic areas – the Laguna hydrologic area and the Mission Viejo hydrologic area both within the San Diego Region 9 Basin. The hydrologic areas and corresponding receiving water bodies are described below.

8.2.1 Receiving Water Bodies: San Diego Region 9 :

Aliso Creek : Part of the project is located in the Laguna hydrologic area, sub-area 901.13 (Aliso), and drains to the San Juan Creek watershed. Locally, the project area vicinity ultimate drainage is conveyed through an MS4 facility prior to discharging into Aliso Creek. Aliso Creek is located within the project vicinity, crossing beneath the I-5 freeway between Alicia Parkway and Los Alisos Boulevard. The creek drains into the Pacific Ocean.

Aliso Creek is included on the 2006 303(d) List. The pollutants of concern for Aliso Creek are indicator bacteria [2005], phosphorus [2019], and toxicity [2019]. The source for these pollutants is nonpoint, unknown, and/or urban runoff and storm sewers.

TMDLs for indicator bacteria, phosphorus, and toxicity are required for Aliso Creek. Phosphorus is a targeted design constituent.

Oso Creek: Part of the project is located in the Mission Viejo hydrologic area, sub-area 901.21 (Oso), and drains to the San Juan Creek watershed. Locally, the project area vicinity drainage is conveyed through an MS4 facility prior to discharging into Oso Creek. Oso Creek is located within the project vicinity, crossing beneath the I-5 freeway between Crown Valley Parkway and Oso Drive. After crossing the freeway, Oso Creek runs south, parallel and adjacent to the I-5 and changes to a concrete channel near the SR-73 interchange. Oso Creek is a soft-bottom channel.

Oso Creek is included on the 2006 303(d) List. The pollutants of concern for Oso Creek are chloride [2019], sulfates [2019], and total dissolved solids [2019]. The source for these pollutants is unknown.

TMDLs for chloride, sulfates, and total dissolved solids are required for Oso Creek in the vicinity of the Mission Viejo Golf Course. That area includes where Oso Creek crosses below the I-5 freeway.

Both Aliso and Oso Creek channels' 100-year floodplains have been studied by the Federal Emergency Management Agency (FEMA) and the results are published on their February 18, 2004 Flood Insurance Rate Maps (FIRM) Panel Numbers 06059C0427H and 06059C0433H. The FIRM panels show the 100-year floodplain is contained within the banks of the natural creeks. Therefore, the project would need to maintain existing capacities of the creeks in order to preserve stream morphology.

8.2.2 Project design considerations:

- **Climate:** The project is located in the southern portion of the Orange County which is generally characterized by hot, dry summers and cool wet winters followed and preceded by warm spring and fall seasons. The temperature ranges between 44 and 77 degrees during the months of November through April. During the months of May through November the temperature ranges between 54 and 86 degrees. The average rainfall in the region is 13.8 – 14.3 inches, with wide annual variations and most of the precipitation falling between the months of November and April. Rainfall intensities vary from 0.9 to 1.45 inches for a storm event of one-hour duration ranging between 10-year and 100-year return periods. According to the Caltrans Project Planning and Design Guide, the rainfall intensity for calculation of water quality flow from areas discharging to flow-based BMPs is 0.2” per hour.
- **Floodplain:** The project is located in two separate hydrologic areas—the Laguna hydrologic area and the Mission Viejo hydrologic area both within the San Diego Region 9 Basin. The hydrologic areas and two receiving water bodies are Aliso and Oso Creeks located within the project area. Both channels' 100-year floodplains have been studied by the Federal Emergency Management Agency (FEMA) and the results are published on their February 18, 2004 Flood Insurance Rate Maps (FIRM) Panel Numbers 06059C0427H and 06059C0433H. The FIRM panels show the 100-year floodplain is contained within the banks of the natural

creeks. Therefore, the project would need to maintain existing capacities of the creeks in order to preserve stream morphology.

- **Noise:** The project is a Type I project as defined by 23 CFR 772 and the Traffic Noise Analysis Protocol because it would increase the number of through-traffic lanes. Major noise sources within the project area are vehicle traffic along the existing I-5. Secondary noise sources include vehicle traffic along the major arterials in the project area. Alternatives 2 and 3 may shift travel lanes closer to noise-sensitive receptors, which may increase noise levels. Residential and other noise-sensitive land uses located near the project may be exposed to higher noise levels as a result of the proposed improvements. Sound walls occur along the existing corridor.

A Noise Study Report (NSR) would be required in accordance with Caltrans and federal policies. The NSR would characterize the existing noise environment and estimate the increase in noise levels at noise-sensitive land uses resulting from the project. The NSR will conclude whether the project will result in predicted traffic noise levels that approach or exceed the noise abatement criteria, specified in 23 CFR 772. Abatement measures (typically, soundwalls) may be necessary to comply with state and federal noise guidelines. In addition, if the project construction involves pile driving, structure demolition, blasting, etc., the NSR will also need to consider land uses or activities which may be affected by construction noise and determine the measures which are needed in the plans and specifications to minimize or eliminate adverse construction noise impacts to the community.

A detail noise analysis will be performed during the environmental phase of the project (PA-ED Phase).

- **Air Quality:** The project is a capacity increasing project. The project site is located in the South Coast Air Quality Management District (AQMD). An Air Quality Technical Study consistent with the most current AQMD Air Quality Analysis Guidance Handbook and Caltrans Transportation Project Level Carbon Monoxide Protocol will be prepared for this project. The study will assess the proposed projects effects on regional air quality conformity as well as potential local impacts. An analysis will be necessary to determine if emissions from construction and operation of the project will exceed AQMD levels of significance thresholds.
- **Soils, Geology Soils** within most of the project area are clay and clay loams classified by NRCS Group D and are generally characterized as having very slow infiltration rates. In order to consider any type of infiltration BMP, soil testing in the exact area would need to be completed. In addition, the Soils Maps from the Orange County Flood Control Department indicates there are some pockets of B type soils located near some of the interchanges. There are no known slope stabilization concerns.
- **Topography:** Topography of the project consists of rolling hills and drains in a southwesterly direction towards Oso and Aliso creeks.

- **303(d) list / Pollutants of Concern:** Both the San Diego Creek and the Upper and Lower Newport Bay are included on the 2006 CWA Section 303(d) List of Water Quality Limited Segments Requiring TMDLs. Reach 1 of the San Diego Creek is listed for Total Maximum Daily Loads (TMDLs) for Nitrogen and Selenium. In addition to these contaminants, the Office of Water Programs from CSU Sacramento has identified nutrients, pesticides, and sedimentation/siltation. Pollutant potential sources for the San Diego Creek Reach 1 include sources unknown, urban runoff/storm sewers, and unknown nonpoint sources. Upper Newport Bay is listed on the 2006 CWA Section 303(d) List for Chlordane, Copper, DDT, Metals, PCBs, and Sediment Toxicity. In addition to these contaminants, CSU also identifies metals, nutrients, pathogens, pesticides, and sediment toxicity. Lower Newport Bay is listed on the 2006 CWA Section 303(d) List for chlordane, copper, DDT, PCBs, and sediment toxicity. CSU also identifies nutrients, pathogens, pesticides, and sediment toxicity. Pollutant potential sources for the Newport Bay include sources unknown, agriculture, unknown non-point, contaminated sediments, urban runoff/storm sewers, construction/land development, and erosion/siltation, channel erosion.
- **401 Water Quality Certification:** It is likely that a Section 401 Water Quality Certification will be needed; however, this will be verified during the environmental work in the upcoming PA/ED phase.
- **SRWQCB Special Requirements/Concerns:** The project is located within the San Diego Regional Water Quality Control Board (Region 9). It is not known at this time if special requirements for this project are required by the RWQCB.

 - The rainy season within the San Diego R9-WQCB is October 1 through April 30.
 - Soil stabilization and sediment control shall be provided throughout the rainy season.
 - Year round implementation of pollution prevention practices shall include wind erosion control, tracking control, non-storm water management and good housekeeping practices.
- **Local Agency Requirements/Concerns:** No seasonal construction or construction exclusion dates restrictions are anticipated from the local, state, or federal agencies. However, construction windows for vegetation clearing between September 15 and February 28 may be required to prevent impacts to migratory birds.
- **Groundwater:** Groundwater Data Summary (per Caltrans Log of Test Borings As-built records)

Location	FS	GWS	Depth	Date	Comments	Max Depth of boring
405/5 Separation			0	October-85	No groundwater encountered	39.8
Bake Pkwy	266.5	213	53.5	November-90		52
	260	218	42	December-90		42

Table 40
Groundwater Data Summary

Location	FS	GWS	Depth	Date	Comments	Max Depth of boring
	276.5	219	57.5	December-90		57.5
El Toro Rd.	381	337	44	February-92		
Los Alisos Rd.	384.4	345.8	38.6	August-81		
Aliso Creek	367	346	21	February-92		
	365	335	30	February-92		
	346	333	13	November-94		
	344	332	12	November-94		
		334.3	0	March-55		
		332.8	0	March-55		
Alicia Pkwy			0	January-71	No groundwater encountered	37
La Paz Rd.	398	357	41	February-92		
	400	362	38	February-92		
Oso Pkwy			0	January-68	No groundwater encountered	40
Crown Valley Pkwy	300.2	271.1	29.1	April-78		
Avery Pkwy	250	225.5	24.5	February-92		
	250	220	30	February-92		
		223	0	January-63		
		224	0	January-63		

- **Right-of-way Relocation or Staging Area:** Project construction will occur within the existing state right-of-way and the additional right-of-way acquired, dependent on the alternative selected. Alternative 1 will not require any additional right-of-way. Alternatives 2 and 3 will require additional right-of-way as shown in Exhibits E and F at some locations.. Temporary construction easements (TCE) will be required for Alternatives 2 and 3.No staging areas will be located outside of the right-of-way therefore; no BMPs for these types of activities are anticipated.
- **Slope Stabilization:** Unstable soils formations are not expected to be encountered and therefore, slope stabilization concerns do not affect this project. Slope stabilization, however, will be required during the rainy season.
- **Aerially-deposited lead (ADL):** Sampling for ADL will be performed during PA/ED. Reuse of contaminated soil will be addressed at that time. A review of the ADL study performed in 2008 for the proposed I-5 freeway improvements at La Paz Road showed that based on the testing for ADL, the soil from embankments at La Paz Road are considered hazardous waste, and should be disposed to a Class I facility. The entire project site was in use as a freeway

since early 60s. Based on the results of the ADL study of the portion of the site and frequent usage since the 1960s it should be assumed that near surface soil in the unpaved areas of the entire project site are impacted by ADL. Sampling for ADL will be performed during PA/ED. Re-use of any contaminated soils will be considered at that time. ADL is anticipated to be encountered, however level of ADL concentration will not be known until actual testing and sampling has been completed.

- **Right-of-way Costs for BMPs:** There are no known or observed treatment BMPs located within the project limits. At this time, it is not expected that additional right-of-way is required for design pollution or treatment BMPs; however, if additional right-of-way is required the estimated unit cost is approximately \$30 per square foot. The cost of storm water pollution prevention control has been included in the construction cost estimate.
- **Local Land Use within Project Area and Adjacent Area:** The surrounding land use is primarily residential and commercial. There are some locations of light industrial, parks, schools, golf course, and vacant land. There are some locations where a local frontage road is adjacent to the mainline.
- **Dry Weather Flows:** Dry weather flows are not persistent within the project segment.

8.2.3 Measures for avoiding or reducing potential storm water impacts:

The project consists of widening and modifications to an existing facility and as such, relocation or realignment to avoid impact to receiving waters is not considered feasible due to prohibitive construction costs. Improvements in or close to the existing drainage channels shall be staged such that construction does not occur during the rainy season, thereby, reducing the construction impacts and reducing work in live streams.

- Modifications to existing slopes will be minimized to the extent possible. The existing slopes will be modified for new ramp alignments and the new auxiliary or GP lanes. Cut and fill areas will be minimized to reduce slope lengths. Retaining walls will be incorporated into the design to shorten slopes and reduce the right-of-way needs. Further evaluation will be required to minimize wall length while maximizing the benefits to the slope extents. It is anticipated that proposed slopes will be no steeper than the existing (pre-construction) slopes (2:1) and when possible flattened to 4:1 to facilitate re-vegetation. Additionally, the slopes will be rounded and shaped to limit erosion.
- During the rainy season, disturbance areas will be limited as much as possible and temporary erosion control measures will be installed. Permanent treatment BMPs, specifically infiltration basins, will be constructed early in the construction process and used to minimize construction storm water impacts. This project will implement appropriate measures within the constraints of the design process to avoid or reduce potential storm water impacts. To the extent feasible, the BMPs will be designed to allow ease of maintenance. There are no known or observed existing treatments BMPs within the project limits.

8.3 Environmental Status

The Preliminary Environmental Analysis Report (PEAR), as shown in Exhibit K, provides the initial environmental evaluation of a project and all feasible alternatives before it is programmed in the State Transportation Improvement Program (STIP) or State Highway Operation and Protection Program (SHOPP).

OCTA is the project sponsor. Caltrans would be the lead agency and provide oversight under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) (under the NEPA authority assigned to Caltrans by the US Department of Transportation in Memorandum of Understanding 6004 and 6005 [effective July 1, 2007]).

The PEAR concludes that an Initial Study /Mitigated Negative Declaration (IS/MND) would be the appropriate level of environmental documentation under CEQA and an Environmental Assessment / Finding of No Significant Impact (EA/FONSI) would be the appropriate level of environmental documentation under NEPA. The anticipated environmental compliance time frame is 18 to 24 months.

The findings of the environmental technical studies to be prepared during PA/ED will determine the level of environmental documentation that is required for CEQA/NEPA compliance. However, findings of the environmental technical studies during PA/ED could require the need to elevate the level of CEQA and/or NEPA documentation.

8.3.1 Technical Studies:

The following technical reports are anticipated to be required for the environmental documentation of this project:

- Draft Relocation Impact Report
- Community Impact Assessment
- Visual Impact Assessment
- Air Quality Technical Study
- Noise Study Report
- Traffic Operation Analysis Report
- Cultural Resources Studies (Historic Property Survey Report, Archaeological Survey Report, Historic Resources Evaluation Report)
- Initial Site Assessment (being prepared as part of the PSR)
- Natural Environment Study-Minimal Impact (including biological survey for presence of birds, bats, and other protected species and pre-construction bird survey if removal of vegetation during nesting season conducted)
- Jurisdictional Delineation Report
- Water Quality Assessment Report
- Floodplain Evaluation
- Geotechnical (Soil & Water) Assessment

8.4 Special Considerations

The following is a brief summary of the special considerations that may affect project delivery:

- Surveys for sensitive biological species would need to be conducted at the appropriate time.

- Construction windows for vegetation clearing between September 15 and February 28 may be required to prevent impacts to migratory birds. Focused surveys for Southwestern Pond Turtle, California Gnatcatcher, Least Bell's Vireo, Arroyo Chub, and salmonids may be required to determine presence.
- If the project requires removal of vegetation during nesting season (March 1–September 15), then a pre-construction bird survey would be required. If nesting birds are found, it may be necessary to delay removal of suitable vegetation until the birds have fledged.
- A number of permits (described below) would be necessary for the construction of the proposed project.
- The project schedule could be impacted due to full right-of-way acquisitions, and possible railroad right-of-way impacts.

8.5 Permits

The following discussion outlines the anticipated resource/regulatory agency permits required for construction of the proposed project:

8.5.1 Water Quality permits

The project must conform to all applicable water quality regulations and/or permit requirements of the State Water Resources Control Board(s) (SWRCB) and the San Diego Regional Water Quality Control Board (SARWQCB), including but not limited to:

- Caltrans National Pollutant Discharge Elimination System (NPDES) Permit (Order No. 99-06-DWQ, NPDES No. CAS000003)
- Caltrans Statewide Storm Water Management Plan (SWMP), May 2003 and any subsequent revisions
- General Construction Permit (Order No. 99-08-DWQ, NPDES No. CAS000002)
- Storm Water Pollution Prevention Plan (SWPPP)

8.5.2 U.S. Army Corps of Engineers Section 404 Permit

If the project involves the discharge of fill into or alterations of the Aliso Creek, Oso Creek, Trabuco Creek and / or small, unnamed concrete ditches, a Nationwide Permit from the US Army Corps of Engineers (Corps) may be required. If the project involves the discharge of fill in these channels in excess of 0.2 hectare (0.5 acre), it would require an individual permit from the Corps.

8.5.3 California Department of Fish and Game Streambed Alteration 1602 Agreement

If the California Department of Fish and Game (CDFG) determines that the project could substantially affect an existing fish and wildlife resource, such as Aliso Creek, Oso Creek, and Trabuco Creek, a Streambed Alteration Agreement is required.

8.5.4 Regional Water Quality Control Board Section 401 Certification

The project is located within the jurisdiction of the San Diego Regional Water Quality Control Board. If the project could result in any discharge into navigable waters, a certification from the State must be provided to the licensing or permitting agency which shall include where the

discharge originates or will originate. Any such discharge must comply with all applicable provisions of this title.

8.5.5 U.S. Fish and Wildlife Service (USFWS), Section 7 - Federal Endangered Species Act.

If impacts to Federal listed sensitive species will occur, then consultation with the USFWS and a Biological Opinion (BO) may be required. A BO is a written document with the agency’s opinion that the issuance of the permit is not likely to jeopardize any protected plant or animal species.

8.5.6 CDFG, Section 2080.1 or 2081(b) of the California Fish and Game Code per compliance with the California Endangered Species Act (Incidental Take Permit).

If impacts to sensitive species will occur, then an Incidental Take Permit from the CDFG for state-only listed species may need to be obtained under Section 2081(b) of the California Fish and Game Code (CFG). If the species is both federal and state-listed, compliance with the Federal Endangered Species Act may satisfy the California Endangered Species Act if the CDFG determines that the incidental take authorization is “consistent” under Section 2080.1 of the

9. FUNDING

The proposed project is currently funded with an estimated \$400 million as part of the Renewed Measure M (local half-cent sales tax) freeway program. The Renewed Measure M program was reauthorized by the Orange County voters in November 2006, and it is set to begin in 2011 and sunsets in 2041. The original Measure M was passed in 1990 by Orange County voters to fund a 20-year program of transportation improvements. Measure M allocates all sales tax revenues to specific Orange County transportation improvement projects in three major areas—freeways, streets, roads, and transit.

The project will also seek federal and other additional funding sources. A draft cooperative agreement outlining the roles and responsibilities of OCTA and Caltrans will be prepared in the PA/ED phase.

This project will be a candidate for programming PA/ED capital outlay support only in the 2010/2011 State Transportation Improvement Program (STIP). Table 41 below shows a summary of the approximate capital and support costs for this project.

Table 41 Capital Outlay Estimate			
Alternative	Capital Construction Cost*	Right-of-way Cost	Total Project Cost
1	\$0.0	\$0.0	\$0.0
2	\$279,776,760	\$73,042,970	\$352,820,000
3	\$342,800,000	\$113,723,100	\$456,523,000
*Capital Construction Cost = Roadway Items Cost + Structure Items Cost			

The accuracy of the capital cost estimates is useful for long-range planning purposes only. The capital costs should not be used to program or commit capital funds. The Project Report will be the document that provides suitable estimates for programming the capital components of the project.

Table 42		
Capital Outlay Support Estimate for PA/ED		
Fiscal Year	OCTA PYs/\$s	
	PY's	\$'s
2011- 2012	8.2	3,300,000
2012-2013	8.2	3,300,000

10. SCHEDULE

The following tentative milestone schedule has been identified for preparation of preliminary engineering, environmental studies, and proposed design and construction documents for this project. Only the PA/ED milestone is to be used for programming commitments. All other milestones are used to indicate relative time frames for planning purposes.

OCTA will manage the PA/ED and Caltrans will provide oversight for the PA/ED. It is recommended that the project alternatives identified in the Alternatives section of this PSR/PDS be carried forward into the PA/ED phase for additional studies. Alternatives may be added or revised during the PA/ED phase as more information becomes available.

Table 43	
Tentative Project Schedule	
Milestone Schedule	Completion Date
Begin PSR/PDS	January 2009
Complete PSR/PDS	January 2011
Begin PA/ED (24 months)	September 2011
Public Hearing (3 months)	September 2012
Final PA/ED	September 2013
Begin PS&E	October 2013
End PS&E (24 months)	October 2015
Right-of-way certification (12 months)	March 2014 to March 2015
Ready to list (4 months)	March 2016
Advertisement and contract award (6 months)	July 2016
Begin construction (24 months)	January 2017
Construction Completion	January 2019

11. FHWA COORDINATION

The proposed project would qualify under the Mobility Improvement Project category. Therefore, per the Federal Highway Administration (FHWA)/Caltrans stewardship agreement of December 2002, this project is a State Authorized project with review and oversight responsibilities delegated to Caltrans.

This project has sufficient funding available at the time of the circulation and approval of the environmental document to allow for the inclusion of the fully funded preferred alternative under Renewed Measure M by OCTA.

12. PROGRAMMING RECOMMENDATION

12.1 Conclusion

Based on field observations during the peak periods and the traffic analysis performed for this project, there is a definite need to relieve congestion and improve operational efficiency on I-5 from SR-73 to I-405. During the peak periods, both directions of the freeway have varying levels of congestion during the periods of 5:00 A.M. through 9:00 A.M. and 3:00 P.M. through 7:00 P.M. Congested conditions are particularly heavy in the NB direction of travel during the AM peak period and in the SB direction of travel during the PM peak period. As growth continues in the Southern California region, the I-5 corridor will become increasingly more congested unless capacity enhancements are made.

By constructing capacity in both directions of travel within the project area, it is anticipated that traffic delays can be reduced significantly. In addition to reducing congestion on I-5, the project alternative is expected to reduce the amount of traffic using parallel arterials. The OCTAM traffic demand model forecasts that between 2007 and 2040 an increase in traffic demand on the order of 500 to 750 vehicles per hour will occur during AM and PM peak hours. Since I-5 is already heavily congested, a significant amount of this traffic demand would likely shift to local roads; thereby, diminishing the traffic operations and increasing traveler delay along local arterials.

As indicated in the Baseline Project analysis, the parallel arterials will be built-out by 2040 and no practical improvements could be implemented to reduce traffic congestion along these arterials. For this reason, any operational improvements made along I-5 will be beneficial to the parallel arterials.

Based on our analysis, Alternatives 2 and 3 will enhance the capacity of the freeway and highly improve operations for both HOV lanes and auxiliary lanes.

12.2 Future Improvements at Existing Interchanges

OCTA, in partnership with Caltrans has programmed La Paz Road and Avery Parkway Undercrossings as identified "Project D" under Measure M2 to reduce traffic congestion along I-5 corridor. This project will improve traffic operations by modifying the existing interchange configurations to reduce congestion from/to local arterials to the I-5 freeway. The El Toro interchange will be studied in a separate PID and PA-ED phases and a future determination for inclusion of this interchange improvement will be developed during the PS&E phase.

13. DISTRICT CONTACT

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LIST OF EXHIBITS

EXHIBIT A: Project Location Map

EXHIBIT B: Alternatives Schematic

EXHIBIT C: Strip Map

EXHIBIT D: Typical Cross Sections – Alternative 2 (One Lane Widening)

EXHIBIT E: Alternative 2: Key Map and Layouts

EXHIBIT F: Alternative 3: Key Map and Layouts

EXHIBIT G: General Utilities Conflict Plan

EXHIBIT H: Project Cost Estimate Summary (Alt 2 and 3)

EXHIBIT I: Right of Way Data Sheet

EXHIBIT J: Non-Standard Design Features List

EXHIBIT K: Preliminary Environmental Analysis Report (PEAR)

EXHIBIT L: Initial Site Assessment (ISA) Checklist

EXHIBIT M: Storm Water Data Report Cover

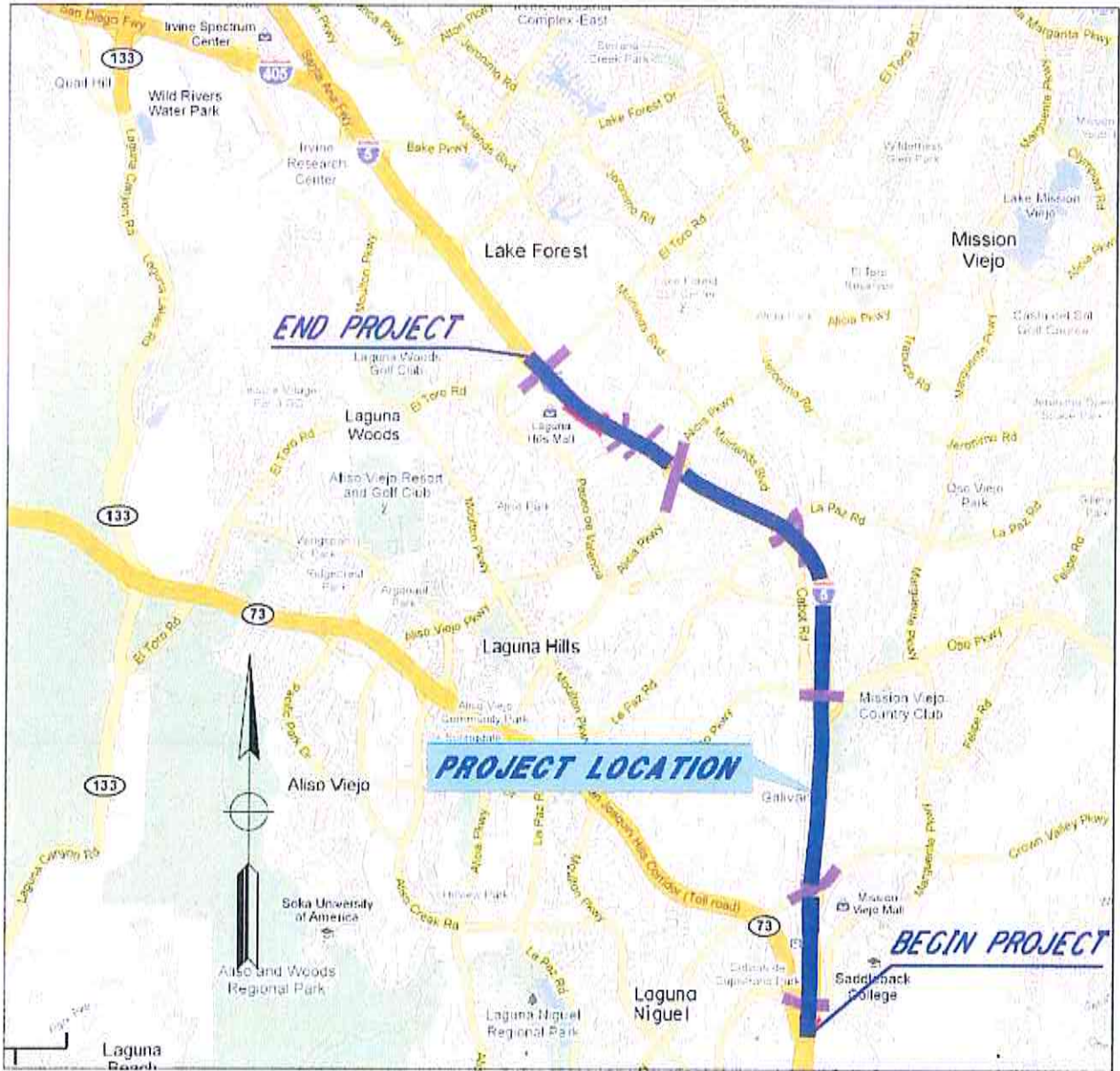
LIST OF ATTACHMENTS (SEPARATELY BOUND REPORT)

- Traffic Operations Analysis Report (Includes CD)
- Initial Site Assessment (ISA)
- Storm Water Data Report (SWDR)

12-ORA- 005
PM 12.4 to PM 18.9
A OK020K- EFIS 1200000318
December 2010

EXHIBIT A

Project Location Map



PROJECT LOCATION MAP

On Interstate 5 (I-5) from PM 12.4 to PM 18.9
From SR-73 to El Toro Interchange in Orange County